12th International HCH and Pesticides Forum
6-8 November, 2013, Kiev, Ukraine

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12th International HCH and Pesticides Forum

12th Forum 10 years after the 7th forum in Kiev: what has been achieved in a decade in Ukraine – what is Ukraine's role for the other EECCA countries

6-8 November, 2013, Kiev, Ukraine

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- Ministry of Agrarian Policy and Food of Ukraine
- Institute of Geochemistry of Environment (National Academy of Science of Ukraine)
- ECOINTOX (Medved Institute), Ukraine
- S.I. Group Consort, Israel
- FAO
- Federal Environment Agency of Germany (UBA)
- Free University of Berlin, Germany
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- GreenTox, Switzerland
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- POPs Environmental Consulting, Germany
- Ramboll, Denmark
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- GEF-UNEP-WHO Project “Demonstrating and Scaling-up of Sustainable Alternatives to DDT in Vector Management Global Programme“
- SI Group Consort Ltd., Israel
- FAO
- Federal Environment Agency of Germany (UBA)
- FREE University of Berlin, Germany
- GreenTox, Switzerland
- SAVA, Germany
- TREDI, France
- Veolia, United Kingdom
- POLYECO S.A., Greece
- PortService, Poland

Introduction

This booklet summarizes the outcomes of the 12th International HCH and Pesticides Forum held in Kiev, Ukraine, 6-8th November 2013.

It presents the background for the Forum and the Forum Declaration, which was read out and fully endorsed by all participants.

Furthermore, the booklet contains important statements from the Minister of Ecology and Natural Resources of the Ukraine, Mr. Oleg Proskuryakov, the Minister of Environment of the Republic of Moldova Mr. Gheorghe Şalaru, the European Commissioner to the Environment Mr. Janez Potočnik , and the State Secretary on Health Protection of Slovenia, Ms. Brigita Čokl, who all addressed the Forum and emphasised the urgency of finding proper solutions to the elimination of obsolete pesticides in the region.

We trust that this report can contribute to
the efforts of the authorities to develop better
policies and strategies to the obsolete pesticides issues, their impacts on public health, the ecosystem and the National Economies and to promote continued and accelerated action.

For more information on the subject, please visit our website on www.ihpa.info.

Forum Sponsors

The International HCH and Pesticides Forum in Kiev was sponsored by:

the European Union through the project “Improving capacities to eliminate and prevent recurrence of obsolete pesticides as a model for tackling unused hazardous chemicals in the former Soviet Union”, FAO, the GEF-UNEP- WHO Project “Demonstrating and Scaling-up of Sustainable Alternatives to DDT in Vector Management Global Programme”, GreenTox, Switzerland, SI Group Consort Ltd., Israel

EDL, New Zealand, Federal Environment Agency of Germany (UBA), Free University of Berlin, Germany, POLYECO S.A., Greece, PortService, Poland, SAVA, Germany, TREDI, France, Veolia, United Kingdom.

IHPA is grateful for the support given from all companies and organisations. Your support facilitated the 12th Forum in Kiev. This enabled easy access for Regional experts to travel to Kiev and to particpate in the discussions. Thank you all.

The 12th International HCH and Pesticides Forum

The 12th International HCH and Pesticides Forum created a platform for discussing the national and regional strategies, action plans and financial resources for elimination of obsolete pesticides with a special focus on the need for accelerated action. Valuable scientific results and best practices were exchanged; and the progress in the Ukraine was showcased, emphasizing the importance of Government determination and focus.

On November 6 – 8th the 12th Forum on HCH and Pesticides Forum was held in Kiev, Ukraine with participation of more than 220 experts from more than 40 countries.

The 12th Forum brought together governments, international financing institutions, UN agencies, representatives from EU institutions, IGOs, NGOs, academia and the private sector for further exchange of information and possible cooperation among countries, experts, institutions and donors. The Forum was initiated and enabled by the International HCH and Pesticides Association (IHPA) in order to follow up on the progress since the 11th Forum in Gabala, Republic of Azerbaijan in 2011.

The Forum was hosted by the Ministry of Ecology & Natural Resources of the Ukraine, and the participants expressed their gratitude to the Ministry for its hospitality and generous contribution in organizing this Forum.

The sessions during the Forum were launched by high-level discussions on framework conditions and followed by various thematic technical sessions. At the high level session three panel discussions were organised; a political panel discussion, a panel discussion with industry and private investors representatives; and a panel discussion with representatives of the most important International Financing Institutions (IFIs).

High-level discussions

The political session included a statement by the Minister of Environment of the Republic of Moldova, Mr. Gheorghe Șalaru, as well as positions from the EU Delegation in Ukraine, Mr. Jean-Francois Moret and the Vice-Chair of the Committee on the Environment, Public Health and Food Safety of the European Parliament, Mr. Dan Jørgensen. They all expressed their political commitment and stated their support for further action.

In the industrial session, the representatives included Mr. Ilya Marchewsky from SI Group Israel, Chairman, Mr. Thomas Vandenbrouque from Tredi International, Mr. Jean-Francois Nogrette, Veolia and CEO of SARP Industries group. The participants discussed barriers and potentials. They expressed their willingness for investment in regional facilities and clean up technologies and stressed the need for a clear legal framework and political will to ensure a regulated and transparent market for obsolete pesticides (and other hazardous waste) treatment and elimination.

The last panel discussion focussed on the role of the major IFIs. Their representatives included Mr. Ibrahima Sow from the GEF, Dr. Kevin Helps from FAO and Dr. David Piper from UNEP. All representatives ensured the availability of support to well-prepared and Government supported projects.

The High-level discussion was followed by thematic technical sessions including all key issues related to Persistent Organic Pollutants and their impact on human health, the ecosystem and economy, including the consequences of non-action. Among others, IHPA launched a new approach to quantifying the socio-economic damages and losses, and will with this approach work for a more comprehensive assessment of the impacts from obsolete pesticides. It is expected that the outcomes of this approach will also make the international community better aware of the huge economic effects and will lead to both acceleration and a higher level of ambition to eradicate obsolete pesticides.

It is time to accelerate action

By John Vijgen, Director IHPA

For decades obsolete pesticides have contaminated the soil and water destroying natural resources with large consequences for human health, ecosystems and national economies.
The adoption of the Stockholm Convention in 2001 was an important step in the direction towards a pesticide free future. However, after more than ten years with the Stockholm convention, initiatives to eliminate stocks in EECCA-region have turned out to develop slowly, amongst other due to lack of technical capacity and funding.

Non-action is too expensive

Our collective effort has proven to be too slim and too uncoordinated to mitigate the growing pollution caused by obsolete pesticides.

Today we still see persistent organic pollutants migrating into the environment, and that problems we thought were contained, have grown 20-30 times or more of the original extent. Economic losses of an export ban caused by pesticide residuals in food are measured in billions of euros. It is obvious that clean up is more cost-effective.

Signs of improvements in EECCA-region

However, important initiatives in obsolete pesticides elimination have been taken.

When looking at the region, Ukraine, Belarus and Moldova stand out in their determination to advance. But also other countries make progress. Russia has recently ratified the Stockholm Convention, technical capacities have been built in Azerbaijan and collection and long-term storage of obsolete pesticides have taken place in Turkmenistan. Moldova and Azerbaijan have started to conduct detailed mapping of obsolete pesticides in soil and water in areas where pesticides previously have been stored.

Much more should be done to combat further spreading of persistent organic pollutants into the environment.

Damages and Losses

To support national governments, IHPA proposes a new approach that combines identification of damages and quantification of the economic losses of non-action.

The ‘damages and losses’ methodology assesses the cost of different types of damages, including increased illness, loss of life, failing ecosystem services and polluted agricultural products.

This new approach ensures transparency in decision-making, and will enable benchmarking and accelerate private sector investment in the required environmental infrastructure.

Outlook - upcoming tasks

Building on the 12th Forum declaration there is a crucial need in the years to come for all EECCA-governments to prioritize obsolete pesticides at national level and to prepare clear plans for obsolete pesticides elimination, including appropriate policies and legal enforcement.

The ongoing EU financed FAO project on 'Improving capacities to eliminate and prevent recurrence of obsolete pesticides as a model for tackling unused hazardous chemicals in the former Soviet Union' is a new milestone as it addresses as well management of obsolete pesticides as sustainable agriculture production practices. This project is a beacon and its implementation should be ensured and followed up in all countries.

Only by building destruction capacities in the Region, the countries will be able to manage the elimination of obsolete pesticides themselves. This is therefore an important priority – a MUST!

The European Union, international agencies and financing institutions therefore also play a pivotal role in supporting, assisting and accelerating clean up initiatives planned and taken by national governments.

And continuation of awareness raising and capacity building is a pre-condition for success.

The next Forum is planned to take place in Aragon (Spain) in 2015.

I am looking forward to seeing you there.

It is simply time to accelerate action!

8 November 2013

FORUM DECLARATION

12th International HCH and Pesticides Forum Kiev, Ukraine
6-8 November 2013

The International HCH and Pesticides Forum having met at Kiev from 6-8 November 2013, has taken note of the overall slow progress of elimination of obsolete pesticides, its negative impact on countries socio-economic performance, its severe adverse effects on health and quality of life, as well as its far- reaching consequences to neighbours and shared water resources.

The 12th Forum gathered more than 220 experts, who shared their knowledge and experience and expressed their continuous commitment to awareness raising and cleanup of obsolete pesticides in the EECCA-region.

Accordingly, the 12th Forum decided to call upon Governments in the region, the European Union, the international organizations, financial institutions, the local NGO's and the civil society to recognize the existence of approx. 240.000 tonnes of obsolete pesticides in the region, and the need to accelerate action and create the required policies and infrastructure to support the objectives of the Stockholm Convention on Persistent Organic Pollutants.

The following is drawn up based on the discussion and recommendations from the Forum participants.

Call upon all *National Governments* to

1. Establish an open and transparent dialogue on all levels of society, i.e. political, scientific and public level in order to recognise the damages and required actions needed for elimination of obsolete pesticides wastes.
2. Based on the above, develop and implement the required policies and legal enforcement including action plans to eliminate obsolete pesticides wastes in a sustainable manner.
3. Understand the increasing negative socio-economic and human health impacts of non-action and the associated damages and losses, and explain the urgency of the issues in international fora and in bilateral negotiation.
4. Allocate funds for awareness raising through media and education as well as to advance sustainable technologies for elimination of obsolete pesticides wastes in an environmental sound manner (SBC guideline).

5. Work with FAO to ensure the adoption of sustainable agriculture production practices in order to avoid accumulation of obsolete pesticides in the future and to ensure that natural resources such as soil and water are preserved for future generations
6. Strengthen the national environmental institutions, build capacity through training programs and ensure that existing capacities are maintained.

Calls upon the *European Union* to recognise that non-action has immediate and long-term negative consequences to the European Community and the European economy, and specifically call upon

7. The European Parliament to assist the Parliamentarians in the EECCA region in developing and implementing policies to eliminate obsolete pesticides wastes in an environmental sound manner, and to request the European Commission to make the necessary funding available.
8. The European Commission to build on the project 'Improving capacities to eliminate and prevent recurrence of obsolete pesticides as a model for tackling unused hazardous chemicals in the former Soviet Union (FAO/GCP /RER/040/EC')' and lead a regional action plan for elimination of obsolete pesticides wastes in partnership with the EU member states and the private sector; and to prevent new obsolete pesticides wastes.
9. To allocate funds for building awareness in support of NGOs, other citizens organisations and related institutions.

Call upon the *International Organisations and Financial Institutions* to

10. Enhance the capacities of the countries through coordinated technical assistance
11. Facilitate the Governments action planning especially within harmonisation for a regional approach and cooperation
12. Assist countries in assessing the damages and losses in economic terms base on an agreed methodology and in financing urgent projects
13. Allocate funds for implementation of action plans and related projects, and to question countries that are not implementing their approved national implementation plans (NIP)

Specifically call upon,

14. The GEF to continue support the elimination of Obsolete and POPs pesticides by co-funding a regional facility for the treatment of Obsolete and POPs pesticides

Call upon local NGOs and the civil society to

15. Continue their large effort in creating political pressure and raise awareness of the importance to eliminate obsolete pesticides in the environment, food cycle and human bodies and to follow-up on Government policies and assist in their implementation.

The 12th Forum recognised the effort of IHPA as an important contributor in building awareness at governments and civil society in the EECCA region, and urged the organisation to continue working towards the fulfilment of the objectives of Stockholm Convention and in bringing together scientists, industry and policy-makers of the Region.

After this declaration had been read out, the Forum participants spontaneously confirmed their dedication to the eradication of obsolete pesticides and requested IHPA to ask the addressees of this declaration to join their acts of commitment.

Kiev, 8th November 2013

Message from the Minister of Environment and Natural Resources of Ukraine O.A. Proskuryakov

SPEECH OF THE MINISTER OF ENVIRONMENT AND NATURAL RESOURCES OF UKRAINE O.A. Proskuryakov

AT THE PLENARY SESSION OF THE 12th CONFERENCE OF THE INTERNATIONAL ASSOCIATION FOR PESTICIDES AND CHLORINATED ORGANICS

On behalf of the Government of Ukraine I welcome all the participants and guests of the 12th Forum of International Association for Pesticides and Chlorinated Organics in Kyiv!

Waste management is one of the most pressing environmental challenges. This issue is also under special control of the Government of Ukraine. Therefore, finding ways of solving the problem of accumulation of obsolete pesticides and other persistent organic pollutants in Central and Eastern Europe, and other countries, is now extremely urgent for the international community and nation states.

The Ministry of Ecology and Natural Resources of Ukraine considers cooperation with international organizations, institutions and other partners in this area to be one of the preferred directions in its activity. Our absolute priority is fulfilling obligations under:

Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal;
Rotterdam Convention on the Prior Informed Consent on Certain Hazardous Chemicals and Pesticides in International Trade.
Stockholm Convention on Persistent Organic Pollutants.

Given the urgency of solving the problems in this area, the Ministry developed a draft National Waste Management Programme for the years of 2013-2020, which will soon be introduced by the Government to the Parliament of Ukraine.

The Ministry also actively works towards practical measures aimed at clearing the state territory off the places of hazardous wastes storage. The main attention is paid to the most resonant and environmentally dangerous places.

Let's see some examples and figures. Over the past three years the following was removed from Ukraine:

- mixture «Premix», which was illegally imported to the territory of Zakarpattya Region, – 1300 tons;
- obsolete pesticides – over 26 thousand tons;
- hexachlorobenzene wastes from the landfill of toxic industrial wastes in Kalush District of Ivano-Frankivsk Region – over 21 thousand tons;
- mononitrochlorobenzene wastes from the territory of the State Enterprise "Gorlovskij Chemical Plant" – over 2700 tons.
- Beryllium containing wastes from the territory of the State Scientific and Production Enterprise "Zahid" (Kyiv) – 320 tons

Implementation of these measures significantly improved the ecological status of the territories and allowed to relieve social tension among the population.

Ministry will subsequently continue carrying out these important works with wide involvement of private business.
For proper legal regulation and creation of conditions for the application of best practices in this field, we now carry out a series of activities under National Programme of Adaptation of Ukraine's Legislation to EU Laws.

For proper legal regulation and creation of conditions for the application of best practices in this field, we now carry out a series of activities under National Programme of Adaptation of Ukraine's Legislation to EU Laws.

Several draft resolutions of the Government on the implementation of the relevant European directives concerning the treatment of various types of wastes were prepared.

We also welcome the initiatives of enterprises, which impact the environment in their activity, on reducing emissions, waste generation.

The national system of governance in the field of chemical safety is based on the principles of preventive response and "polluter pays full price." This will prevent environmental degradation and reduce the negative impact of hazardous chemical contaminants on the health of the citizens of our country.

Dear Colleagues!
I am strongly convinced that only by working together and with the widest participation of representatives of academia, business and the public we can minimize the impact of modern technological civilization upon the environment and preserve our planet for future generations.

Once again I want to emphasize that our Ministry is open for new initiatives and ready to give every assistance possible.

Thank you for your attention and wish you fruitful work!

Message from the Minister of Environment of the Republic of Moldova, Gheorghe Șalaru

12th International HCH and Pesticides Forum 6-8 November 2013, Kiev, Ukraine
Gheorghe Șalaru Minister of Environment Republic of Moldova

Gheorghe Șalaru
Minister of Environment Republic of Moldova

Opening speech

Dear Colleagues,

Let me greet you, participants in the 12th International HCH and Pesticides Forum and wish you success in your noble mission to reduce and eliminate the danger faced by our countries in the last decades, due to the accumulated stocks of obsolete pesticides and other hazardous chemicals and wastes.

The 12th Forum is remarkable also for the fact that after 10 years he again is held in Kiev, and this is another important point to summarize what has been done during this time in this area and outline the prospects for the coming years.

The problem of obsolete pesticides in Moldova started to manifest itself, as in other former soviet republics, in the 70-80s of last century, in the period of intense chemicalization of agriculture. In our country, with a predominantly agricultural industry, a relatively small area and high population density (34 thousand square km and about 4 million people), this problem has taken a very large proportion. At that time Moldova imported annually up to 40 thousand tons of pesticides, unutilized balances of which were accumulating from year to year. The first attempt to solve this problem was made in the 70s, when in the south of Moldova was built a special landfill for pesticides wastes. During 12 years, until 1987, there had been buried about 4,000 tons of pesticides, including DDT and HCH. Currently, this object is guarded and under constant monitoring.

Especially acute the problem of obsolete pesticides has become in the 1990s, when as a result of changes in property relationship that have occurred in society, including in agriculture, most pesticides warehouses ownerless and began to decay. In many of them obsolete pesticides were stored. By 2000, these objects left about 350 and the quantities of pesticide waste kept in them were estimated at 1,770 tons.

To solve this problem, since 1997 several attempts have been made by the Government of Moldova, but only after special decision (No 1543), adopted in November 2002, actions began. Several ministries (Ministry of Agriculture and Food Industry, Ministry of Environment, Ministry of Defense, Emergency Situations Service) and all regional and local authorities have been involved in this work. Funds for repackaging and centralized storage of obsolete pesticides have been allocated from the state budget and from the National Environmental Fund.

At the same time, the Republic of Moldova acceded to the Stockholm Convention on Persistent Organic Pollutants, committing themselves to reduce and remove the risks associated with POPs. This fact opened up opportunities for support in addressing these issues by the international funds. Thus, all subsequent steps in this direction have been carried out on the basis of funds allocated by the government and with significant support from abroad (World Bank and the Global Environment
Fund, NATO, UNEP, OSCE, the Governments of Canada, the Netherlands, the Czech Republic etc.).

By 2008, all known stocks of obsolete pesticides were repackaged and temporarily stored in secure conditions. In 37 warehouses were stored about 3,350 tons of pesticides waste.

Simultaneously began the process of their export abroad and destruction. From 2007 to 2013, in the framework of two projects implemented by the Ministry of Environment about 1,500 tons of pesticides have been eliminated. This process continues within the five projects started this year, funded by the Czech Government, NATO, OSCE, FAO and the National Environmental Fund. As estimated, by the end of 2015 all stocks of obsolete pesticides stored in warehouses will have been removed.

These results have been made possible thanks to the constant attention drawn by the Government to address these problems, continuing support of the international organizations and governments of some developed countries, as well as to active participation in this process of involved ministries, local authorities and civil society.

At the same time, despite significant progress in addressing issues related to obsolete pesticides, there are still a lot of problems both in the region as a whole and in each country separately. Some of them require immediate actions, the other can be resolved gradually, spreading efforts and resources depending on the seriousness of the problems and priorities of each country.

For Moldova it is, first of all, the removal of stocks of pesticides stored in warehouses, and we have all the chances to complete this process by the end of 2015. After that the removal of 4,000 tons of pesticides buried in the south of the country, near the borders with Ukraine and Romania should be followed. Here we intend to work closely with our neighbors.

In parallel an extensive work on updating, development and implementation of national legislation in the field of chemical products and bring it in line with European and international standards are being conducted.

We should develop and implement a series of national programs to clean up areas contaminated by pesticides, including POP pesticides. These are mostly the former warehouses of chemicals and other objects used in the past in agriculture. Their number is about 1,600.

There are still many problems associated with other hazardous chemicals and wastes, particularly PCBs, chemical waste in scientific and university laboratories, industrial plants, etc. All these issues also need to be assessed and solved in a single package of measures on reducing the negative impact of chemicals on the environment and human health.

In this sense, the Government of the Republic of Moldova, and in particular the Ministry of Environment, will continue to make substantial efforts to achieve the goals set out in this area, and are counting on the continued support of the international community and on enhancing the regional cooperation. Also, we consider the continuation of cooperation with our partners in the country, and primarily with the central executive authorities concerned and involved in these processes – the Ministry of Agriculture, Ministry of Defense, the Ministry of Economy, as well as with district and local authorities, and civil society.

Message from the State Secretary of the Ministry of Health of the Republic of Slovenia Mrs. Brigita Čokl

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Number: 510-94/2013/33
Date: 25. 10. 2013

Subject: STATE SECRETARY'S SPEECH AT THE 12TH MEETING OF THE HCH FORUM, 6 - 8 NOVEMBER 2013

Dear participants of the 12th meeting of the HCH Forum,

I regret not being able to be with you in person, but I ensure you that my colleagues and I follow all your activities in this very important field of work.

Slovenia has been supporting the disposal of obsolete pesticides since the Intergovernmental Forum on Chemical Safety. Among its other tasks, the Forum, established in Stockholm in 1994, also strove for the disposal of obsolete chemicals and reduction of pesticide risks[1]. In the years thereafter, Slovenia followed and actively participated in activities in this field. Thus in 2000, we participated at the OECD and partners' Workshop on Obsolete Pesticides in Alexandria, Virginia[2]. The workshop discussed obsolete pesticides and other obsolete chemicals on the global level. At the workshop, Slovenia presented its efforts to manage the problem of obsolete pesticides at the national level and also established contacts with the International HCH and Pesticides Association (IHPA) and its director John Vijgen. The work of this non-governmental organization is very important, and I thus sincerely congratulate the IHPA on its persistence and current achievements.

Slovenia actively cooperates with the HCH Forum, and we also contributed two ambassadors to promote the issue of obsolete pesticides and other obsolete chemicals.

Although Slovenia succeeded in eliminating obsolete pesticides, we are aware that the problem will not be resolved merely with their disposal. On the contrary, we must strive to prevent the accumulation of such stock in the future. We are also aware that the issue has not yet been resolved in our region or globally.

[1] http://www.iisd.ca/process/chemical_management-ifcsintro.html

[2] http://www.oecd.org/chemicalsafety/pesticides-biocides/2076941.pdf

At a time when we are witnessing climate change and are faced with its consequences, such as extensive flooding, and fires due to drought, and when floods and droughts are becoming more frequent, the danger of these old burdens is even greater. Hazardous substances and their metabolites are spread over greater areas during floods and fires. These also include substances which are known to have dreadful consequences for human health and also for future generations. The endocrine disrupting chemicals to which I am referring may already be poisonous in extreme small quantities.
And what can be done? Our task is to recognize these threats, acknowledge them and speedily address their resolution. Slovenia welcomes the role of the European Commission, FAO, UNEP and others who have approached the great project in this field.

I would also like to say that Slovenia participated at the first briefing related to this issue in the European Parliament on 29 June 2010, when we presented the then new Resolution on improvement of health through sound management of obsolete pesticides and other obsolete chemicals. At a Slovenian initiative, the Resolution was adopted at the 63rd meeting of the General Assembly of the World Health Organization, on 10 May 2010 in Geneva. This Resolution serves as the foundation for the active cooperation of all relevant stakeholders, such as governments, the European Commission, WHO, UNEP and others. The Resolution also realized one of the main recommendations adopted at the aforementioned OECD-FAO-UNEP Workshop in 2000, i.e. "more active participation of the medical community and the World Health Organization".

Furthermore, the issue of obsolete pesticides and particularly hazardous chemicals was included in the EU Danube Strategy (Chapters IV and VI) at a Slovenian initiative.

Dear ladies and gentlemen, esteemed participants of the HCH Forum,

it is our responsibility to suitably define the issue of obsolete pesticides and other obsolete chemicals and to ensure the implementation of all the documents already adopted.

To conclude, I wish to stress again that the issue of obsolete pesticides and other obsolete chemicals is extremely important to Slovenia, although the country is not affected by these issues at the moment.

We are nevertheless aware that this problem affects us all, and we will do our best to further support measures in order to eliminate this problem permanently.

We were planning to hold the meeting now being held in Kiev, in Slovenia, but this unfortunately was not possible.

Therefore, I sincerely thank Ukraine, the host of the meeting, and wish much inspiration for the participants and the best possible outcome of the meeting.

With Regards,

REPUBLIKA SLOVENIJA
MINISTRSTVO ZA ZDRAVJE
SI Ljubljana

Brigita ČOKL
State Secretary

Message from the Environment Commissioner Janez Potočnik

JANEZ POTOČNIK
Member of the European Commission

Brussels, 18. 10. 2013
Ref. Ares(2013)

Message from Environment Commissioner Janez Potočnik to participants at the 12th International HCH and Pesticides Forum, 6-8 November 2013, Kyiv

Dear participants,

I regret that I am not able to attend this gathering to discuss and reflect on the major problem of obsolete pesticides due to institutional obligations that require my participation. That does not mean that I do not put attention to this issue.

Dealing with dangers posed to the health of people and the environment by obsolete pesticides is an enormous challenge for many countries, especially in Eastern parts of Europe and Central Asia.

Many activities have been launched to better understand the problem, to address the causes and to engage the relevant parties in cleaning up sites where obsolete pesticides and other dangerous chemicals are stored. But much remains to be done. This requires co-operation between governments, who are responsible for the well-being of their citizens; the agricultural sector, which is the main user of pesticides, and thirdly the pesticides industry, which has the knowledge and means to promote better alternatives.

I would particularly like to express my appreciation to the International HCH and Pesticides Association for their persistent efforts to solve the problem. Together with FAO, UNEP, UNDP, UNIDO, World Bank and many other organisations, the Association has managed to make people aware of the dangers posed by obsolete pesticides, initiating actions that have brought tangible results. I encourage you to continue your work.

The European Commission is in regular dialogue with partner countries to promote solutions to this problem. We are encouraging legislative reforms to address issues related to the management of obsolete pesticides stocks – the causes that have led to their accumulation – and preventing the problem from recurring in the future. In this context, we are supporting an international project in Eastern Europe and Central Asia to enhance the countries' capacity to eliminate obsolete pesticides stocks. We hope that this project, by bringing together donors and stimulating investment to phase out stocks of obsolete pesticides, will have a snowball effect in the future.

Address: European Commission, 1049 Brussels, Belgium - Telephone : 00.32.2.298.86.70 - Telefax: 00.32.2.298.82.88

As the title of this project reminds us, "prevention" and "elimination" are both equally important. Preventing waste, including hazardous waste, is the first principle of any sound waste policy, and it applies to pesticides production and usage as well. Adopting legislation and policies that aim at achieving sustainable management practices covering the entire pesticide life-cycle is therefore crucial.

I hope you have a fruitful discussion and that your deliberations over the coming days will pave the way for successful measures to phase out obsolete pesticides right across Europe and Central Asia.

Yours sincerely,

About the International HCH and Pesticides Forum

The International HCH and Pesticides Forum represents a platform for discussion between stakeholders of all kinds, working on implementation of projects related to POPs, obsolete pesticides and hazardous chemical waste. It acts as a catalyst in the exchange of information for the implementation of the Stockholm Convention and other chemicals- related multilateral environmental agreements, and the environmentally sound management of pesticides, pesticide waste and other chemicals, and has today developed into an important event for national as well as international decision-makers and stakeholders

History of the International HCH and Pesticides Forum
The first International HCH and Pesticides Forum took place in 1992 in Provincie Overijssel - Zwolle in The Netherlands. Since 1992 the Forum has been organised 12 times and creates a platform for discussing the national and regional strategies, action plans and financial resources for elimination of obsolete pesticides with a special focus on the need for action.

Forum Mission Statement
Obsolete pesticides are not only an environmental problem. Much more it stands in the way of socio-economic development, impacts both the quality of life resulting in human health problems and economic losses. The vision of the International HCH and Pesticides Forum is a world free of obsolete pesticides.

The Forum mission is therefore continuously to ensure that the elimination of obsolete pesticides is on the global agenda by having bi- annual meetings for exchange of information and review of results.

About IHPA
The International HCH & Pesticides Association (IHPA) is an independent and non- political network of committed individuals that wants to draw international attention to the worldwide problems stemming from the production and use of HCH and other obsolete pesticides and its dangers for human health and the environment.

Visit our website www.ihpa.info or contact IHPA, director John Vijgen john.vijgen@ihpa.info for more information

EDUCATION AND WARENESS RAISING: A NEED AND A MUST

FIELD TRIP

WORKSHOP: BIOAVAILABILITY

GEF/UNEP PROJECTS DEMONSTRATING AND SCALING UP OF SUSTAINABLE ALTERNATIVES TO DDT FOR THE CONTOL OF VECTOR BORNE DISEASES IN SOUTHERN CAUCASUS AND CENTRAL ASIA

FAO SESSION: PESTICIDE MANAGEMENT: MORE FOOD LESS RISK

STATE OF THE ART AND LATEST DEVELOPMENT IN FORMER SU STATES AND CENTRAL EUROPEAN REGION

GLOBAL EXPERIENCE ON POPS AND OBSOLETE PESTICIDES WASTE MANAGEMENT

HEALTH PROBLEMS AT OBSOLETE PESTICIDES SITES (EXPOSURE AND TOXICITY OF PESTICIDES)

INVENTORY, MONITORING AND RISK ASSESMENT

NEWLY LISTED POPS AND OTHER STOCKHOLM CONVENTION ISSUES

PCB TREATMENT

SILENT LAND

PROGRESS AND EXPERIENCE ON POPS AND OBSOLETE PESTICIDES WASTE MANAGEMENT

EDUCATION AND AWARENESS RAISING: A NEED AND A MUST

In 2010 a group of 98 people from Tashbulak fell ill after the consumption of the meat of poisoned cows that reportedly drank standing water from pits on the site. 58 of these persons were seriously sick and 35 were hospitalized, among them 15 children.

In 2013 130 sheep pasturing in the neighborhood of Suzak A. died. Today a fence has been built around the site. At the same time, the open pits are covered and a guard house has been built for the guard that keeps a close watch over the site.

GROUPS AT RISK FROM OBSOLETE PESTICIDES IN KYRGYZSTAN

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Abstract

Stocks of obsolete pesticides pose a threat to public health and the environmental in Kyrgyzstan. Exposure to the Persistent Organic Pollutants (POPs), which many of these stocks contain, can lead to serious health effects. Unusable stocks piled up in the Soviet-time Kyrgyzstan due to over-ambitious planning and mismanagement of pesticides.

As a signatory to the Stockholm Convention, Kyrgyzstan aims to eliminate the obsolete stocks and reduce the release of POPs into the atmosphere. Large international projects will be needed for the final disposal of the stocks and it will take time to find enough support to develop and implement these projects. Today, however, the health and environmental risks remain a significant concern and something needs to be done about it.

Suzak A. Burial Site in Jalalabad Oblast is one of the Kyrgyz hot-spots that need direct intervention. The fencing material that once isolated the site from its surrounding has been taken away by locals. Illegal 'waste miners' come to the burial site to dig out the pesticides and sell these on the local market. They spill the pesticides, and pollution of the soil has been observed as a consequence of these activities.

Two years ago, 98 people fell ill and 35 were hospitalised after the consumption of the meat of poisoned cows that reportedly drank standing water from pits on the site. This year, a herd of 130 sheep died after drinking from the same pits. Milieukontakt is convinced that the combination of active stakeholder involvement and short-term risk reduction is the most appropriate way to avoid further accidents from happening at Suzak.

Milieukontakt, Tauw, Green Cross Switzerland, together with the Kyrgyz NGOs Ekois and Green Light joined forces to tackle the problems around the burial site. Cost effective and low tech measures to protect the environment and the villages close to the site are the key technical ingredients for this project. Awareness raising activities and a social medical intervention to support the village of the people who were poisoned will play an important role too. The initiative is financed by the GEF/UNDP Small Grants Programme in Kyrgyzstan, Green Cross Switzerland, OSCE and the Milieukontakt Private Donations Fund.

Keywords

Risk reduction around pesticides hot-spots; protection of vulnerable groups.

ARTICLE:

Obsolete pesticides in kyrgyzstan

Obsolete pesticides (OPs) pose a significant environmental and health threat in the Central Asian region, stemming from the overuse and mismanagement of pesticides during the Soviet era. Many of the chemi-

cals of concern are now either deregistered locally, banned internationally because of their massive impacts on public health or found unusable because of their long-term storage leading to degradation. It is estimated that around half of the world's quantities of obsolete pesticides can be found in the former Soviet Union, and a large portion of it again in Central Asia because of the massive use in agriculture and cotton production.

It has been estimated that at least 250,000 tonnes of obsolete pesticides to date remain at tens of thousands of locations in the countries of the former Soviet Union[1]. In recent years, unprotected stocks of Persistent Organic Pollutants (POPs) have started to enter into the environment and will finally end up in the food chain. This process is globally well underway; scientists have found traces of POPs in the fat tissue of polar bears and Inuit in arctic regions where pesticides have never been used. Laboratory studies show that pesticides can cause health problems, such as birth defects, nerve damage, cancer, and other effects like infertility or genetic damages that might occur over a long period of time. This process is enhanced by the waste mining at the former depots of obsolete and POP pesticides, by people taking advantage of poor farmers buying these obsolete and POP pesticides for a lower price than the price of pesticides in the official market.

Safer handling of hazardous substances and efforts to clean up past pollution will have important health and environmental benefits and contribute to a green economy that should be considered as a vital part of economic development of Kyrgyzstan and, therefore, a key long-term aim for the country. Sick population cannot contribute to a healthy economy.

The Kyrgyz government is aware of the serious health and environmental risks posed by obsolete pesticides and other unused hazardous chemicals, but as one of the less developed countries of Central Asia it lacks the legal, institutional and financial capacity to address the issue. Nevertheless, the country has signed all relevant international conventions addressing the issues of wastes management like the Stockholm, Basel and Rotterdam Convention.

To really tackle the problem, large projects financed by international donors are needed for collection, repackaging and disposal of the stocks in state of the art destruction facilities such as high temperature incineration plants in Western countries. To date, safe disposal facilities are not available in the region and until a modern disposal capacity has been established it will be necessary to export the hazardous stocks to Western Europe. Other proven disposal options but incineration are currently not available, though research is ongoing to have ultimately a larger "toolbox" available for disposal.

International initiatives to tackle the problem

Milieukontakt has been active in obsolete pesticides repackaging projects since 2005 when the Netherlands Ministry of Foreign Affairs and the Dutch Doen Foundation financed a project to repackage a total of around 400 tonnes of obsolete pesticides in Moldova, Georgia and Kyrgyzstan[2].

1 This number will probably grow massively in the years to come because of the addition of lindane to the chemicals forbidden by the Stockholm Convention, but also the search for illegally buried pesticides in the 60s and 70s.

2. For the Kyrgyz part of this project Milieukontakt's representative office was responsible for the local management of the project. Today the former Milieukontakt office is operating as an independent NGO under the name Ekois. Together Milieukontakt and Ekois are involved in the implementation of several pesticides projects in Kyrgyzstan.

More recently, Milieukontakt has been involved as expert in a consortium with Tauw – European Consultants and Engineers, Witteveen+Bos – Consulting Engineers, the International HCH and Pesticides Association (IHPA) and Green Cross Switzerland. The consortium works (in different constitutions) on assignments of GEF/UNEP, The World Bank, UNDP and FAO in Egypt, in former Soviet Countries and on the Balkans, in Egypt and in Vietnam. Currently, the consortium (in different constitutions) is working in pesticides projects in Georgia, Vietnam (UNDP) and Armenia (OCSE).

Green Cross Switzerland has been active since 2008 on obsolete pesticides and is currently the Executing Agency of two GEF/UNEP-funded projects on capacity building on obsolete pesticides in the former Soviet Union and West Africa. Milieukontakt is one of the technical experts working in these projects in former Soviet republics. In recent years, policy makers working at international donor organisations have become more and more aware of the problem and a series of projects addressing the issue have been developed and are currently being implemented. Kyrgyz examples of such projects are as follows:

1.Obsolete Pesticides Technical Study *in the Kyrgyz Republic, the Republic of Tajikistan, and the Republic of Uzbekistan, 2009-2010,* Implemented by a consortium of Tauw, Witteveen+Bos. The International HCH and Pesticides Association (IHPA), Green Cross Switzerland and Milieukontakt International, Financed by the World Bank;

2. *Initiative for Pesticides and Pest Management in Central Asia and Turkey, 2010-1012,* Implemented by FAO, Financed by the FAO Turkish Partnership Programme;

3. *Demonstrating and Scaling Up Sustainable Alternatives to DDT for the Control of Vector Borne Diseases in Southern Caucasus and Central Asia* (Georgia, Kyrgyzstan, Tajikistan), Implemented by Green Cross Switzerland, WHO and Milieukontakt International, Financed by the GEF through UNEP;

4. *Improving capacities to eliminate and prevent recurrence of obsolete pesticides as a model for tackling unused hazardous chemicals in the former Soviet Union.* Implemented by FAO, with partners IHPA, Green Cross Switzerland and Milieukontakt International, Financed by the EC.

The World Bank project mentioned above served as a preparatory study for the formulation of a large scale remediation project to dispose of, amongst others, the stocks collected at Suzak burial site in the Jalalabad District in Kyrgyzstan. Unfortunately, until now, the Kyrgyz government and partners from international donor organisations have not been able to agree on how to finance such a project.

The FAO Turkish project completed a full country obsolete pesticides inventory in Kyrgyzstan.

Within the frame of the GEF/ UNEP project, 60 tonnes of DDT will be repackaged and safeguarded in an intermediate collection centre.

The FAO EC project is an example of one of the largest projects that plans disposal of the collected stocks by means of destruction.

As mentioned above, larger international projects will be needed to really solve this pressing issue, and such projects will be formulated and implemented in the future. However, at the same time, there are people at risk today. Some of them are living close to hot spots of obsolete and POPs pesticides. Houses are built on

top of buried stocks, former stores are privatised and used as food stores, market warehouses or living facilities, children are playing at broken down former storage sites and many of the vulnerable people (women and children) are exposed to unacceptable health risks.

Suzak burial site

Suzak burial site in Jalalabad province is one of the Kyrgyz hot-spots that needed direct intervention. There are two Suzak burial sites: Suzak A and Suzak B. Suzak B is fenced and more or less looked after by the local community that lives very near this site. But Suzak A, that reportedly contains 3000 tonnes of obsolete pesticides, is a real environmental and health hazard. The fencing material that once isolated the site from its surrounding has been taken away by locals and illegal "waste miners" come on a regular basis to the burial site and dig out the pesticides, in order to sell these on the local market as *Dust* (DDT). They spill the pesticides and pollution of the soil has been observed as a consequence of these activities. Another problem is local herds of sheep and cattle passing by the site. Two years ago, 98 people fell ill, and 35 were hospitalised after the consumption of the meat of poisoned cows that reportedly drank standing water from pits on the site.

Milieukontakt International, Tauw, Green Cross Switzerland, together with the Kyrgyz NGOs Ekois and Green Light joined forces for risk reducing remediation of the site in early 2013. Awareness raising activities and a social medical intervention to support the village of the people who were poisoned will play an important role in planned activities. The initiative is financed by the GEF/UNDP Small Grants Programme in Kyrgyzstan, Green Cross Switzerland, OSCE and the Milieukontakt Private Donations Fund.

In the frame of the above mentioned World Bank project, an inventory of the Suzak A site was made. Furthermore, a strategy was developed to eliminate the direct risks on the short term and contain the remaining risks on the mid and long term. In the Goups at Risk Project, the aim is to build on this strategy, and mainly focus on the elimination of the direct risks on the short term. Awareness rising among the groups at risk residing in the villages around the site will be a key intervention to avoid future poisoning of herds and people. Assistance to the medical facilities in the village where people fell ill as a result of eating the poisoned meat is planned.

A strong benefit from public participation and stakeholder involvement

During a first mission in July 2013, it turned out that there is strong commitment to solve the health and environmental problems from the burial site in Jalal Abad Oblast. A Memorandum of Understanding, designed as a Go / No Go decision making instrument to measure the commitment of local government, was signed by all relevant stakeholders even before the mission. Moreover, the first steps of technical implementation were already taken. In September, a new fence was build around the site. At the same time, the open pits were covered and a guard house was build. In exchange for the right to farm almond nuts neighboring the site, a guard that lives there with his family and keeps a close watch on everything that happens around Suzak A.These early results give a good perspective for further project implementation, and high hopes that the project results will be reached in efficient cooperation with local government and NGOs.

Public participation and active stakeholder involvement is highly welcomed by international funding organizations. In many projects, implementing partners incorporate elements of participation and stakeholder involvement in the project design. Real implementation, however, can be difficult because of many reasons. In the Central Asian region it is not always clear to local authorities that they might benefit from participation and stakeholder involvement for instance. Furthermore, a strong focus on the technical side of problem resolution can be encountered. Last but not least, there is no strong tradition of public disclosure and participation to build on.

The start of this small project (with a modest budget of 100.000 USD), right from the start, shows exceptional results. Key factors for achieving these results can be found in the following circumstances:

1. There was an urgent need to solve pressing problems (people and animals were poisoned)

2. Public administration is active and really willing to solve the problems (a new dynamic generation of local governmental officials and politicians took over from the older more bureaucratic generation);

3. Different organizations with different expertise are able to cooperate in a multidisciplinary project;

4. Finances were secured by a well-organized lobby to advocate the need for urgent action; and

5. All stakeholders agreed to compromise and carry out a kind of postponed maintenance of the burial site instead of implementing the final long-term solution for the problem.

There are more sites in the region where there is an urgent need to solve pressing problems, and there are more groups at risk from obsolete pesticides in Central Asia. Based on the experience of this project, Milieukontakt and consortium partners Tauw and Green Cross Switzerland are planning to form alliances with local NGOs, the government and funding agencies to lower the risks around these hot spots in the short term.

The larger international projects will then be able to provide a final solution in the middle or longer term and take the pesticides away for disposal.

PESTICIDES AND GENERAL PUBLIC IN CIS

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Abstract

The world is becoming more complicated each year. The number of people grows, just as their needs and demands surge. High technology creates new materials that enter everyday life. However, high-tech solutions demand high level of culture both from manufacturers and consumers. But how can it be achieved? The former Soviet Union countries now go through transitional processes. High technologies compete with primitive ones, collective farms - with private, quality – with low price. Active and, at times, aggressive advertising confuses people. Eventually, general public, i.e. consumers, are more than perplexed. How to figure out this complicated world on your own?

There exist different approaches to public awareness: TV and radio programs, newspaper articles, information brochures distributed at public places, etc. Green Cross Belarus has been working for 20 years with raising public awareness in the field of health and safety. The most effective, from our point of view, is targeted work with population that preferably starts with children and families. Firstly, because young people are more open to new knowledge as well as more flexible. Secondly, children easily introduce new information into family life and spread it among their peers and neighbors. On the other hand, parents are more cautious and pay more attention to the issues of safety. Over the last few years, we have prepared and published 8 issues of a brochure "How to raise a healthy child", a brochure on healthy and safe nutrition, introductory school course "Me and Pesticides" and a range of other materials. At the moment, in partnership with the Food and Agricultural Organization of the UN, we are preparing an adapted for the post-Soviet area Russian-language version of the guidelines "Schoolgarden". This whole kit of educational materials should help to gradually involve all population categories: from infants to schoolchildren, from students to adults. Also, it is very important how the process of knowledge transmission goes. From our point of view, it is best implemented through a combination of theoretical and practical activities.

This way, participants will not only get but also secure their new knowledge.

Keywords

Pesticides, obsolete pesticides, POP, DDT, public awareness raising, health, risk, safety, garden, danger, education, training, Belarus, former Soviet Union, children, parents, families.

Introduction

Pesticide usage in agriculture is becoming more and more widespread. It is clear that this tendency is connected with further urbanization of the population and, as a

consequence, with increasing demand for cheap food production by means of intensive agricultural technologies. Nowadays, chemical corporations are actively working on new generations of safer pesticides, which do not have long-term implications. However, any such chemicals cannot be absolutely safe and demand adequate culture of usage. Furthermore, nobody knows all potential consequences of newly developed pesticides on health state and environment, which could appear in many years.

Public awareness in CIS region

Any technologies, either nuclear or chemical, demand appropriate culture among specialists as well as among general public. Otherwise, consequences may have grave implications on local, regional or international scale. As an example to this may serve the Chernobyl catastrophe, the tragedy in Bhopal, tens of thousands of tons of chemical weapons at the bottom of the Baltic Sea or the latest accident in Fukushima. The consequences of the last one are (and will be) much more significant than it was foreseen in 2011.

Therefore, actively participating in this process developed countries create a new consumer culture for the direct users working in agriculture as well as for the general public who consume a wide range of food, produced by means of new technologies. As experience shows, it allows to considerably decrease risks though still does not guarantee full security.

After the collapse of the Soviet Union, a range of new countries, which have to individually create their own system of technologies and their security, emerged. Though new countries have a certain technological heritage from the previous system, they most often do not have as strong science and technology base as their predecessor's. Moreover, the majority of these countries are in a lingering economic crisis, which does not allow spending adequate funds on safety assurance. The crisis stimulates interest in cheap technologies and cheap products.

Vital problem for CIS and other developing countries is associated with the quality of food, which is rapidly going from worse to bad. The majority of supermarkets seduce wide public with not expensive and cheap food, which is not natural and/or not healthy. Lack of knowledge and experience in healthy and safe nutrition among ordinary people causes serious problems for their health state and even more long term consequences for their children and grandchildren.

MODULE 1: international drawing contest "man on the land"

The Contest rules and conditions will be distributed among the project countries through different ways of communication. As soon as all the interested parties are informed of the Contest, its terms and conditions, they will work on the drawings respecting those conditions and send them in for the evaluation. All the works submitted to the Contest will be registered, sorted and prepared for consideration by professional jury. It can be expected that around 6,000 works will be submitted to the Contest. The international jury board consisting of art educators and experts will evaluate all the submitted works and choose the best ones for awarding and exhibition. All the Contest winners will, in person, through their schools/studious or by post, receive diplomas purposefully developed for the contest. A number of winners selected by Jury will get special awards to stimulate them for further self-development. A special award ceremony with performance, where winners will get their awards and meet each other, is being planned. Their teachers, parents, guests, diplomats and mass media will be invited to the ceremony. An art exposition, which will be exhibited in Minsk and fur-

ther on used as a transportable exposition in other project countries and various public events (including Steering Committee Meetings of the GCP/RER/040/EC program), will be formed from the winning works. All the winning works will be digitized in high resolution so that the Program will benefit from produced visual materials. The following products will be developed and, as a result of the Contest run, produced the following:

1. A video film, representing the Contest "Man on the Land" and addressing topics and issues of the Program;
2. Winning works image data base, which will be used for the purposes of the visualisation of the Program.
3. Transportable exposition that will be presented in project countries as well as at various public events;
4. Desk and wall calendars for 2014 and 2015, which will be based on the Contest drawings and will have and the English and Russian versions; postcards that can be used for the communication purposes of the Program (e.g. sending out holiday greetings, networking, informing about planned events and keeping close connections with stakeholders);
5. A presentation CD of the Contest that will have the electronic database of drawings and the Contest video film on it.

MODULE 2: pilot education course for schoolchildren

Nowadays, there are 6,500 tons of obsolete pesticides in burial sites in Belarus. Thousands tones of new pesticides, which are being actively used in agriculture are being bought each year.

To increase public awareness of the general public, "Green Cross Belarus" developed a pilot course "Pesticides and me" for schoolchildren. The course consists of 7 lessons with senior schoolchildren and is oriented at ecology, chemistry, biology and geography teachers. For it was developed a methodological kit:

7 PowerPoint presentations, a manual with an attachment, tests and questionnaires.

The material is divided into 4 sections:

1. Pesticides – allies and enemies: a historical overview of chemical means usage alongside with the definition of POPs and important normative documents and modern standards for pesticide production and storage.
2. Pesticide classification: a flow chart of the most widespread types of pesticide classifications on the basis of their purpose, dates, action mechanisms, etc.
3. Pesticides in the environment: different ways of pesticide penetration into the environment, migration schemes and pesticide influence on the organic world, alternatives to pesticide usage.
4. The influence of pesticides on human health. In this chapter, attention is given to bioaccumulation of pesticides in human body, influence of pesticides on human beings (direct and indirect), study of pesticide substances, major factors of pathologic changes under the influence of minor pesticide doses, preventive measures and reduction of pesticide negative influence on health.

Why have we chosen schoolchildren as our target group? This was done because they are most open to new information and also try to apply new knowledge. Out of all existing systems of spreading knowledge, school is undoubtedly the best one. On the other hand, this course teaches youth to think and act independently, which is very important in the modern situation, especially in the CIS countries. Schoolchildren also bring their knowledge to the families and try to embed them their usually trying to overcome conservatism of their parents. In fact, the older a person gets, the more conservative he becomes.

Also the idea of the course is to include students of the major universities into active awareness raising process. New knowledge comes into existence very rapidly, and it is necessary to be able to reform your self and take it to practical application.

Before approbation, an inception workshop, in which lecturers from universities, school teachers and a group of senior schoolchildren took part, was held. During the workshop, several open lessons were held and reviewed by all participating parties. After that, the course went through approbation in 4 schools of Belarus during one school year as a part of extracurricular activities. The children spread questionnaires among adult population of their localities. The results showed that unfortunately the knowledge of adults, including specialists, is extremely low in this field. Moreover, concern about the pesticide usage among regular people is also low and exists in people's mind rather than in everyday life. With the help of this course, we managed to increase awareness in localities where the course was used for approbation. Moreover, extremely important issues of people's motivation to ensure their safety and health protection of their families were raised. It is interesting that the majority of population believe that their health condition depends fully on the sate of national health care system: clinics, hospitals, doctors, medicine, but not a bit on their own behavior, level of knowledge and culture of life, nutrition and life style.

MODULE 3: education course for schoolchildren "schoolgarden"

"Schoolgarden" education course for schoolchildren was developed by the Food and Agriculture Organisation of the United Nations for developing countries with the focus on Africa. At the same time, it contains basic knowledge and helpful information, which could be successfully used in CIS countries. Thus, Green Cross Belarus will arrange translation of available education kit into Russian and arrange its adaptation for CIS region. The work is planned in the framework of FAO-EC Project entitled "Improving capacities to eliminate and prevent recurrence of obsolete pesticides as a model for tackling unused hazardous chemicals in the former Soviet Union" for 2014. Then, the results will be spread out among all project partners in CIS.

MODULE 4: preliminary education of young parents "How to raise a healthy child"

Food is one of key factors influencing human organism. Coming from outside, the food is transformed into a number of internal ingredients taking part in all vital life processes. Food serves as a means to support life, growth, development and workability of human beings. Rational nutrition is the nutrition which fits the needs of human organism and is adequate to its energy consumption. The main principles of rational nutrition combine balancing of needs and effective regime. To develop and realize rational nutrition, we have to determine needs of organism in main food substances taking into account age, profession and climate as well as social and living conditions. The man usually needs

7 main food components (arranged by significance): water, proteins, carbohydrates, fat, cellulose, vitamins and microelements. The world statistics calculated that 70% of deaths are caused by cardio-vascular disorders, cancer and insults; 50% of those happening as a result of poor nutrition. There are many harmful and unnecessary substances in our organisms while there is lack of many needed substances.

Nutrition style is coming from family. Thus, Green Cross Belarus has developed a set of education brochures on "How to raise a healthy child". One of the most important of those brochures is focused on "Healthy nutrition". It provides young parents with basic knowledge about nutrition and gives advice on how to arrange healthy nutrition in the ordinary life conditions.

Conclusion

New technologies and materials are the sign and reality of our time. Nowadays, almost every inhabitant of our planet is their consumer. Modern materials and food, technologies and rules of usage demand a competent and careful attitude to reach the desired outcome and not to inflict any harm, i.e. they require high consumer culture. While in developed countries, much effort is devoted to creating consumer culture, the process of such education in developing countries is usually happening on its own through trial and error of consumers. Such approach has the potential to be dangerous to the population of these countries. Unfortunately, the majority of foods nowadays are being produced with the aid of intensive agricultural technologies, i.e. with the active application of chemicals. For the majority of population, the decisive factor is the price, not the quality.

The question of human safety in this case for environment and food production becomes more and more acute especially for the population of developing countries. Those who develop, and those who produce and spread pesticides and other new chemicals need to carry not only moral but also practical responsibility through active participation in the consumer culture dissemination.

With these several ideas, we attempt to step by step raise human awareness of the issue of food security, pesticides and their safe application among the wide public. We suggest spreading such knowledge through an existing system of school education and extra education of parents, primarily, mothers. An emphasis is given to the link between generations: parents – children as well as between teachers – schoolchildren – families. They should become an important path along which awareness and new culture (first of all the culture of rational nutrition and safety) will spread in the society.

EDUCATION AND AWARNESS RAISING: A NEED AND A MUST

S. Molenkamp & W. L. Pronk
Organized by Milieukontakt International
and Green Cross Belarus

Aziz Umarbaev from the Kyrgyz NGO Green Light presenting the NGO initiative to remediate Suzak A. obsolete and POPs pesticide burial site in Jalal Abad district

During the 12th HCH & Pesticides Forum, a separate session on education and awareness raising in obsolete and POPs pesticides projects was organized by Milieukontakt International and Green Cross Belarus. Three presentations introduced education and awareness raising activities implemented within the international obsolete and POPs projects:

Green Cross Belarus does a lot to involve children and teachers in awareness raising activities in its projects and, in this way, spreads the message that people should stay away from the dangerous chemical stocks among the entire population. Vladimir Shevtsov, the director of the organization, showed some impressive results from an international contest of drawings and paintings that illustrate the health and environmental threats from obsolete and POPs pesticides.

Olga Tsygulyeva from the Ukrainian organization *Mama 86* drew attention to the fact that the organization was able to find extra stocks of unidentified obsolete stocks of (POPs) pesticides in a project completed in 2010 in cooperation with Milieukontakt through an intensive awareness raising campaign. By talking intensively to different groups of people in villages, some additional and previously unknown stocks of buried pesticides were uncovered in the project area.

Milieukontakt, along with the *Green Light* Kyrgyz organization, gave a presentation on a small project in Kyrgyzstan, where obsolete and POPs pesticides from a burial site recently poisoned people and cattle. In line with the agreements under the Stockholm Convention, Kyrgyzstan has to dispose of the estimated 3000 tonnes of obsolete and POPs pesticides at this burial site, but finding the resources to realize such a final solution will take years. Through active awareness raising, a consortium of international environmental NGOs and an environmental consultancy firm have been able to secure the modest project financing from different sources needed to minimize the immediate environmental and health risks from the burial site, leaving the task to dispose of the stocks a goal for longer term planning. The project is a good example of how to achieve important results with a very modest project budget.

As a reaction to the presentations, the participants concluded that awareness raising campaigns and stakeholder involvement efforts need to be organized very carefully. If awareness raising does not contain the right message formulated in the right way, it can even have a counterproductive effect. If organized and prepared properly, awareness raising is a vital part of any project on POPs and obsolete pesticides

and ensures that problems do not occur again.

In the experience of the participants of the session, many international projects do have some elements of public participation, but often only as an obligatory part of the project. It was concluded that public participation, education and awareness raising are very important but need to be organized as a structural component of every project. There is, however, little tradition of public disclosure and participation in the region of former Soviet republics and implementation can be difficult and will require a lot of efforts and time.

FIELD TRIP EXPERIECE

FIELD TRIP ORGANIZED BY SI GROUP: IMPRESSIONS 2ND DAY

Photo 1: Group arrival at demonstration site
Photo 2: Close up of PPE
Photo 3: Preparation repackaging works

WORKSHOP: BIOAVAILABILITY

RESULTS OF BIOMEDIATION EXPERIMENTS FOR POPs POLLUTED SITES: (CASE STUDY: THE REPUBLIC OF MOLDOVA)

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Abstract
The important pollution sources for the environment in the Republic of Moldova are old pesticides storages. The inventory of pesticide polluted site showed a huge number of high polluted sites (near 250) and large pollution spectrum. The polluted sites with high risk for environment and public health need effective remediation actions. One of the perspective technologies is a bioremediation. Some demonstration projects on the bioremediation technologies of POPs polluted soils have been tested in the Republic of Moldova. DARAMEND technology and phytoremediation have been studied for the perspective implementation in practice. The aim of this article is to review the obtained results and recommend the elaboration for the implementation of bioremediation technology for old pesticide polluted sites.

Keywords
Soil pollution, POPs**,** bioremediation, phytoremediation.

Introduction
The inventory of old pesticide storages in Moldova executed by the Ministry of Environment and the World Bank showed that a large quantity of polluted sites (1589) remain after the repacking and evacuation project. Nearly 16 % of old storages have POPs pollution more 50,0 mg/kg in soil (254 sites) [2,3,4]. The pollution spectrum is complex and consists of five POPs groups (DDTs, HCHs, Toxaphene, Chlordane, and Heptachlor), Trifluraline, Triazines, PAHs, Metolachlor and industrial chemicals, such as PCBs. They are synthetic chemical substances with high toxic characteristics to wildlife and humans.

The remediation actions are needed for highly polluted sites for the mitigation of risks for the environment and human health. Two bioremediation technologies (phytoremediation and DARAMEND) were tested in the condition of the Republic of Moldova last time [2,5]. These technologies are bioremediation, which are relatively new and potentially cost-effective remediation options for the remediation of POP-contaminated sites [1,6-14]. In-situ options are more economically attractive compared with ex-situ options, which involve excavation and storage of excavated material before transporting the same to ex-situ remediation facilities. Every remediation project should to be designed to take into consideration such aspects like soil conditions, volume of polluted soil, pollution spectrum, construction remains, groundwater level, and soil filtration properties.

This article presents the evaluation of the results of the implementation of phyto- and bioremediation technologies for the remediation of POPs polluted sites in Moldova. Phytoremediation is the name given to a set of technologies that use different plants as a containment, destruction, or an extraction technique. Phytoremediation has been receiving attention as results from field trials indicate potential cost savings compared to conventional treatments that require soil excavation and transportation (USEPA, 2000). The general approaches of this technology were used for the design of the phytoremediation experiment. The phytoremediation study of POPs polluted sites showed good extraction of DDTs, HCHs, PCBs, and other chlororganic compounds from the soil by zucchini and pumpkin plants [1,8 and others]. The design of a phytoremediation system varies according to the contaminants, conditions at the site, level of cleanup required, and plants used. A thorough site characterization should provide the needed data to design any type of remediation system. The source of the pollution may need to be removed if phytoremediation is the chosen technology for remediation.

Another demonstration project is based on in-situ bioremediation by land farming with addition of amendments - The DARAMEND® process by ADVENTUS [6]. Sequential cycles of anaerobic (no oxygen, strongly reducing conditions) and aerobic (oxygen present) conditions enhance reductive dechlorination of chlorinated organics.

1.Materials and methods

Based on previous investigation of POPs polluted sites, two locations were selected for a more detailed investigation.

The site location is illustrated in Figure 1.

Figure 1: The locations of polluted sites where bioremediation study was carried out

Selected sites were sampled for more detailed investigation. Based on these results, one site (Balceana) was selected for the phytoremediation trial and other (Bujor) - for bioremediation. Soil samples were taken from top soil, 0 - 20 cm. The samples were air-dried under laboratory conditions of about 20°C, then sieved through a 1.0 mm screen, and homogenized. Plant samples were dried in a drying box at 60°C. Ten gram subsamples of soil and 1 – 2 g subsamples of plant tissue were extracted with duplicates using a Soxhlet system for 14 hours. The solvent was a mixture of hexane and dichloromethane in the proportion 1:1 with a total volume of 150 ml.

Extracts were concentrated to 1 ml and cleaned by silica column chromatography and by solid phase extraction silica cartridges. All analytical determinations of POPs content in soil, plants and other environmental media were made by gas chromatography Agilent 6890 equipped with micro-ECD detector and Agilent 6890 with mass detector 5793 (GC/MS) using USEPA method Method 8081A. The detection limit was 0.01 mg/kg for DDTs, aldrin, dieldrin, endrin, and chlordane. The detection limit was 0.005 mg/kg for HCHs, hexachlorbenzene, and heptachlor In this paper, DDTs refers to the sum of

concentrations of all DDT metabolites (DDT, DDE, DDD), and HCHs refers to the sum of concentrations of HCH isomers (α-, β-, and γ-HCH). Each sample was extracted and analyzed twice (two chromatograms). A detailed methodology of both experiments was presented in earlier publication [2,3,5].

1.1 Phytoremediation

The Balceana site was selected for the phytoremediation field experiment based on two primary considerations: 1) a sufficiently large cultivatable area surrounding the site was polluted by obsolete pesticides, primarily by DDTs, and 2) there was a good potential for local community involvement in planning and conducting the study. Situated in the lower Lapusna River Valley, the soil at the Balceana site is classified as a "chernozem" with a pH of 7.6 and an organic carbon content of 3.2%. The depth to groundwater is 3.0 – 3.5 m.

The experimental plot was established using typical agricultural techniques for soil preparation and planting. No additional soil treatment or soil amendment were used. The field experiment was designed using five vegetation treatments on plots planted with the following plant species: maize (Zea mays L.), zucchini (Cucurbita pepo L. var. pepo), pumpkin (C. pepo L. var. pepo), carrot (Daucus carota L.), and sorghum (Sorghum bicolor L. Moench).

1.2 Bioremediation

This experiment was based on in-situ bioremediation by land farming with the addition of amendments - DARAMEND® process by ADVENTUS [6]. Sequential cycles of anaerobic (no oxygen, strongly reducing conditions) and aerobic (oxygen present) conditions enhance reductive dechlorination of chlorinated organics. This solid-phase bioremediation technology employs organic and inorganic amendments to stimulate the decomposition of organic contaminants by indigenous soil microorganisms.

The contaminated building waste and soil adjacent to the warehouse have been isolated in an on-site waste deposit with bottom and top protective liners (membrane), and secured by a surrounding protective bank and a top layer of clean soil. The total volume of waste amounted to 1.550 m^3. The remaining contaminated soil is treated by in-situ bioremediation by land farming with addition of amendments (nutrient organic material as a microbiological carbon source, and reduced iron – DARAMEND© process by ADVENTUS) [5,6].

5 - 10 cycles of treatment have been applied to the top soil at the demonstration site. The soil was allowed to rest for at least 5 days during the anaerobic (reductive) phase. Reducing condition need to be maintained during this period to induce reductive dechlorination of DDTs and HCHs. It can be achieved by ensuring that the moisture content is high by the covering the wet soil with black plastic sheeting. The soil was tilled during the anaerobic (reductive phase) to provide oxygen, and then allowed to rest without any covering or addition of water for at least two days during the aerobic phase. Two phases (anaerobic and aerobic) were repeated for each treatment cycle. Soil sampling was repeated after 5 and 7 cycles.

To document the treatment, a sampling and analytical program based on statistical tests using the "Duplicate Method" to quantify contaminant heterogeneity during soil sampling in soil was applied, and this method demonstrated a relatively large degree of soil contaminant heterogeneity within a short distance.

2. Results and discussion

2.1 Pollution level

Balceana site. The site plan and spatial distribution of DDTs and HCHs are illustrated in Figure 2.

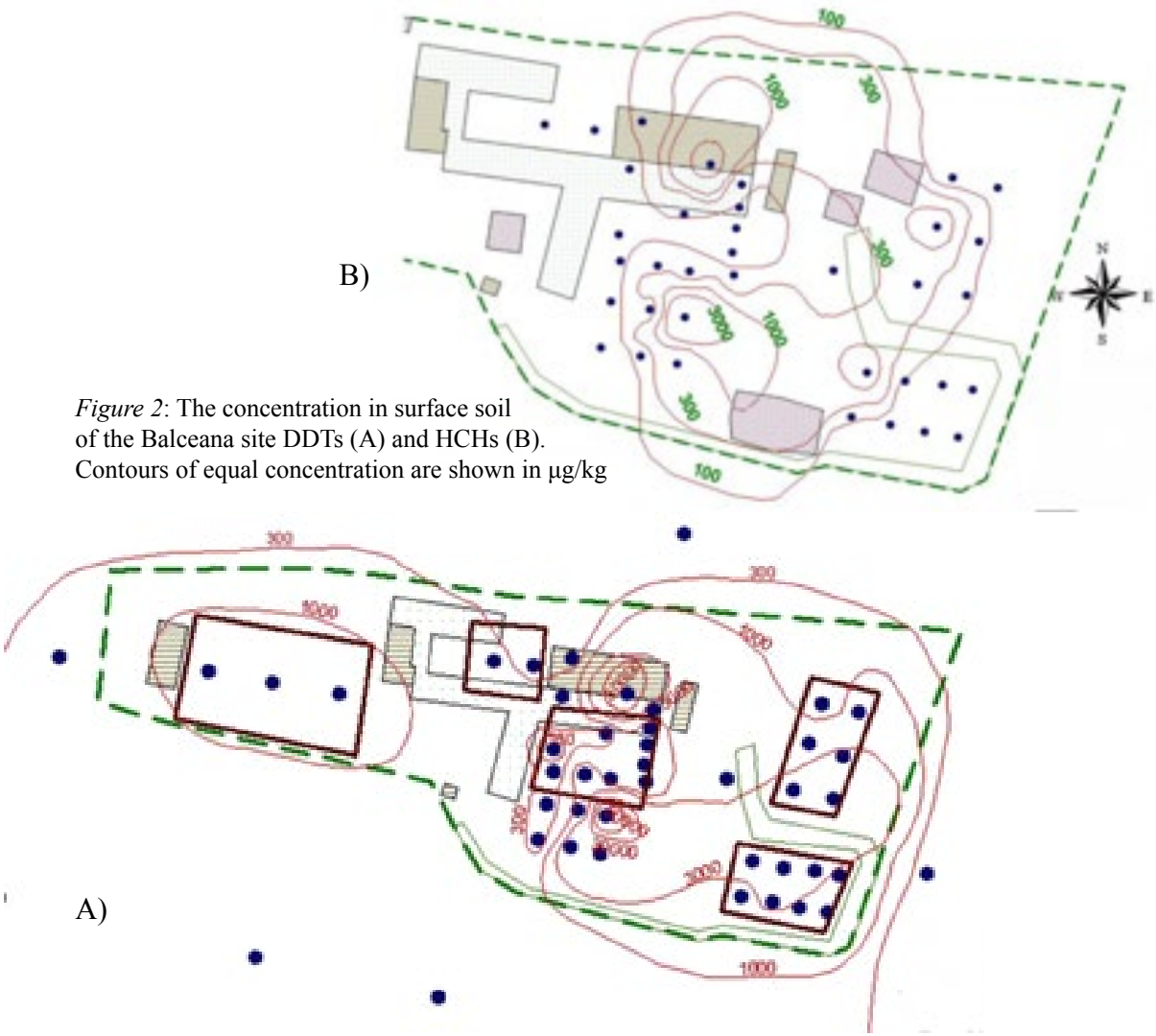

Figure 2: The concentration in surface soil of the Balceana site DDTs (A) and HCHs (B). Contours of equal concentration are shown in µg/kg

All territory surrounding the Balceana site is highly polluted by DDTs with concentrations more than 10 times exceeding the 0.10 mg/kg MAC. Two anomalous samples were identified with unusually high pesticide concentrations greater than 50,0 mg/kg. Higher soil concentrations of DDTs were observed in the lower part of the site. The pollution level of HCHs is lower in comparison with DDTs. In the two anomalous samples, high HCHs correlated with the DDTs results. The principal problem with this site is the contamination by DDTs.

The results, which provide the information to estimate the approximate area and volume of polluted soil, are illustrated in Table 1 below. The mass of contaminated soil with DDTs greater than 50,000 µg/kg is estimated at 41.3 tons. This soil would be considered toxic waste. The estimated mass of soil with the DDTs in the interval 30,000 – 50,000 µg/kg is 141.7 tons. Other intervals with lower concentrations have greater volume and are also dangerous for the environment and public health. The area at the Balceana site with a pollution level greater than the MAC for DDTs is larger than 15.2 hectares.

Table 1: Spatial distribution for concentrations of total DDTs and estimated volume of polluted soil at Balceana study area

DDTs pollution mg/kg	Area m^2	Area %	Polluted soil volume, m^3, 0.5 m depth	Weight, tons to 0.5 m depth*
0.1 – 0.3	14,982	9.8	7491	11986
0.3 – 1.0	114,320	75.0	57160	91456
1.0 – 3.0	16,994	11.2	8497	13595
3.0 – 10.0	4,857	329	2428	3885
10.0 – 30.0	1,054	079	527	843
30.0 – 50.0	177	0.1	89	141
> 50.0	52	0.03	26	41
Total	152,435	100.0		

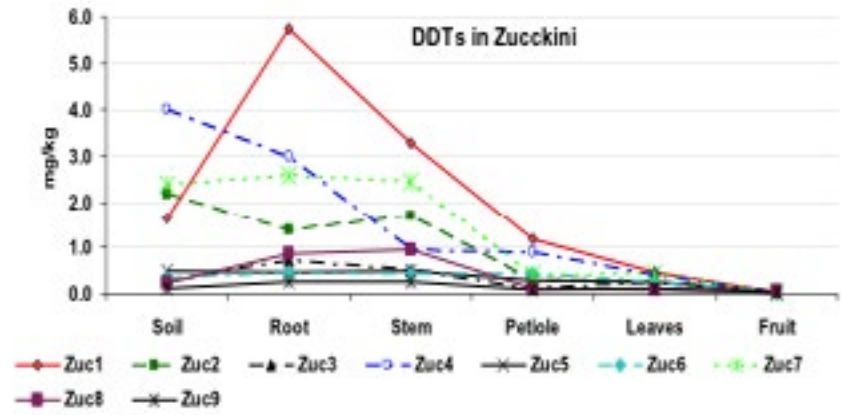

Figure 3: Accumulation of DDTs in zucchini by different plant parts. Each line represents one of nine zucchini plants that were harvested.

Bujor site. Bujor site showed a high pollution level of POPs in the central part of the storehouse territory. Soil samples had very high concentrations of DDTs, which exceed 50.0 mg/kg. The spatial distribution of pesticide contamination covers a smaller area in comparison with the Balceana site. The contaminated soil is primarily located within the foundation of the Bujor site, and all area surrounding the site is covered by natural vegetation that minimizes pesticide migration by movement of soil, water and air. This site potential for phytoremediation is limited since the principal pollution is located within the construction foundation in relatively high concentration.

This site was divided into 5 treatment areas and a control area. Areas 1 – 4 (total area of 210 m^2) and control area (total area of 25 m^2). Two complex soil samples were taken from each area (each complex sample was composed of 5 random soil samples from the depth of 10 – 20 cm.

2.2 Results of phytoremediation experiment

Only two plants showed a good extraction capacity for DDTs and HCHs: zucchini (C. pepo L. var. pepo) and pumpkin (C. pepo L. var. pepo). Zucchini plants were grown in three of the plots at studied site. Each plot had different initial soil pesticide concentrations with DDTs in the rhizosphere varying from 0.12 to 4.02 mg/kg. A total of nine zucchini plants were harvested.

Zucchini accumulated a high level of DDTs and the amount of accumulation depended on pesticide concentration in the soil near each plant (Figure 3). Harvested plants were divided into roots, stems, petioles, leaves and fruit.

Total accumulation of DDTs decreased from the roots to the fruit. Relatively high levels of accumulation were found in the roots and stems. Accumulation in the stem is the most important result for phytoremediation potential because it indicates translocation of DDTs from the roots to aboveground stems that are most easily harvested and removed from the site.

The Bioaccumulation Factor (BAF), an important indicator of phytoremediation potential, is calculated as the ratio of pesticide concentration in plant parts to pesticide concentration in the soil. BAF values for all zucchini plants fluctuated from 0.6 to 4.0 for roots and from 0.3 to 4.3 for stems (see Figure 4).

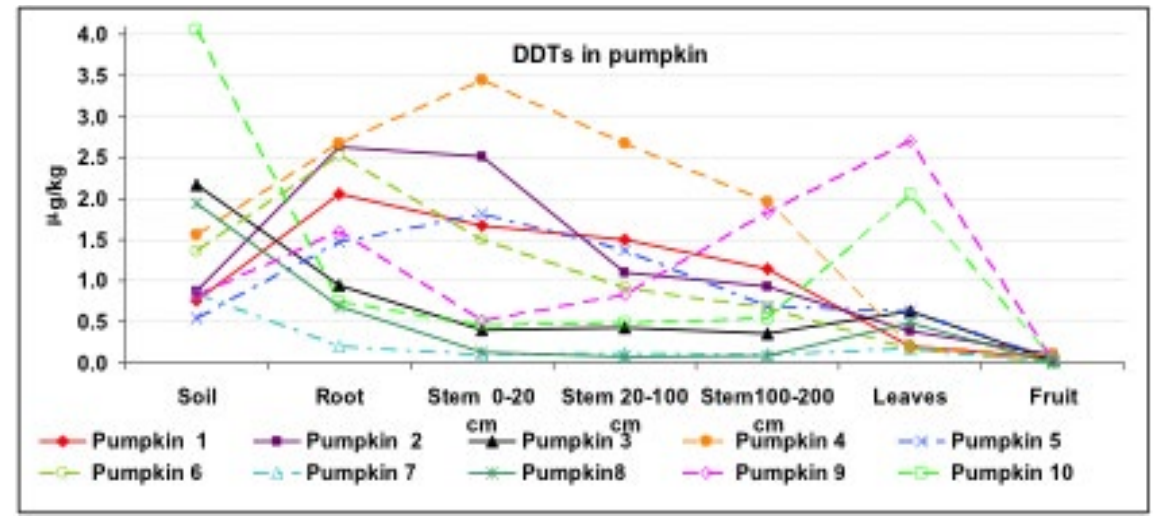

Figure 5: Accumulation of DDTs in different plant tissues of pumpkin.
Each line represents results from one of ten harvested plants.

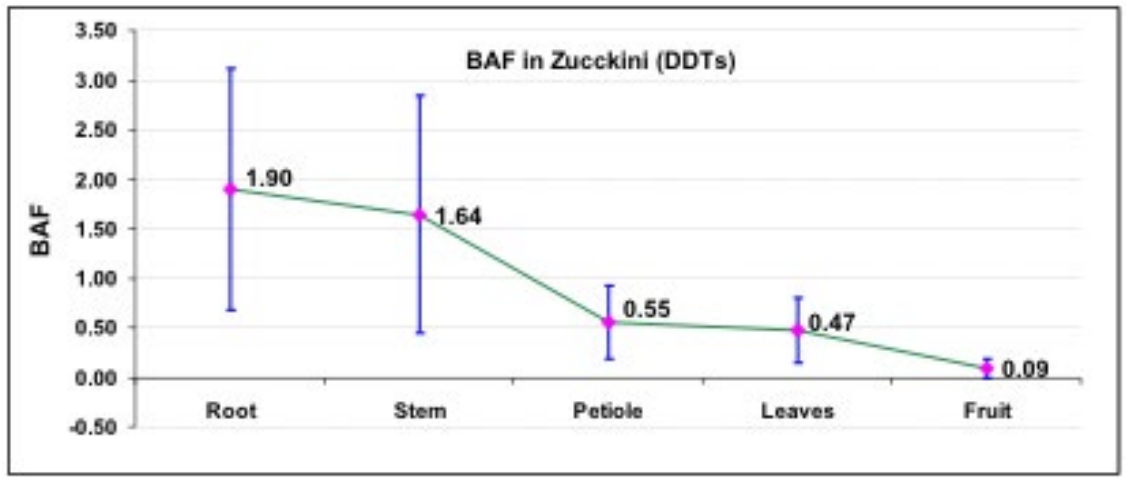

Figure 4: Bioaccumulation factor for DDTs for different tissues of zucchini plants: mean and standard deviation of BAF.

Other plant parts showed lower bioaccumulation potential. A BAF greater than 1.0 shows the evidence of accumulation potential since the concentration in plant tissue is greater than the concentration in soil. The BAF for roots and stems averaged over 1.0 with means of 1.90 and 1.64, respectively.

The pumpkin vegetation treatment also showed good phytoextraction capacity. Six plants showing higher pesticide concentrations in the roots and stems compared to the soil. Four plants showed lower DDTs concentrations in roots and stems

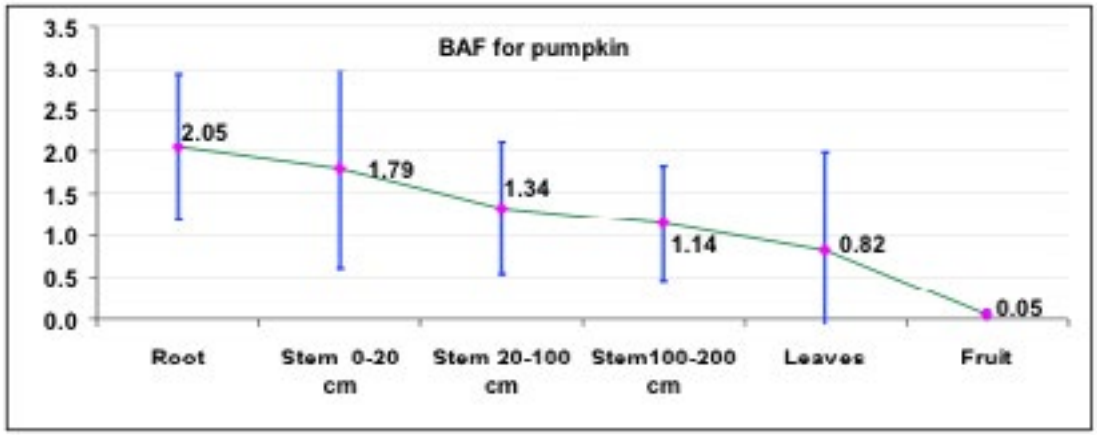

Figure 6: Mean and standard deviation of the bioaccumulation factor for DDTs in different plant tissues from ten pumpkin plants.

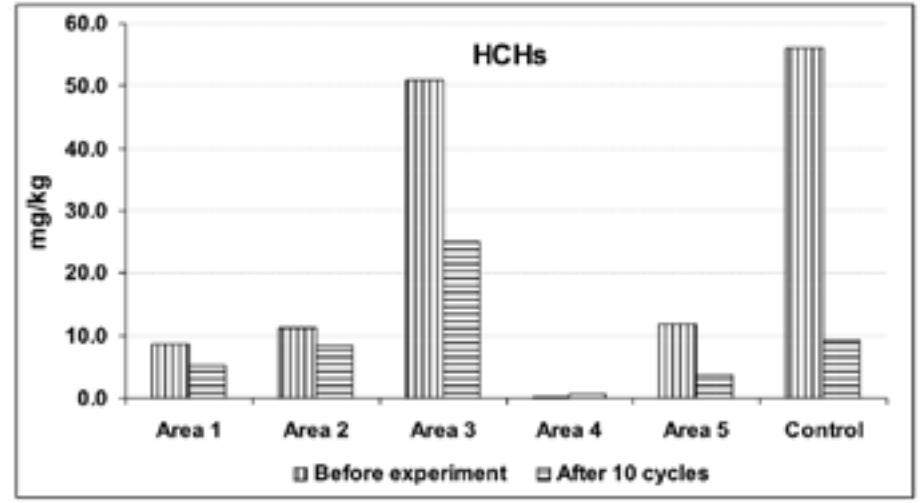

Figure 7: HCHs concentration in soil before and after bioremediation experiment

compared to soil (Figure 5). The pumpkin biomass was greater than zucchini biomass. Pumpkin stems reached up to 3 – 5 m in length. The stems were separated into groups by the distance from plant roots. The stems harvested near the plant roots showed higher concentrations of DDTs compared to stems farther from plant roots. Bioaccumulation factors for DDTs in plant tissues were very similar to observations for zucchini (Figure 6). The range of BAF for stem concentration varied from 0.45 to 3.01. The average decreased from 2.05 for roots to 0.82 for leaves. The fruit accumulate much lower amounts of DDTs with BAF 0.05. The weighted average value of BAF for zucchini was 1.10, and for pumpkin-1.42.

2.3 Results of bioremediation experiment

The principal soil pollution at this site is DDTs and HCHs isomers. The bioremediation of polluted soil leads to the decreasing of total POPs concentration in soil in the interval from 28 to 68% for HCHs and from 41 to 95 % for DDTs (Figures 7 and 8). The same decrease is indicated for Heptachlor (41 – 82 %). The principal isomer for DDTs group is p-p-DDE and beta-HCH for HCHs. The individual results for composite samples from each area show a large variation, which is attributable to the field sampling variation. The statistical analysis demonstrated that the sampling uncertainly due to contaminant

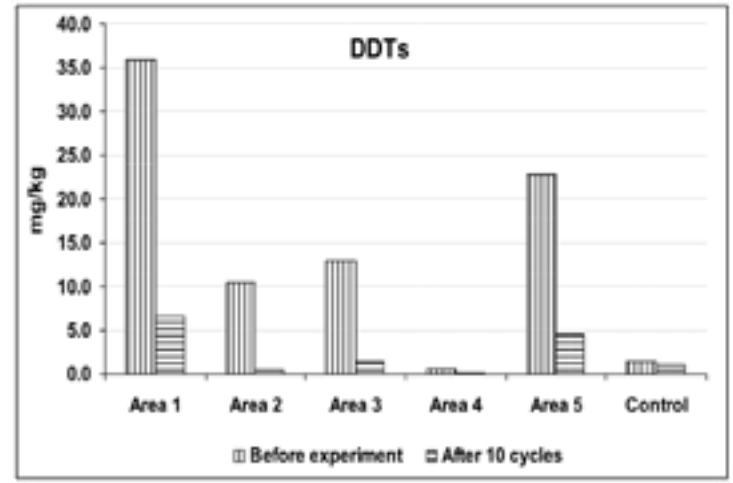

Figure 8: DDTs concentration in soil before and after bioremediation experiment

heterogeneity in the soil is much greater than the uncertainly due to analytical sampling and analysis.

The average POPs destruction after 10 cycles of treatment showed a higher level in comparison with 5 cycle treatment. The results after 10 cycles of treatment demonstrate appreciable reduction for DDTs (from 16,3 to 2,6 mg/kg, 82%), HCHc (from 16,7 to 9,7 mg/kg, 42%), and Heptachlor (from 6,3 to 1,5 mg/kg, 76%). The destruction of studied pesticides is indicated also for control area. The HCHs concentration is going down to 84 %, and for DDTs – to 34 %.

The microbiological parameters of soil community are growing by the experiment in all areas including and control site. The increase of the soil microbial activity is caused by the addition of organic substrates and can contribute to the degradation of POPs pollutant in some soils. This effect is a basic concept of DARAMEND biotechnology. This technology activates indigenous soil microorganisms for the acceleration of POPs destruction by co-metabolism. Sequential cycles of anaerobic (no oxygen, strongly reducing conditions) and aerobic (oxygen present) conditions enhance the degradation of chlorinated organics and are generated by mechanical tillage and application of DARAMEND® granulate followed by irrigation to regulate oxygen availability and moisture content.

The microbial biomass is raising up to 1,4 times, heterotrophic bacteria – 3,8 times, actinomycetes – 2,6 times, and fungi – 2,5 times in comparison with control plot. The microbiological indexes exceed regional values in local soils and were growing by the treatment process. We can simultaneously observe the acceleration of organic carbon value on test plot from 1.9 to 3,3 % in connection with DARAMEND application.

We can also indicate a relative high level of microbiological indexes in polluted soils from the investigated site, which demonstrates a presence of the active indigenous soil microorganisms. Thereby, we can explain a significant POPs destruction on control plot, without DARAMEND application: 85 % for HCHs and 34% for DDTs.

Conclusion

Phytoremediation can be used for the remediation of polluted sites; however, it needs to be designed based on local conditions. Investigators must take into consideration all advantages and limitations of this technology. This is important for plant selection, design of optimal plant density, and appropriate soil fertilization for the improvement of BAFs.

Time required for agricultural phytoremediation might be long and require utilization of complex approaches like biotechnology for the highest polluted soils.

The in-situ bioremediation by land farming could be implemented in Moldova and the results after 10 cycles of treatment demonstrate appreciable POPs reduction. Soil microbiological activity is growing by this bioremediation process, which can lead to the abovementioned destruction process. The soil contamination is still above the Moldovan soil quality criteria for agricultural land, but the risks associated with contaminated soil have been greatly reduced.

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REVISION OF THE GERMAN STANDARD DIN 19738, CHALLENGE AND FIRST RESULTS OF THE EXPERIMENTAL APPROACH

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Abstract
In Germany, an in vitro method simulating human gastrointestinal conditions was developed in 2004 in order to provide an estimate of contaminant bioaccessibility: DIN 19738 (2004-07). This existing DIN standard is currently under revision on behalf of the German Federal Environmental Agency (UBA) in order to harmonize and optimise the current standard procedure to provide conservative but reasonable estimates.

As the first step, the experimental key parameters were identified, which had mayor impact on the results of the method: the application (or replacement) of milk powder, use of enzymes and duration of the intestine phase. Soils contaminated with polycyclic aromatic hydrocarbons (PAHs), including Benzo[a]pyrene (BaP) as the relevant pollutant and soils contaminated with cadmium (Cd), lead (Pb) and arsenic (As) were used in the experimental phase.

Initial results of the research demonstrate the impact of the application of whole milk powder or concentrated milk as food surrogates on the bioaccessibility of contaminants. The use of enzymes turns out to be a further important factor for digesting of those food surrogates and thus, for the results of the experiments.

Keywords
Bioaccessibility, DIN 19738, in vitro method, polycyclic aromatic hydrocarbons, Benzo[a]pyrene, cadmium, lead, arsenic.

Introduction
Incidental soil ingestion is an important exposure pathway for assessing public health risks associated with contaminated soils. In Germany, an in vitro method simulating the human gastrointestinal conditions was developed in 2004 in order to provide an estimate of contaminant bioaccessibility: DIN 19738 (2004-07).

Within the revised German soil protection act, the investigation of the bioaccessibility of contaminants was added to get a more realistic exposure assessment. The respective lab method is supposed to provide robust and reliable data that can be used in human health risk assessments. For that reason, the existing German standard DIN 19738 is currently under revision on behalf of the German Federal Environmental Agency (UBA). The target is to harmonize and optimise the current standard procedure to provide conservative but reasonable estimates.

As the first step, the experimental key parameters were identified, which had mayor impact on the results of the method:

1. Duration of the intestine phase,
2. Use of enzymes, and

3. Application (or replacement) of milk powder.

These key parameters are modified separately within the experimental phase to determine their impact on the bioaccessibility data and to investigate the robustness of the method.

Methods

All experiments were carried out on the basis of the German standard DIN 19738 (2004-07). The existing in vitro method consists of a gastric phase (2 hours) and an intestinal phase (6 hours) simulating the human physiological digestive conditions. The saliva phase is optional (30 minutes) and was not included in the current investigations. All experiments were carried out with and without milk powder as food surrogate. The details of the methods are shown in Figure 1.

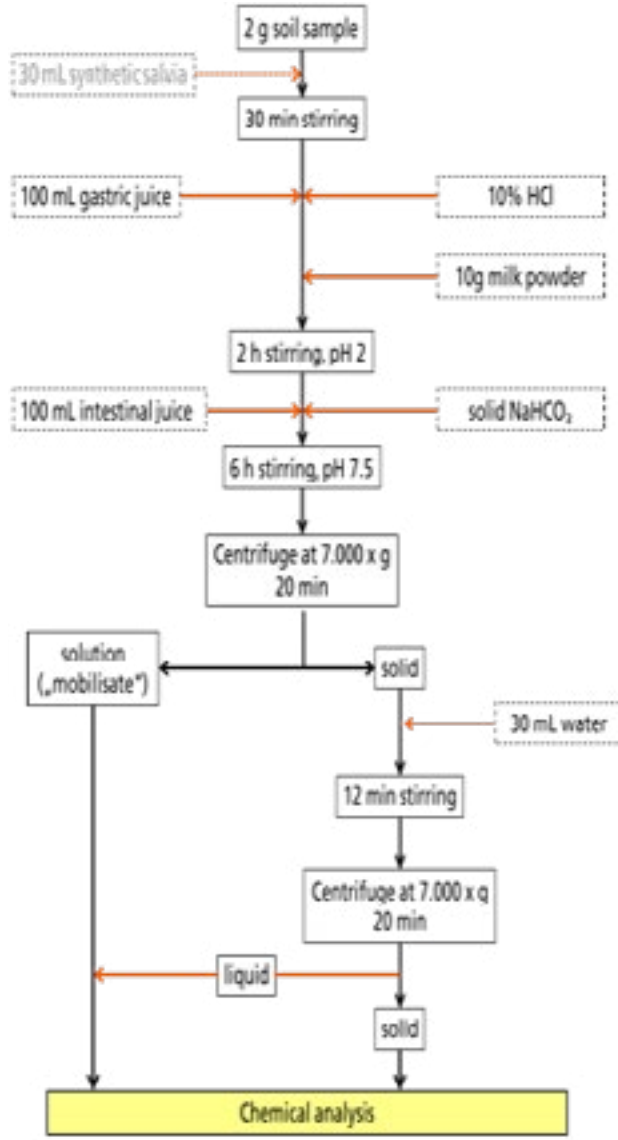

Figure 1: Procedure to investigate bioaccessibility simulating the human gastrointestinal conditions according to DIN 19738 (2004-07)

One soil contaminated with polycyclic aromatic hydrocarbons (PAHs) including Benzo[a]pyrene (BaP) as the relevant pollutant was used for the experiments with organic contaminants.

The soil was chosen due to its high concentration of PAHs (704 mg/kg soil dry weight) and BaP (56.6 mg/kg dry weight) in order to carry out all experiments without any additional clean-up or concentration steps before chemical analysis and, thus, to exclude possible further analytical variations. Chemical analysis was carried out using HPLC with fluorescence detection.

Regarding inorganic pollutants soils contaminated with cadmium (Cd), lead (Pb) and arsenic (As) were used in the experimental phase. Initial experiments were carried out using five different soils including BGS Guidance Material 102 of the British Geological Survey (BGS). Chemical analysis was performed using ICP-OES.

Results

Organic contaminants: Benzo[a]pyrene (BaP) as relevant pollutant for PAHs.
The existing standard method was modified regarding the parameters (i) duration of intestinal phase, (ii) the use of enzymes and (iii) the application or replacement of milk powder as food surrogate. The results of these experiments are summarised in Table 1.

Table 1: Results of the bioaccessible fration of Benzo (a) pyrene (BaP) as % of the total BaP concentration as mean values of three replicates.

Modified parameter	Bioaccessible fraction of BP (% of total concentration) Without milk powder	Bioaccessible fraction of BP (% of total concentration) With milk powder
Existing standard procedure	3.6	18.8
Reduced intestinal phase	2.8	18.0
Preconditioning of enzymes	1.4	17.8
0.5 x enzymes	3.2	n.a.
no enzymes	4.5	2.7
Calv-milk powder		12.5
Condensed milk		13.5

*n.a. was not analysed due to a non-homogeneous mobilisate.

The duration of the intestinal phase is an essential factor for the work organisation. For this reason, the duration of the intestine phase was reduced from 6 hours to 3 hours. Using half the time for intestinal phase, the results for the bioaccessible fraction of BaP decreased slightly from 3.6 % to 2.8 % without milk powder or remained stable with milk powder compared to the standard procedure. The test system is very dynamic due the various components like proteins, fat and carbo-hydrates of the milk powder, soil, enzymes, bile and their interaction.

Furthermore, the conditions are varying continuously throughout the test duration due to digestion, solution, precipitation and complexing processes. Therefore, further experiments focused on the composition of the synthetic digestive juices especially on the amount and activity of the enzymes (pepsin, trypsin, pancreatin).

As the first step, preparation steps were tested to ensure a gently dissolution of enzymes and, thus, to assure a high enzymatic activity throughout the test. For this reason, preconditioning of enzymes overnight was compared to the use of enzymes as solids which was carried out during the standard procedure. Preconditioning resulted in a decreased bioaccesible fraction of 1.4 % without milk powder compared to 3.6 % when enzymes used as solids whereas the results with milk powder showed no impact of preconditioning (17.8 %).

As the second step, the concentration of enzymes was reduced: Experiments were carried out using half the concentration of enzymes and no enzymes. The results for the bioaccessible fraction of BaP were 3.2 % and 4.5 % without milk powder and, thus, in the range of the standard procedure (3.6 %) indicating that the concentration of enzymes does not have an impact on the test system without food surrogates. In the experiments with milk powder however, the mobilisate was found to be non-homogeneous (i.e. a fat phase was visible) and the results of the bioaccessible fraction of the pollutant were greatly reduced (2.7 %) compared to the standard procedure (18.8 %).

Milk is a food surrogate containing proteins, fat and carbohydrates as an emulsion and is currently used in the test system as a powder. To investigate the impact of this food surrogate, calv-milk powder and milk in a standardised liquid form (condensed

milk) were used in the experiments. Bioaccessibility results of both calv-milk powder and condensed milk were reduced (12.5 % and 13.5 %, respectively) compared to the milk powder (18.8 %). Regarding calv-milk powder, the results may be caused by the lower fat content. Handling of all three options is similar, but the separation of the solid phase with condensed milk is more difficult, and an extension of the centrifugation step is, therefore, needed.

Further experiments with a reduced amount of milk powder and condensed milk and contemporaneously halved or doubled concentration of enzymes are ongoing.

Conclusion

The robustness of the in vitro method DIN 19738 was tested using Benzo[a]pyrene as a representative of lipophilic contaminants.

Samples with addition of milk powder turned out to be robust against variation of intestinal phase duration whereas samples without milk powder are probably more sensitive against variation of this phase.

The fat portion of the milk powder is an important factor for lipophilic contaminants during bioaccessibility testing. Non-digested milk powder (e.g. a visible fat phase) resulted in a severe underestimation of the bioaccessible fraction. The fat may act like a surface coating of the soil and prevent the transfer into the aqueous mobilisate or the mobilisate is non-homogeneous resulting in non-reliable analytical results. In this context enzymes play an important role by digesting the milk powder (and not the soil) during the test.

A high variability of PAH results was found despite of the high contaminant concentration in the chosen soil, especially when the bioaccessible fraction was very low. The standard deviation was up to 57 % within 3 replicates.

Experiments with the inorganic contaminants cadmium, lead and arsenic confirmed the great impact of milk powder on heavy metal bioaccessibility, which is described in literature. Robustness is still under investigation.

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RISK REDUCTION OF SOIL CONTAMINATED BY OBSOLETE PESTICIDES IN AFRICA

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African Stockpiles Programme-Mali, Bamako, Mali

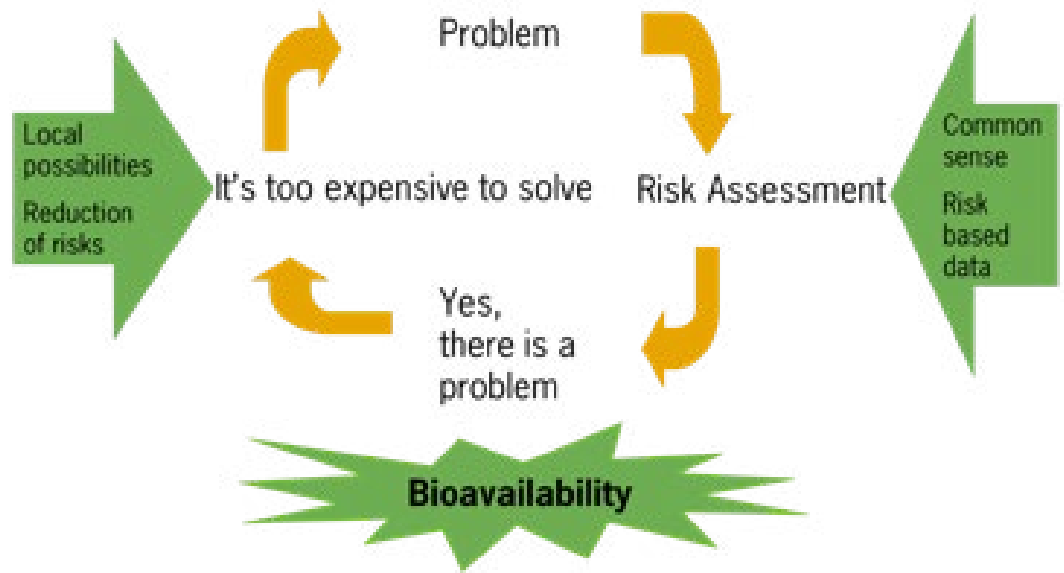
1. Introduction

The FAO Programme on the Prevention and Disposal of Obsolete Pesticides (FAO, 2013) is designed to get rid of stockpiles of obsolete pesticides and to ensure that new stockpiles do not accumulate. The Africa Stockpiles Programme (ASP), being a part of this program, had its focus on Africa. Most of the pesticides have been shipped to Africa for locust control but did not arrive at the proper place or proper time, thereby becoming obsolete. High concentrations of pesticides (e.g. dieldrin, parathion, malathion, chlorpyrifos) can be found in soils on the stockpiles.

The experience within ASP has shown that methods to assess the risks of contaminated soils are often too theoretical, difficult to complete in the African conditions, necessary laboratory facilities are lacking, and this all results in a wait and see attitude. This wait and see attitude becomes even stronger if the assessment procedure is followed by the recommendations based on too expensive or not realizable northern technology. The result is that no real actions to reduce risks are taken, nothing will happen till a new assessment will be started in future; an infinite circle (Figure 1).

This paper presents another entry: break this circle, assessment is not the primary goal, because for most suspect depots and sites, a visit and expert judgment is

Figure 1: Breaking the assessment circle (slightly modified from Harmsen and Naidu, 2013)



already sufficient to conclude that there is a potential risk for human health and environment. There is a strong need for immediate action and measures to reduce the risks of the pesticides. Regulations are mostly focused on these concentrations, but from a risk-based point of view, contaminations are only a risk if they are or may come available, a risk-based approach. This widens the range of options and, therefore, can facilitate more tailor-made solutions for individual sites. In a risk based approach, the stimulation of biodegradation of the pesticides and/or immobilization and isolation of the contaminant may play a role. The concept of bioavailability has shown to be a suitable tool in breaking the circle.

From a risk-based perspective, contaminations are only a risk if they are or may become available. This widens the range of options and, therefore, can facilitate more tailor-made solutions for individual sites (Harmsen et al., 2009). The following steps are necessary:

1. Investigation of the site (e.g. his torical use, hydrology, climate, transport).
2. Defining of the site specific risks.
3. Gathering of missing information, including local conditions and sampling.
4. Possibilities for site specific and sustainable remediation by risk reduction.
5. Implementation of the risk reduc tion measures.

2. Materials and methods

Three sites in Mali and three sites in Mauritania were investigated in 2007 following steps 1-3. Most important risks identified were as follows: a) inhalation of volatilized pesticides, b) transport to groundwater, c) physical contact by human and cattle d) run-off by rain (Mali) and e) wind erosion (Mauritania). Based on the results obtained and results of analysis of the samples taken, risk reduction proposals were made and discussed locally (step 4). All proposals are based on the use of local conditions to stimulate biodegradation and/or to prevent rain water to transport the pesticides both vertical as horizontal. In populated areas, a plan for future use was part of the solution to prevent that houses will be built on the isolated site. All plans have in common that they reduce the risks for the local population, are simple and cheap and can be implemented on a sustainable way, even under the difficult African conditions. First implementations (step 5) have been started in summer 2008 in Molodo (Mali) followed by activities on several other locations.

3. Results and Discussion

3.1 Results of monitoring and proposals for risk reduction

From all six sites, the following general conclusions could be drawn:

− On all locations, vegetated and biological active zones were present, in which biodegradation could occur.

− The amount of precipitation is limited, accounting from 20-200 mm/year in Nouakshott to 250-600 mm/year in Molodo. Most rainfall falls in the period from June to September. The evaporation is higher and if it is possible to use vegetation, all precipitation can be evaporated, thereby, preventing leaching to the groundwater.

− In Mali, transport of contaminants by surface run-off caused by heavy rains may occur.

− In Mauretania, polluted soils can be transported by wind.

− In Mauretania, the formation of sand dunes can be used to prevent the pollution. Vegetation can be used to stabilize these dunes and evaporate the small amount of rain.

For remediation, the following strategies has been followed:

− If possible, removal of the contamination in the source and spreaded contamination by biological treatment using landfarming (Harmsen et al., 2007). Landfarming is an easily applicable, simple and cheap technology.

− Isolation of the contaminant by evaporation of the precipitation using vegetation

− Isolation of the contamination by using natural covers (e.g. sand dunes in Mauretania).

− Increasing adsorption capacity of soil by adding local available black carbon (charcoal). Organic contaminants are strongly adsorbed by black carbon (Koelmans et al., 2006)

In the final situation, the areas used for landfarming and the final destination have to be vegetated using deep-rooting vegetation that can survive under local dry conditions and are not eaten by cattle (BOUMEDIANA, 2001). Vetiveria (Mafei, 2002) and Jatropha have been selected.

3.2 Implementation

The first implementation started in Molodo in June 2008. For logistical reasons, it was necessary to start with the excavation of the centre. One of the concrete construction present on the site has been used for temporary storage. Care was taken not to break the clay layer in the contaminated area to prevent direct contact with the groundwater. For refilling of the excavation, bioactive surface soil has been used. Doing this, biological activity was introduced at the contact layer of the contaminated soil left and the refilling soil. It is expected that this activity will slowly decrease the residual concentration. After filling, the soil has been enriched with local available compost and vegetated with vetiveria and jatropha to increase evaporation.

A small landfarm has been constructed, just beside the contaminated centre. This landfarm has been enriched with compost for further biological activation. The first charge of the contaminated soil has been spread on the landfarm. The results of this first charge are presented in Table 1 on next page. As expected, parathion-ethyl has been degraded and dieldrin not. Part of the soil on the landfarm has been transported to the final concrete depot. The soil on the bottom of this depot has been enriched with charcoal, to increase the adsorption capacity for dieldrin (Figure 2). A following charge has been brought to the landfarm from the temporary storage.

Figure 2: Application of charcoal to prevent leaching

Table 1 Pesticides concentration in soil on the landfarm

	July 16, 2008			November 11, 2008		
	Parathion-ethyl g/kg d.m.	Dieldrin g/kg d.m.	Ratio	Parathion-ethyl g/kg d.m.	Dieldrin g/kg d.m.	Ratio
1	0.527	0.786	0.67	0.0095	0.442	0.021
2	1.497	0.518	2.89	0.021	0.745	0.028
3	1.615	0.869	1.86	0.011	2.775	0.004
4	3.085	1.081	2.85	0.01	0.775	0.013
5	0.868	0.459	1.89	< 0.003	0.118	<0.025
Average	**1.52**	**0.74**	**2.03**	**0.011**	**0.97**	**0.018**

Table 1: Pesticides concentration in soil on the landfarm

4. Conclusions

A lot of sites in Africa are polluted with obsolete pesticides, which are sent to Africa for locust control. In pilots in Mali and Mauretania, remediation strategies are developed that reduce risks and can be used under difficult African conditions. The remediation strategies are based on application of bioremediation using land-farming and/or isolation of the contamination. Implementation has been started in 2008 and turned out to be successful. This was followed by the implementation on the other sites in Mali and Mauretania.

The results of the project were shared with other African counties during a workshop in Bamako in 2010. This was followed by the implementation in Botswana, and in autumn 2013, activities were started to implement the approach in Benin.

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MEASUREMENT OF BIOAVAILABILITY, THE ROLE OF STANDARDIZATION

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1. Introduction

Contaminants only pose a risk if they are or become, available in a form that can have impact on human or ecosystem health. A risk-based approach that incorporates the bioavailability of contaminants for the identification of sites that require remediation and for setting priorities (NRC Committee, 2003), may be useful and more cost-effective than the approach based on total contaminant loading. A risk-based approach, rather than a total concentration approach, should result in the stimulation of the application of biodegradation and/or immobilisation and isolation of the contaminants as part of the solution. Local site-specific conditions may also play an important role and be taken into account by risk-based approaches (Harmsen and Naidu, 2013).

In the scientific community, it is already common knowledge that the total concentration of contaminants overestimates the risks and that risk assessment should be based on available concentrations.

Although definitions are still being discussed, there is a common view on bioavailability. Moreover, a large number of methods that estimates the bioavailable fraction, has become available. On the level of regulation and administration, people also realize that risks are overestimated, but there is a long experience with total concentration. Total concentrations are measured with validated, and reliable methods are often described in both national and international standard procedures. From regulatory point of view, there is no direct drive to change their system. If they change, the system should 1) be easy explainable to the public, 2) make use of methods that others use, 3) provide clear results and no further discussion, and 4) be cheap and straightforward.

For the implementation of bioavailability, the regulation should like to have “THE” method to measure the bioavailable fraction. Science, however, offers a large number of methods, and developers of test have a lot of arguments to prove that their method is the best one. This causes confusion and hampers the implementation of bioavailability within the regulation. Standardization is a tool to close the gap between science and regulation. In this paper, we describe the way ISO working groups have worked on the standardization of methods to establish the bioavailable fraction. Scientific approaches had to be translated into standardized methods (Harmsen, 2007). Doing this in a proper way, standards will play an important role in the implementation of bioavailability in regulation, as shown for Germany by Kördel et al., 2013.

2. To standards on Bioavailability

2.1.Guidelines

The ISO working group on bioavailability started their work with the development of a guideline on bioavailability. This guideline had the function of a conceptual framework and gave direction for use and further development of methods.

The concept is presented in Figure 1. The upper part in the figure represents the soil, while the lower part- the organism, and both parts are separated by the cell membrane. Bioavailable compound will pass the cell membrane, and the amount can be predicted by chemical measurements in soil, or biological measurement using specific organisms. In soil, bioavailability can be distinguished as follows:

• The actual dissolved amount at ambient conditions, and

• The potentially-available amount, for example, the maximum amount that can be released under (predefined) worst-case conditions.

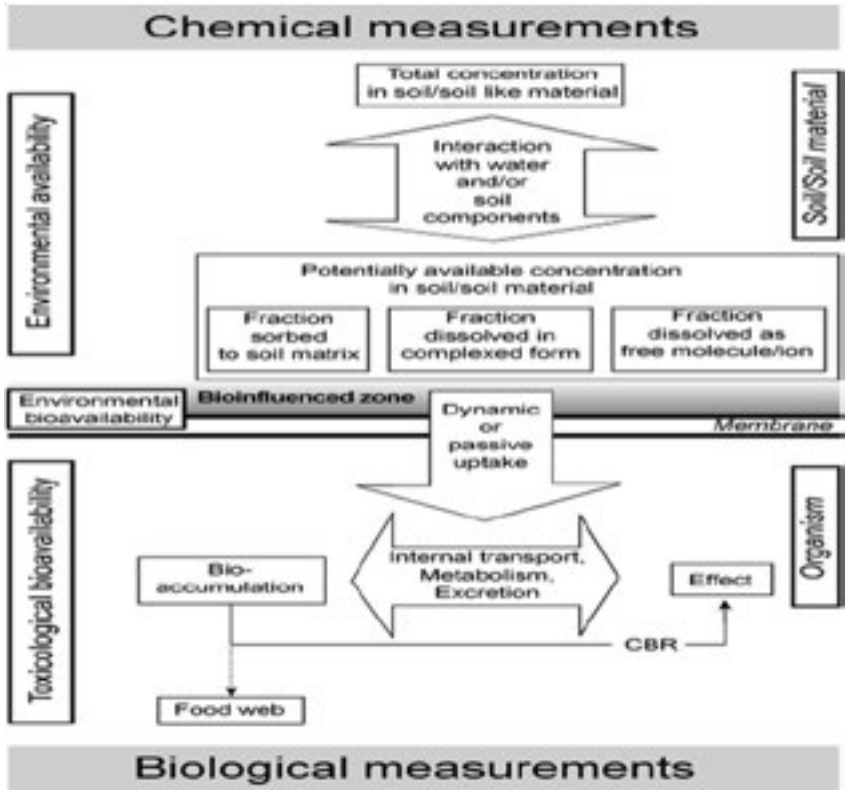

Figure 1: Concept of bioavailability, from total concentration in soil to effect (From: ISO 17402)

An important statement in the guidelines was that methods should have an understandable physical base. Empirical methods should not be the basis of a standard method. In 2008, ISO 17402:2008 Soil quality -- Requirements and Guidance for the Selection and Application of Methods for the Assessment of Bioavailability of Contaminants in Soil and Soil Materials, has been published.

2.2 Measurement of bioavailability

2.2.1. Trace elements

Following the publication of the guidelines, the development of specific standards to give an estimate of bioavailability has started. For trace elements (e.g. heavy metals), a method using 0.001 M CaCl2 was adopted to measure the actual availability. This method simulates the amount solved in the pore water. This method (ISO/TS 21268-part 1) is already used to predict leaching. The second method, ISO 19730, already in use for a longer period, uses 1 M NH4NO3, which physical base is less because of the high concentration. The method is used to predict the uptake by vegetation (Gryschko et al., 2005). To measure the potential available trace element, an extraction with diluted HNO3 is developed (ISO/DIS 17586).

As follows from Figure 1, bioavailability can also be estimated using the organism. In ISO 16198, a plant-based biotest is described to assess the environmental bioavailability of trace elements to plants in contaminated soils. Trace elements are transported through the water phase, and the accumulation using well-defined conditions is a measure for the availability.

For users of the standards, it is important to know what the meaning of the measured values is. Bioavailability has to be combined with the word "for". The size of the bioavailable fraction of a contaminant depends on the organism. Pathway (e.g. ingestion dermal contact inhalation) and exposure (e.g. contact time and binding to soil) are organism dependent parameters. It is necessary to calibrate a method (measured bioavailable fraction against the effect). Effects can be uptake and accumulation, but also toxicological parameters like mortality, growth, reproduction and behavioural responses. How to use the measured values and limitations of this use will be described in ISO/CD14858 Soil Quality — Environmental Availability in Soil — Use of Soil |Extracts for the Assessment of Trace Element Bioavailability.

2.2.2. Organic contaminants

For organic contaminants, ISO-standardisation is presently focused on the potentially available fraction using the TENAX/ cyclodextrin method. In the near future, this will be followed by translation of the scientific developments on the measurement of actual availability (passive sampling) into an ISO-standard.

The standard (ISO 16751) for the potential available fraction specifies an extraction method using a 'receiver phase' for an organic contaminant with strong sorbing properties. This phase can be a complexing agent (cyclodextrin) or a strong adsorbent (Tenax), which maintains the mass transfer of available organic contaminants from a soil or soil-like material including (dredged) sediments to the aqueous phase. By abating solubility constraints, both methods give an estimation of the environmental availability of the organic contaminant, i.e. the amount of the contaminant with mass transfer potential to exchange from soil or soil like material into the aqueous phase and reflects the fraction of contaminant that can exert effects on biotic systems. The method is applicable for organic contaminants with a log Kow> 3.

Using this method, biodegradation and effects on organisms can be predicted (e.g. Cornelissen et al., Reid et al 2000, 1998, Hulcher et al, 2003, Hickman et al; 2008). All these "calibrations" will be described later, comparable to ISO/CD14858 for trace elements to give the users some guidance in application of the measured results.

3. Broader applications

Leaching of contaminants to groundwater, which can also be considered available, is an unwanted effect of use and reuse of soil and also building materials. This has been recognized in standardization and standards on leaching are in use. The first series was the ISO/TS 21268:2007 Soil quality -- Leaching Procedures for Subsequent Chemical and Ecotoxicological Testing of Soil and Soil Materials. Having more experience with this method, it became possible to predict leaching behaviour, using soil characteristics like pH, clay, iron- and aluminium oxides and thermodynamic properties. For this purpose, the ISO 12782 series has been developed.

In soil and site assessment, human take a specific position. Ingestion of soil, especially by children, is considered as an important risk. Bioaccesibility/bioavailability for human is described in ISO/TS 17924 (Assessment of human exposure from ingestion of soil and soil material -- Guidance on the application and selection of physiologically based extraction methods for the estimation of the human bioaccessibility/bioavailability of metals in soil). This standard from 2007 will be actualized in the coming period.

4. ISO standards on bioavailability or related to bioavailability

4.1. Bioavailability

The standards listed below are published or in development within ISO/TC190/Soil

Quality.
It represents the situation of December 2010

ISO 17402:2008 Soil quality -- Requirements and guidance for the selection and application of methods for the assessment of bioavailability of contaminants in soil and soil materials

ISO/DIS 16198 Soil quality -- Plant-based biotest to assess the environmental bioavailability of trace elements to plants

ISO/DIS 17586 Soil quality -- Extraction of trace elements using dilute nitric acid

ISO 19730:2008 Soil quality -- Extraction of trace elements from soil using ammonium nitrate solution

ISO/CD14858 Soil quality — Environmental availability in soil — Use of soil extracts for the assessment of trace element bioavailability

ISO/AWI 16751-1 Soil quality -- Environmental availability of non-polar organic compounds -- Part 1: Determination of potential availability using a strong absorbent or complexing agent

4.2 Leaching
ISO/TS 21268:2007 Soil quality -- Leaching procedures for subsequent chemical and ecotoxicological testing of soil and soil materials

• Part 1: Batch test using a liquid to solid ratio of 2 l/kg dry matter

• Part 2: Batch test using a liquid to solid ratio of 10 l/kg dry matter

• Part 3: Up-flow percolation test

• Part 4: Influence of pH on leaching with initial acid/base addition

ISO 12782:2012 Soil quality -- Parameters for geochemical modelling of leaching and speciation of constituents in soils and materials

• Part 1: Extraction of amorphous iron oxides and hydroxides with ascorbic acid

• Part 2: Extraction of crystalline iron oxides and hydroxides with dithionite

• Part 3: Extraction of aluminium oxides and hydroxides with ammonium oxalate/ oxalic acid

• Part 4: Extraction of humic substances from solid samples

• Part 5: Extraction of humic substances from aqueous samples

These series will be completed with Part 6, Guidance for the application of ISO 12782, which describes the use of models.

4.3 Bioaccesibility/bioavailability
ISO/TS 17924:2007
Soil quality -- Assessment of human exposure from ingestion of soil and soil material -- Guidance on the application and selection of physiologically based extraction methods for the estimation of human bioaccessibility/bioavailability of metals in soil.

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REMEDIATION OF POP PESTICIDES POLLUTED AREAS IN THE CONDITIONS OF MOLDOVA

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Abstract

During the last decade, pollution due to POP pesticides has been recognized by the Moldovan authorities as a problem of national priority, which needs to be resolved in order to reduce/eliminate the impact of POPs on human health and the environment. As a result of national inventory carried out in 2008-2010, about 1600 contaminated sites were identified and described.

This study on remediation of POP pesticides polluted areas is complementary to the actions undertaken during last years in the field of sustainable POPs management and has as specific objectives: (i) to identify Best Available Technologies (BAT) for of POP pesticides polluted areas, taking into account technical, financial and economic aspects; (ii) to assess their potential environmental/health benefits and impacts; (iii) to implement appropriate remediation techniques at a few selected sites.

Based on the assessment which included aspects of practical and economic feasibility for implementation taking into account costs, performance, efficiency and potential impacts on the environment and human health, two techniques – isolation in controlled soil stockpiles and biological treatment with the Daramend technique have been selected and tested/validated at three pilot demonstration sites in order to identify methods most appropriate for Moldova with a view to recommendation of remediation strategies for other OP sites throughout the country pending the available financial resources.

Based on practical results, the Guidelines for local environmental authorities on how and when to carry out remediation measures on areas polluted with POP obsolete pesticides have been prepared.

Keywords

Persistent organic pollutants (POPs), obsolete pesticide (OP), contaminated sites, risk assessment, remediation, economic evaluation

Introduction

By the early 1990s, about 1000 warehouses for pesticide storage had been built in the collective farms. During the period from 1991 to 2003, most warehouses were destroyed or dismantled and only about 20% were maintained in a satisfactory condition. Significant amounts of obsolete pesticides were stored in the open inadequate containers and areas adjacent

to warehouses were contaminated as a result of improper management of OP storage. As some storage facilities are situated close to residential areas and water courses, the risk of harmful effects on the environment and people's health is thereby greatly increased.

As a result of actions on repackaging and centralized storage of OP carried out in 2003-2008, about 340 warehouses have been fully emptied, ensuring the elimination of the most direct threats to human health and the environment. At the same time, these warehouses remain a significant pollution source because their walls, floors, and adjacent territories are contaminated.

Tackling this problem requires a detailed inventory and risk assessment of those sites, along with development of appropriate remediation measures. Such studies were conducted in parallel in 2008-2010 by the Ministry of Environment within two projects supported by the World Bank. As a result of the first study about 1600 contaminated sites were identified, described and included in an integrated database: http://pops.mediu.gov.md /1/.

The second study, presented below, was carried out to satisfy the urgent need for selecting suitable and affordable technical options for clean-up of obsolete pesticide residues and remediation of contaminated sites. It was conducted within the CIDA/WB Project "Remediation of POP pesticide polluted areas and inventory of PCB contaminated oil in power equipment" by the NIRAS Consulting Engineers and Planners A/S, and managed by POPs Sustainable Management Office (www.moldovapops.md).

The specific objectives of this study were as follows:

– To identify Best Available Technologies (BAT) for of POPs pesticides polluted areas, taking into account technical, financial and economic aspects;

– To assess their potential environmental/health benefits and impacts;

– To implement appropriate remediation techniques at a few selected sites.

The remediation techniques had to be tailored to best fit local characteristics like soil type, hydrogeology, contamination degree, and pesticide category. The identified techniques had to be tested/validated at selected pilot demonstration sites in order to identify methods most appropriate for Moldova with a view to recommendation of remediation strategies for other OP sites throughout the country pending the available financial resources.

1. Approach

To achieve the objectives set, addressing the issue included several stages: (i) classification of POP pesticides polluted sites; (ii) selection of demonstration sites; (iii) evaluation and selection of appropriate BATs for remediation; (iv) application of selected remediation techniques at the demonstration sites; (v) economic evaluation of the methods applied. More detailed description is presented in /2/.

Classification of pop pesticides polluted sites

During the initial project phase, data collection to identify site characteristics was initiated. Criteria for pre-selection and final selection of demonstration sites to test remediation technologies were defined based on the following considerations: site conditions affecting choice of remediation technique; and the need for remediation i.e. risk to human health and environment.

Based on the data available concerning the former OP warehouse, the main criteria for classifying the sites have been as follows: soil pollution levels and potential

for pollution in floors and walls; physical state of warehouse; threat to human health dependent on the proximity to sensitive human and ecological targets; type of soil under and around the warehouse classified either as permeable to rain water.

Selection of demonstration sites

Based on above mentioned criteria, three contaminated sites for demonstration, of the 386 records for former OP warehouses, have been selected and proposed clean-up actions for each particular site as well as approximately amounts of soil to be treated are:

• *Bujor*: combination of bioremediation and isolation in cofferdam of demolished foundation. Amounts: bioremediation – 170 tons soil, cofferdam – 340 m³ soil, demolition wastes – 449 m³. Excavation and backfill the site with clean soil – 550 m³. Cofferdam built on site.

• *Congaz*: demolition of building and cofferdam with both soil and demolition waste. Amounts: soil – 780 m³; demolition waste – 1030 m³. Excavation and backfill the site with clean soil – 1020 m³. Cofferdam built 3 km south-west off site.

• *Step-Soci*: demolition of foundation and cofferdam with both soil and demolition waste. Amounts: contaminated soil – 30 m³; demolition waste – 120 m³. Excavation and backfill the site with clean soil – 150 m³. Cofferdam built on site.

Evaluation and selection of appropriate BATs for remediation

The applicability of BAT Remediation Technologies for clean-up of sites polluted with pesticides (contaminated soil) was identified and assessed. The assessment included aspects such as practical and economic feasibility for implementation in Moldova and took into account costs, performance and efficiency as well as treatment time in full-scale field trials; and potential impacts on the environment and human health. The evaluation criteria included:

– *Risk management* based on ability of different kinds of remedial options to prevent risks in relation to the conceptual model describing the source of contamination and spreading to the environment and human targets;

– *Identification of available potential techniques* to clean-up soil contaminated by pesticides and POPs, already tested and approved by international organizations /3, 4, 5, 6/;

– *Economics*, based on techniques that are low cost, also for low volumes of soil to be treated;

– *Performance and efficiency* – it is important that the selected technique is not sensitive to variation in the type and nature of the contamination or require many fine adjustments of the process in order to achieve the required effect.

– *Time-frame and need for post clean-up monitoring* – the selected technique can complete clean-up to the required criteria within a reasonably time frame, and it is also desirable that there are no long-term requirements to monitor clean-up levels or control integrity of clean-up measures;

– *Environmental effects* – it is important that the selected technique does not produce residues, wastewater and gaseous emissions that can contaminate the environment and requiring special treatment.

Two remediation (BAT) techniques have been chosen for the three demonstration sites and tested with a view to possible further implementation in Moldova:

isolation in controlled soil stockpile (cofferdam) and bioremediation.

2. Remediation at the demonstration sites

Remediation activities at the demonstration site works have been preceded by a preparation process involving the development of the documentation legally required before starting the works.

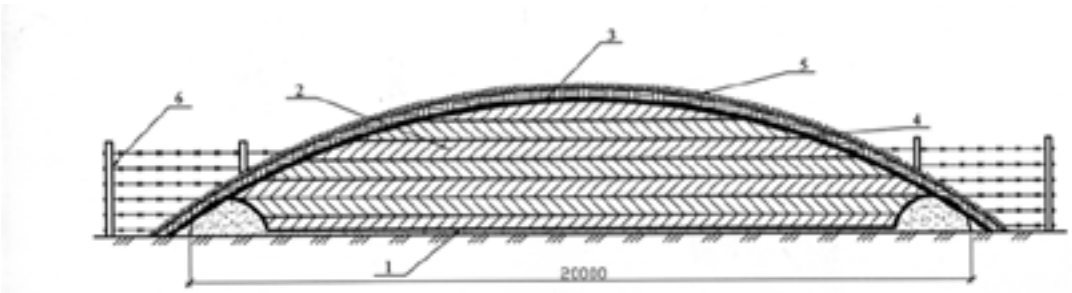

Figure 1: Constructive scheme of controlled POPs contaminated soil stockpile (cofferdam): 1 - polyethylene film covering the bed of cofferdam (buttom membrane), 2 - contaminated soil and rubble placed in layers and compacted, 3 - polyethylene film covering cofferdam (top membrane), 4 - layer of topsoil, 5 - sown grass, 6 - fence made of concrete pillars and barbed wire (mesh).

Controlled soil stockpile (cofferdam)

The scheme illustrating principle construction of a cofferdam is shown in Figure 1.

The cofferdam is a constructed controlled pile where contamination from the content stored inside it (in our case - contaminated soil and contaminated demolition wastes) to the ground water is secured by a bottom and top liner (membrane) and the soil is secured against surface water and rainwater by a bank around the pile and a top liner. The top liner is secured with a layer of clean soil topped with grass and a fence with warning signs are placed around the cofferdam.

Since the main function of a cofferdam is isolation the requirements toward this kind of construction consist of respecting/considering a number of factors which could affect its function/purpose: the right topographical location; the right design and its diligent execution in order; the content of the cofferdam; the access to cofferdam is denied /2/.

Bioremediation

Daramend is an advanced biological treatment technology for soil, sediment and solid wastes contaminated with recalcitrant organic compounds /7/.

The bioremediation test at the Bujor site included 10 cycles of Daramend application. The total surface of the test area was about 200 m2. The depth of tilling was 25-30 cm. The concentration of HCH, DDT and Heptaclor in the soil has been determined after 5 and after 10 cycles of treatment, and compared with data for the baseline analyses /2/.

As the mean concentrations after 5 cycles of treatment were still well above the Moldovan soil quality criterion of 0.1 mg/kg, the soil treatment in all areas has been extended to 10 cycles of treatment. The results after 10 cycles of treatment demonstrate appreciable reduction of up to 84% for sum of DDT, 42% for sum of HCH and 76% of Heptachlor.

The soil contamination is still above the Moldovan soil quality criteria for agricultural land (0.1 mg/kg), but the risks associated with contaminated soil have been greatly reduced. The contaminated area at

Bujor will not be used for agricultural or residential land use and the residual contamination is less than soil quality criteria for industrial land as defined in some EU countries. Furthermore, the site is usually covered by fairly dense vegetation, which prevents spreading of the low-level contamination in soil dust. No further actions are therefore recommended.

3. Economic evaluation

The economic evaluation of the BAT applicability – the direct and total costs as well as the unit price (efficiency) of both methods achieved during the remediation activities are presented in the table below (1 Euro = 16 Moldovan Leis).

		Congaz	Bujor cofferdam	Step-Soci	Bujor bioremediation
Amounts of soil and rubble treated,	m^3	4 942	1 545	440	98
Time to achieve cleanup	Day	23	10	8	>70
Man hours required to complete	hr	864	264	126	120
Training hours need to complete	hr	2	2	2	2
Cost of treatment/materials	Leis	39 212	20 662	7 892	112 612
Cost of hire for equipment	Leis	170 450	76 650	26 600	44 246
Cost of manpower	Leis	19 440	5 940	2 835	1 950
Daily Rate, manpower , man/days	Leis	150	150	150	130
Costs of hire equipment, average	Leis	350	350	350	350
Direct costs	Leis	229 102	103 252	37 327	158 808
Total cost including taxes	Leis	408 297	196 964	71 307	158 808
Cost of PPE		21 419	11 953	5 380	2 767

		Congaz	Bujor cofferdam	Step-Soci	Bujor bioremediation
TOTAL GENERAL		429 716	208 917	76 687	161 575
Price/ m^3	Lei/m^3	86,9	135,2	174,3	1 648,7
Achievement of clean-up goal		100%	100%	100%	50%
Need for maintenance		Yes	Yes	Yes	No
Need for follow up treatment		No	No	No	No
Applicability at other sites		Applicable	Applicable	Applicable	Applicable
Future maintenance		Needed	Needed	Needed	No
Need for future treatment		Yes	Yes	Yes	No
Future cost , treatment		Unknown	Unknown	Unknown	None

Table 1: Comparison of Economic Aspects

Conclusions

The conclusions concerning the appropriate remediation techniques that can be implemented by local authorities in Moldova can be summarized as follows:

Priority for clean up activities: Risks should be reduced immediately as a top priority if there is risk to human health due to close proximity of the OP site to residential areas or vulnerable drinking water wells, and if the soil pollution and/or contaminated building materials are present at the OP site.

Good detailed site investigations: The site investigation is the basis for decisions on the need for remediation and on the extent of remediation required.

Start planning in good time: The planning process takes time, and the implementation is not possible in the winter months.

Getting Works Permit: The demonstration projects experienced a number of delays due to the need for clarification on a number of legislative aspects concerning permits to start the work. Some of these problems are solved by the descriptions provided in the guidelines and the template for the Technical Design of Works used for the demonstration projects.

Establish a local advisory facility: From the workshops and dissemination seminar, it is learned that the "site owners" needs a back up advisory facility from e.g. the PMT office or a local consultant attached to the PMT office. The Guidelines should be used by the "site owners", but anyhow some backup advisory is needed especially in the first remediation projects regarding; site investigations, planning, work permits, use of PPE and training of site supervision managers etc.

Use of PPE: Occupation health aspects involving use of Personal Protective Equipment (PPE) are easier to enforce if a short-term intensive construction project is initiated immediately after training in the use of PPE.

Recommended remediation method is a controlled soil stockpile (cofferdam): As many sites have both contaminated soil and building rubble, the method of choice is to excavate the contaminated soil and rubble to a controlled soil stockpile (Cofferdam). However this method is not a permanent method since the contamination is not treated, but isolated. Risks to human health are prevented, but maintenance is required to ensure the integrity of the protective isolation measures. If there are a number of smaller sites, there might be economical and management advantages to excavate the soil and waste materials and transport these to a local controlled soil stockpile site, so that maintenance costs can be reduced.

Enhanced biological degradation is not directly applicable: The biological method by land farming whereby excavation is avoided is assessed not to be directly applicable in Moldova at former OP warehouses due to uncertainty about the clean up levels that can be achieved for the investment involved and due to the presence of contaminated rubble. Permanent reduction of risk is however achieved, and the land is most probably suitable for industrial purposes especially if combined with an addition step to cover residual soil pollution with a clean soil layer.

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IMPACT OF BIOCHAR AND BIOCHAR SUBSTRATES AMENDMENT ON BIOAVAILABILITY AND DEGRADATION OF ORGANIC CONTAMINANTS AND PESTICIDES IN SOIL

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At the end of the last century, the famous Terra-Preta soils, which are very rich anthropogenic black earth with high contents of stable organic carbon, were rediscovered in the Amazon area. The Terra-Preta-soils provide high adsorption capacity, very effective microbial activity, excellent nutrient and water supply. The central element seems to be biochar or charcoal that was composted or fermented together with organic waste.

In the last 10 years, a lot of scientific work was done to decode the properties, impacts and possibilities of the amendment of biochar to soil. Concerning the reduction of negative impacts of contaminants in soil biochar provides to chances, especially polar organic substances have a huge potential to adsorb at the huge surface of biochar; on the other hand, site biochar improves the soil microbial activity including the ability to decompose organic pollutants.

New results concerning biochars influence on bioavailability and decomposing of pesticides summarizing the current status quo of scientific work will be presented as well as own results regarding to the impact of biochar on bioavailability and decomposing of organic pollutants in pot, lysimeter and field experiments.

EVALUATION OF POLLUTANTS IN SOIL BASED ON BIOACCESSIBILITY - PATHWAY SOIL - HUMAN BEING

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Abstract
In Germany, the evaluation of pollutants in soil is regulated. If measured concentrations of pollutants (total contents) in soil exceed the trigger values, detailed investigations are required. Therefore, an examination of the exposure conditions as well as of the mobile or mobilizable content of the pollutants might be useful. Since 2004, an in vitro method (DIN 19738), which is based on a physiological model of the digestive procedures in the upper digestive tract, has been applied. The results of these measurements allow the final assessment of pollutants in soil showing the most sensitive effects on human health after oral uptake. Meanwhile, in Germany, more than a thousand data sets are gained in practical appliance, assessing different cases and settings. In fact, the possibilities and limits of the method in practical use are known. Therefore, a review of the standards as well as a ring-test is being planned. Current scientific work has been started to prove the ruggedness of the standard. More specific results can be expected in 2014.

Keywords
Bioaccessibility, DIN 19738, in vitro, laboratory standard, oral route of exposure; detail investigation, Soil protection act.

Introduction
The investigation and evaluation of suspected sites, suspected contaminated sites, harmful soil changes and contaminated sites requires normative regulations. Therefore, in Germany, the Federal Soil Protection Act (BBodSchG) as well as the Federal Soil Protection and Contaminated Sites Ordinance (BBodSchV) were adopted in 1998/1999. In the focus of these regulations, the objects of protection are the soil, the groundwater and the health of human beings. To describe potential risks, the regulations look at specific pathways, which are defined as routes from the source of pollution to the place of potential effect on a resource to be protected. To look at environmental impacts on the health of human beings, it is indispensible to concentrate on possible exposure pathways and the routes of exposure (oral, inhalative, percutanous). The following contribution describes the background of soil evaluation of sensitive landuse with the focus on the protection of the health of human beings and on an applied method of detailed investigation in the process of the final evaluation.

Evaluation of harmful soil changes
In Germany, trigger values have been derived for inorganics (arsenic, lead, cadmium, chromim, cyanide, nickel, mercury) and some organic pollutants (PAH, PCB, HCH, DDT, aldrin, hexachlorobenzene, pentachlorophenol) considering their toxicological profile (toxic or carcinogenic)

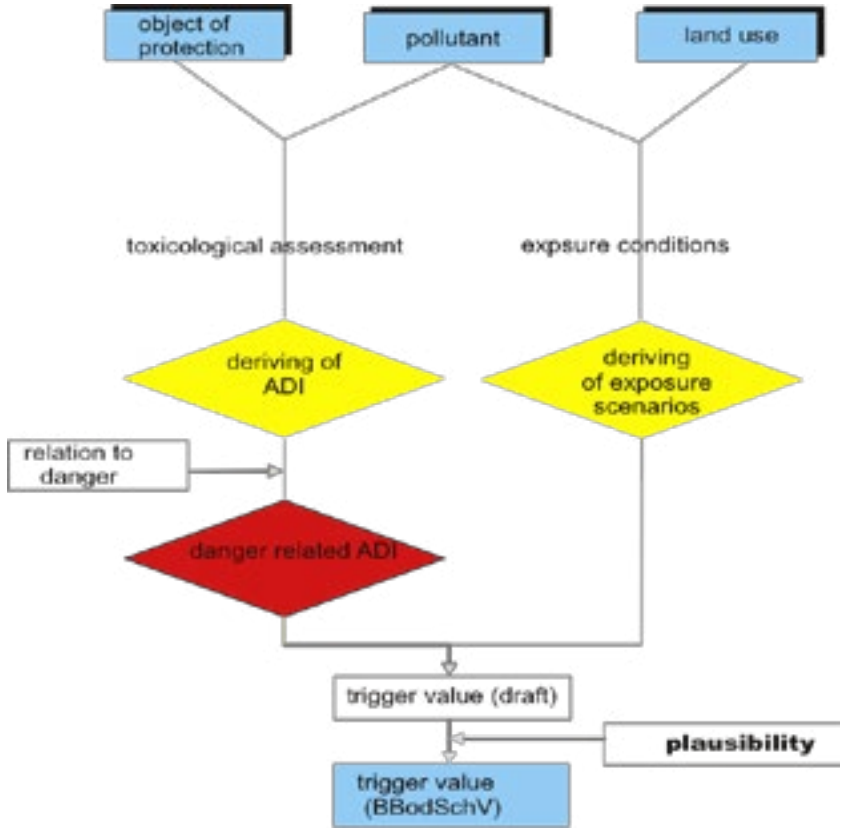

Figure 1: Procedure of deriving trigger values in Germany

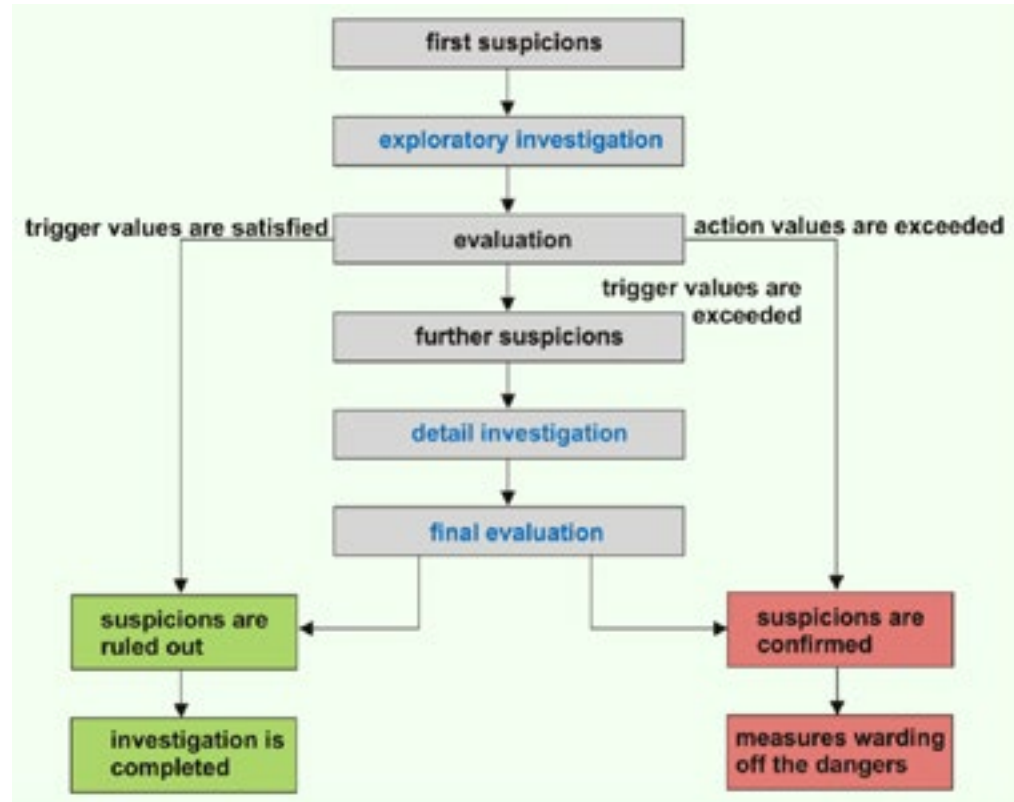

Figure 2: Procedures of investigation according to the Federal Soil Protection and Contaminated Sites Ordinance (Germany)

and their most sensitive mode of action as well as the possible conditions of exposure. The assessment of the toxicity of pollutants is based on toxicological studies and case reports and results in a proposed ADI (Acceptable Daily Intake) for humans. In the next step of the proce-dure, the ADI is combined with a factor (2-10) according to the defined level of protection (averting danger). The resulting so called "danger-related ADI" is used to assess the possible uptake of the pollutant assumed for defined exposure conditions. Standardised scenarios are defined for playgrounds, residential areas, back and small gardens, parks and recreational facilities and industrial and commercial real properties. After comparing the derived trigger value drafts with background contents or other information, epidemiological data (check of plausibility)

the trigger values can be proposed (see Figure 1).

When a trigger value is exceeded at the sampling site, it shall be ascertained in the particular case whether the suspected danger resulting from the pollutant has to be confirmed. The flow chart (see Figure 2) gives an overview of the different steps in the procedures of investigation according to the Federal Soil Protection and Contaminated Sites Ordinance (Germany)

Detailed investigation (Assesment in particular cases)

As regulated in the ordinance, detailed investigation shall be the comprehensive further examination for the final hazard assessment which particularly serves the determination of amount on spatial distribution of pollutants, their mobile or mobilizable components, possibilities for their spreading in soil, water and air, as well as the posibility of their intake by human beings, animals and plants.

If humans (for example children who are playing on the ground) ingest pollutants bound to soil, it is not only the total contents that are of relevance to their health, but also the bioaccessibility of the pollutants in the gastrointestinal system. Although the bioaccessibilty and bioavailability can be determined by in vivo studies (for example, mini-pigs), the results cannot be extrapolated directly to humans.

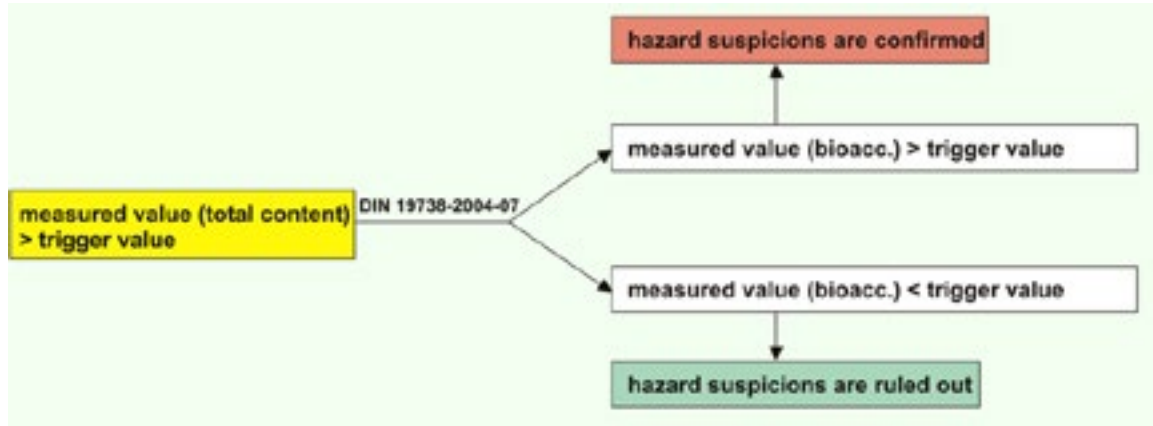

Figure 3: General evaluation of bioaccessible concentrations

A rapid and much less expensive method is to determine the amount of contaminants that can be released from contaminated soil by digestive juices of the upper

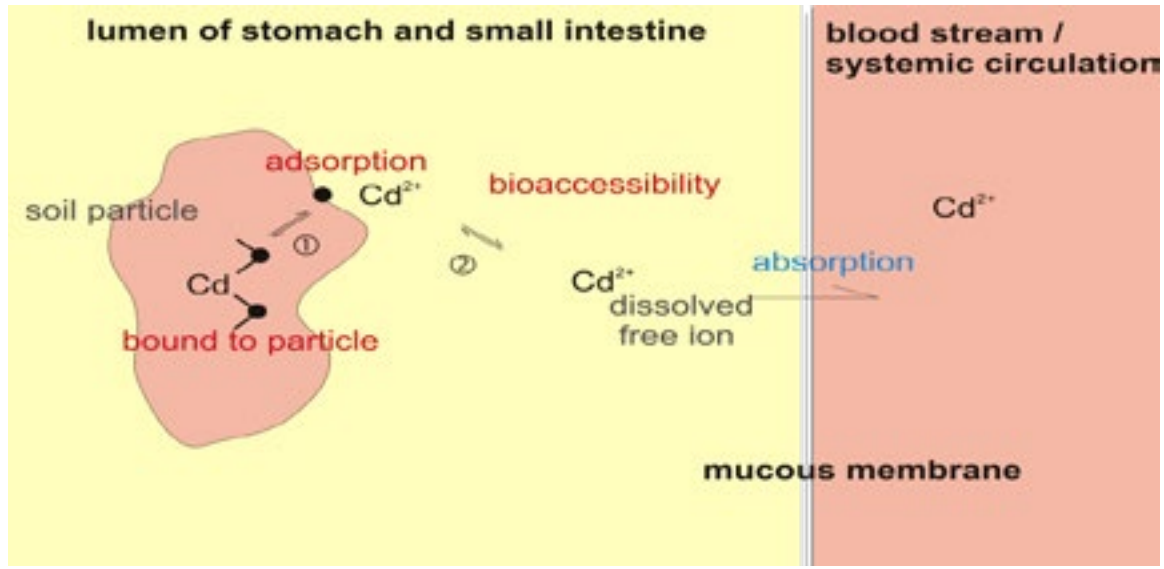

Figure 4: Bioaccessibility of substances bound to soil (oral pathway) – for example cadmium

digestive tract. For that, a standard (DIN 19738 (2004-07) has been developed, which provides the data for assessing the pathway soil-human being (see Figure 3). If the measured bioaccessible content exceed the trigger value, the hazard suspicions are confirmed, whereas hazard suspicions are ruled out when the trigger value i satisfied.

In vitro test system (DIN 19738)

Since it was thought that pollutants ingested with soil particles would become available to the gastrointestinal tract by 100 % (bioaccessibility = 100 %) regarding the analysed total content, DIN 19738 should verify this assumption. As far as is known, only a certain part of the pollutants adhering to soil particles can be set free by mobilization or desorption in the digestive tract. In case of release, these pollutants can be absorbed into the systemic circulation (see Figure 4).

This standard describes a test system for mobilizing contaminants from soil using synthetic digestive juices. Digestive juices are complex solutions of electrolytes, enzymes and digestion aids, whose compositions vary with type, quality and quantity amount depending on exogenous and endogenous factors, a major being the food. So, the experimental set-up and the composition of the synthetic digestive juices are described in detail. To take account of the influence of food components on the mobilization of contaminants, whole milk powder is proposed to be added to the test system.

The standardised model shall be suitable for testing the mobilization of PAH, PCBs, HCB, PCDs, PCDFs, HCH, DDT, endosulfan, propham, chloropham, aldrin, dieldrin, toxaphene and brominated and chlorinated diphenyl ethers. The mobilization capacity of inorganic substances as arsenic, lead, cadmium, chromium, mercury, thallium, antimony or radionuclides can also be examined.

Scope

For more than ten years, this method aimed at examining bioaccessibility by detailed analyses (DIN 19738 2004-07) has been applied in the laboratory successfully. In Germany, a few thousand data are available, especially for arsenic, antimony, lead, cadmium, thallium as well as for organic pollutants as PAH and, in some cases, PCB. In the course of the final risk, this method has been used to gain data basis for final assessments in different cases as former waste disposal sites, former industrial estates, large-area contaminations as a consequence of i.g. industrial emissions or flooding areas along rivers. However, in the daily routine it turned out that several methodological issues regarding reproducibility, conclusive results as well as the efficiency of the method came up. Therefore, it appears to be expedient and promising to streamline the introduced DIN within the scope of a multidisciplinary approach to work. To achieve this aim, the durability of the data basis for risk quantification techniques should be increased further.

Outlook

Currently, the workgroup “bioavailability” of the DIN-standards committee is reviewing DIN 19738. Objectives of this study are to verify the assumption described above and, therefore, DIN 19738 will be used to validate the hypothesis by several examinations. Furthermore, a complete revision and specification of DIN 19738 will be carried out.

The intention of this study is to operationalise the over-all scheme into five working aspects:

A1: Assessment of the shortcoming of the study technique and proposal for priority pollutants.

A2: Sampling and preparation of contaminated soils as well as testing the ruggedness of the technique.

A3: Preparation of the ring test to show the bioaccessibility.

A4: Execution and statistical evaluation of the ring test to display the bioaccessibility.

A5: Updating and presentation of DIN standard 19738.

Currently, the following examinations have been taken to gain further insights on the ruggedness:

• impact of food (milk powder , tinned milk, etc.);

• impact of synthetic digestive juices (amount and activity of enyzyms); and

• duration of the simulation of the intestinal phase.

As a result, a draft of the revised standard method shall be used for comparative interlaboratory tests as well as a basis for the ring test. There will be several examinations to attain more knowledge about ruggedness of the procedural steps, affecting the results distinctly and simultaneously affecting the additional work steps as well. More specific results can be expected in 2014.

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SUMMARY: WORKSHOP BIO AVAILABILITY

J. Harmsen & D. Hennecke
Chaired by Konstantin Terytze & Dieter Hennecke

In risk assessment it is already common knowledge that total concentrations measured in soil often over estimate risks. The available concentration is a better predictor of risks and can often be correlated with effects. Decreasing of the bioavailability is considered as a proper tool to reduce the risks on a contaminated site.

For the estimation of risks it is important to have suitable methods. In Germany incidental ingestion of soil is considered as an important pathway that affects human health. Since 2004 an in vitro method is in use that simulates the human gastrointestinal conditions (DIN 19738). This method is in revision in order to improve the experimental procedure to give more reliable results. Dieter Hennecke and Monica Machtold focussed on their presentation on the aspects that needed improvement. Well defining of additives in the tests (e.g. milkpowder), the use of enzymes and incubation time has been shown to have effect on the results.

The work in Germany will lead to a more robust method that can also be internationally applied.

Joop Harmsen summarized the developments in International Standardization (ISO) on the subject of bioavailability. Besides a guideline on the application of methods, specific methods become or are already available. All ISO-methods must have an understandable chemical-physical base, which is an important aspect for the acceptation of the concept of bioavailability within regulation.

The presentation of Oleg Bogdevich showed that using a remediation process based on biodegradation should be monitored by an experienced and accredited laboratory. For an assessment of the prospects it is necessary to identify the complete spectrum of contaminants and also get information on the geotechnical conditions of the site.

Ion Barbarasa showed that bioavailable pesticides are available for uptake by vegetation as a low tech approach which can easily applied in developing areas. However, to remove all pesticides from a contaminated site will need a long period, which was subject of the discussion after his presentation.

Contaminated sites can also be found in Africa. Joop Harmsen presented the African Approach to reduce the risks on the site. Important methods are stimulation of biodegradation using landfarming or reduction of the availability by isolation of the pesticides. This can be a physical isolation or using of adsorbing material (charcoal).

The use of adsorbing materials (biochar) was further explained by Ines Vogel. She also mentioned the effect on decomposition.

In the final discussion Konstantin Terytze focussed on the future of bioavailability. He stressed the necessity of possibilities to measure bioavailability and the importance of international standard methods. If we do it on the proper way it will become an important tool to better understand the risks on contaminated sites.

GEF/UNEP PROJECTS DEMONSTRATING AND SCALING UP OF SUSTAINABLE ALTERNATIVES FOR DDT FOR THE CONTROL OF VECTOR BORNE DISEASES IN SOUTHERN CAUCASUS AND CENTRAL ASIA

THE EXPERIENCE OF IMPLEMENTATION THE STOCKHOLM CONVENTION ON PERSISTENT ORGANIC POLLUTANTS AT THE REGIONAL LEVEL IN RUSSIA

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After Russian ratification of the Stockholm Convention on Persistent Organic Pollutants (POPs) made in 31.06.2011 Tomsk Public Organization "Siberian Environmental Agency" and Tomsk Green Cross initiated the work on the complete elimination of the pesticides use, which are banned but still exist in the Tomsk region. Our partners in this respect are the Russian Green Cross and Swiss Green Cross.

Figure 1: Location of the Tomsk Oblast in the Russian Federation

We started our work in 2012 from coaching the prospective specialists in the sphere of banned pesticides use according to the standards of FAO. The experts chosen for this purpose were experienced professionals from Georgia and Moldova who already dealt successfully with the pesticides problem in their regions. As a result, 10 experts were trained (e.g. government representatives, nonprofit institutions and enterprises dealing with waste management) according to the programme of banned pesticides use based on the FAO standards. There was also the project of regional level on implementation of the Stockholm Convention created and passed to the local Government of Tomsk region. The plan includes the preparation and implementation of a complete inventory of warehouses and burial banned for use and obsolete pesticides.

Figure 2: Inventory Work during training

During a training inventory of the pesticide DDT burial ground in Teguldet village of Tomsk region soil contamination of vegetable gardens was discovered. The vegetable gardens belonged to the residents of Teguldet village and were close to the pesticide burial ground. The level of contamination of cultivated soil comes up to 11 mg / kg or 110 MPC. Due to our requests, Government began to eliminate DDT burial ground in Teguldet, which approximately contains about 180 tons of DDT and about 14,000 tons of contaminated soil according to the estimation of Tomsk Polytechnic University.

Figure 3: The joint inventory with Green Cross Switzerland

In general, the implementation of the Stockholm Convention at the regional level is hampered by lack of the National Plan of Action for the implementation of the convention. Also obstacle is the strong differences in the approaches of the inventory and repackaging of toxic waste between national legislation and Russian standards FAO.

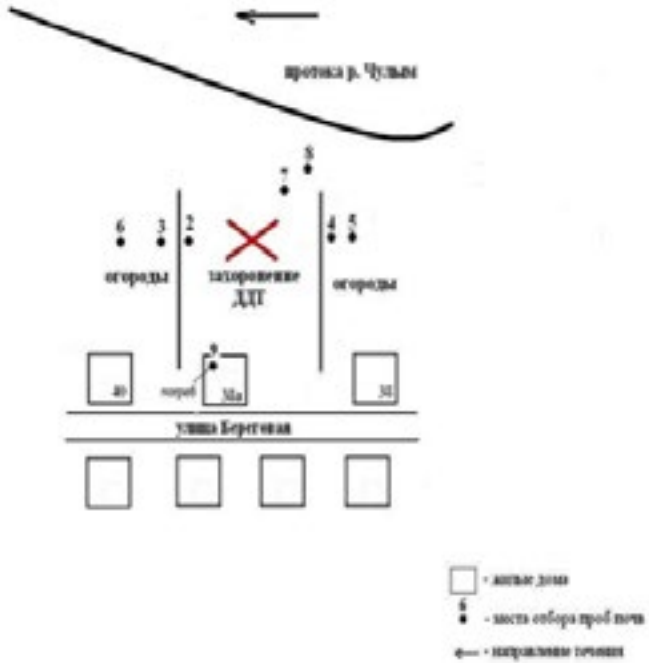

Figure 4: Overview of gardens where samples have been taken

Figure 5: Sampling works in the vegetable gardens belonging to the residents of Teguldet village close to the pesticide burial

SUBSTITUTING DDT IN FIGHTING AGAINST MALARIA

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Scientific Support Branch,
Secretariat of the Basel,
Stockholm and Rotterdam Conventions

The uses in disease vector control in accordance with the World Health Organization (WHO) recommendations and guidelines are the only acceptable purposes available for DDT under the Stockholm Convention. Except when locally safe, effective and affordable alternatives are not available for Parties, production and use of DDT be to eliminate. The Convention also invites, with the goal of reducing and ultimately eliminating, the Conference of the Parties to encourage Parties using DDT to develop and implement an action plan including the development of regulatory and other mechanisms to ensure that DDT use is restricted to disease vector control and implementation of suitable alternative products, methods and strategies, including resistance management strategies to ensure the continuing effectiveness of these alternatives. It also invites Parties to take measures to strengthen health care and to reduce the incidence of diseases.

Currently WHO recommends that in areas targeted for malaria vector control, all persons at risk should be protected by Insecticide Treated Nets (ITNs) or Indoor Residual Spray (IRS). The choice of ITNs or IRS depends on entomological, epidemiological, and operational factors including seasonality of transmission, vector survival and behavior, and insecticide susceptibility of anopheline vectors[1] . There are 14 insecticide formulations from four different chemical classes are recommended by the WHO for IRS. There are seven pyrethroid based insecticide formulations recommended for ITN.

Among major challenges in effective control of vector, accessibility to effective alternatives and capacity for their efficient implementation towards sustainable control are common in many developing countries. Safer and more efficient vector control interventions are generally associated with high operational cost to maintain the disease transmission. It is important that the decisions, both at national and local level, are taken on scientifically sound basis with adequate knowledge of the local data for efficient control and management of vector resistance. Assurance of desired standards in product quality and IRS operations are the key factors of successful vector control programmes found challenging in certain settings.

Substitution of DDT with another safer alternative product requires adjustments to the programme that entail the need for supplementary resources. It would include human and physical resources, knowledge, additional data and related technical and scientific information. Unless the vector in question has developed resistance to DDT, from the operational point of view, there is no immediate economic incentive to switch to a new product. Instead, it should be seen and implemented as an alternate management strategy of the vector for long term health and environmental benefits. Integrated Vector Management (IVM), is a *"rational decision-making for optimal*

1 World Malaria Report: 2012, World Health Organization.

use of resources" *(Source-WHO)*. Once adapted to the local situation, the IVM approach should provides a way forward for a sustainable solution to the programme managers. For successful implementation of IVM, among others, it requires an efficient inter agency coordination mechanism with a system in place for the collection of vital field data.

There are many new researches into testing and validation of the effectiveness and role of innovative new approaches as well as traditional pest control methods in vector control. While some are of bio and botanical origin, others range from molecular biology to environmental engineering. Some of the techniques and approaches currently being developed could potentially play an effective role within IVM approach. The limitations in deploying them under varying conditions, the demand of knowledge-intensive operations and poor statistical power of the existing results are some of the challenges to overcome. However, case studies from different parts of the world are available on successful employment of some of those techniques, along with conventional vector control interventions, both for the control of malaria as well as towards its elimination.

PROBLEMS OF DDT IN AZERBAIJAN

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Azerbaijan has always been an agricultural republic; it was supplying the country's population and big cities of the former Soviet Union with fresh vegetables, fruits, grapes, and other products. The country's strategic crop- cotton was grown on large areas, in more than 20 regions. The crops needed to be protected from pests and diseases, and many pesticides had to be used for that purpose.

Until 1958, to fight cotton pests, a product DDT was being imported to the Republic of Azerbaijan from different countries. After the start of the DDT production in Sumgait plant "Himprom", import from other countries stopped and it should be noted that Azerbaijan was sending DDT production to other regions of the former Soviet Union. Though the plant capacity was 60,000 tons per year, about 20,000-35,000 tons were produced annually.

In 1975, the usage of DDT in agriculture was forbidden; nevertheless, the product was used until 1990 as there were no alternative products against cotton pests.

In 1980, huge pesticides residues were formed in the Republic of Azerbaijan, which went out due to usage prohibition, ineffective purchase planning, products distribution, and pesticide demand reduction due to their ineffectiveness and large volumes of cheap products being delivered.

In 1985-1995, the remaining residues of pesticides, including DDT, were buried in Dzhangin landfills. During this period, about eight thousand tons of different chemical pesticides were buried in 183

№	Year	Tons produced	№	Year	Tons produced
1.	1958	1216		1970	25122
2.	1959	5412		1971	12496
3.	1960	19939		1972	14805
4.	1961	18874		1973	11133
5.	1962	25647		1974	21931
6.	1963	27061		1975	21133
7.	1964	36200		1976	22257
8.	1965	35093		1977	26221
9.	1966	29102		1978	23400
10.	1967	21823		1979	27428
11.	1968	27717		1980	5246
12.	1969	21293			
Total: **480549**					

Figur 1: DDT production in Sumgait Himprom (1958-1980) in tons

landfill bunkers; more than half of them was DDT. Prior to the reorganization of "Azerselhozhimii", the site was secured, and, from 1996 till 2005, due to the lack of protection, almost half of the products were taken out/stolen from the bunkers. In Azerbaijan, there is only one landfill (Dzhangin landfill) for pesticide disposal (there is also a landfill for hazardous waste of the Ministry of Ecology and a landfill of Emergency Situations Ministry, but neither of them contain pesticide waste).

In December 9th, 2003, the Republic of Azerbaijan ratified the Stockholm Convention "Persistent Organic Pollutants". To solve the problem arising from the Stockholm Convention, Presidential Decree of July 29th, 2004, the National Coordinating Center under the Ministry of Ecology and Natural Resources was established.

For the first time, in Azerbaijan, the inventory of obsolete, banned and unusable pesticides balances began in August 2006. Specialists of the State Phytosanitary Control Service together with the specialists from the Ministry of Ecology and Natural Resources in the framework of National Implementation Plan under the Stockholm Convention on Persistent Organic Pollutants, held a joint work to identify them.

Based on the monitors held, the original data was received. During the inventory, different residues of obsolete and POPs pesticides were found; many of them were mixed (DDT, granozan, izofen, dalapon, treflan, Zineb, hexachloran, hometsin, sulfur mixed with izofenom, etc.). Besided barrels of polidofen that contain 20% of DDT were detected in Salyan and Ganja. Large areas of land contaminated with pesticide residues were revealed.

By the end of the inventory, the National Implementation Plan under the Stockholm Convention was prepared and submitted to the Government for approval, but so far the plan has not been approved.

In September 2006, the problem of obsolete, banned and unusable pesticides by the Order of the President of the Republic of Azerbaijan "Comprehensive Action Plan for ecological improvement of the Republic of Azerbaijan in 2006-2010" was approved. Paragraph 5.11 of the Comprehensive Plan is entirely devoted to the inventory, collection and disposal of obsolete, banned from using toxic substances and the reconstruction of the landfill for pesticides. The realization of the targets of the Comprehensive Plan item was entrusted directly to the State Phytosanitary Control Service at the Ministry of Agriculture of the Republic of Azerbaijan.

The initial target of the Comprehensive Plan was Dzhalangin landfill transmission at use of the public service and its comprehensive reconstruction.

Currently, landfill acts as industrial structure, funded by the state, which has its director, chemists, workers and other personnel. The entire territory of the polygon perimeter is fenced with a metal lath; gates, water tank and fire safety system were installed. During the period 2008-2010, the landfill has been completely renovated, and more than 4,000 tons of solid residues of pesticide and contaminated soil from different regions of the country were transported and disposed of. Filled bunkers were tightly closed with concrete slabs. Up to date, the volume of buried pesticides at Dzhalangin landfill is about 9,000 tons of banned, obsolete pesticides and POPs and heavily contaminated soil.

In the framework of "Comprehensive Action Plan for ecological improvement of the Republic of Azerbaijan in 2006-2010", a warehouse for storage of liquid pesticides was built in 2010, 60 bins for solid pesticides were built, half of which had already been filled.

Besides DDT, a liquid preparation Polidofen 60 %, which contained 20% of DDT + 40 % of polychlorocamphene

against pest of different crops was used in the Republic. This preparation had been lying in one of the warehouses in the city of Ganja until 2010. In 2010, after the allocation of funds from the "Comprehensive Action Plan for ecological improvement of the Republic of Azerbaijan in 2006-2010", around 1180 barrels of polidofen were repackaged and 200 pallets were transported to the Dzhalangin landfill (for storage of liquid pesticides a new warehouse was built in 2010) for storage until complete disposal.

The site in Salyan region is in a critical condition now. Liquid polidofen has leaked on the ground from old rusted barrels. It should be noted that close to it living quarters, warehouses for food storage are located; the warehouse is located within the district center. In this region, the groundwater is shallow, and the Kura River, which falls into the Caspian Sea, flows nearby.

At the site of Daykend Salyan district, polidofen residues were buried in the ground. During recent inventory, while excavating, rusty pesticides barrels were found.

There is a big problem with repackaging and disposal of the existing liquid pesticides at the landfill. Some barrels, which had been repackaged in Ganja in 2010, are already showing leaks.

INFORMATION ON DICHLORODIPHENYLTRICHLOROETHANE (DDT) IN RUSSIAN FEDERATION

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Currently, the use of DDT is banned in most countries. The sequence of introducing the ban was as follows: New Zealand, the USSR, Hungary, Sweden, Denmark, and Finland, followed by some other countries. However, the ban on the use of DDT does not exist in all countries. Besides, many countries have solid stocks of DDT.

In the USSR, active production and use of DDT began in 1946-1947, when the plants were built in Moscow, Dzerzhinsk and Cheboksary. During 1950-1970, about 20 tons of herbicide was used per year, resulting in a huge amount of contaminated land across the whole area of former Soviet Union.

Regions	Year	Use of DDT, tons
Belgorod	1982	28,9
Voronezh	1982	4,1
Kursk	1978 1982	14,5 19,9
Lipetsk	1978	8,4
Samara	1987	2,9
Tambov	1978 1979	36,6 23,4

Table 1: Amount of DDT used in different regions of Russia

The first country where DDT was banned was New Zealand, and the second - the USSR. However, this prohibition had some exceptions: the use of DDT was allowed in cases of malaria in the taiga regions, in the foci of tick-borne encephalitis, which can effectively be dealt with by means of DDT.

In 1969-1970, DDT was excluded from the official list of pesticides used in the USSR. Even then, the production and use of DDT has not stopped. Even in 1986, 16 years after the official ban, DDT production volume accounted for10 thousand tons per year. Until the late 80s, DDT was used "as an exception" in Uzbekistan and

in many regions of Russia.
As a result, about 20% of the fertile soils in the former USSR are contaminated for many years. With normal care for the soil, 0.5-1 ppm in 1960-70 and 0.1 ppm in 1981, respectively, in many places the amount of DDT in soils was 5-10 times higher, and in the cotton growing regions of Uzbekistan, the excessive amount of DDT reached 85 times.

DDT treatment of gardens and woodland many years ago led to the fact that its content in the soil in these areas is very high. Now, in many places, instead of fruit trees, other crops that can accumulate DDT from the soil are being grown, which causes it getting into the food of animals and humans.

In 1975, DDT was contained in 8% of meat samples, 5-10% of root crops and potato samples. In 1988, 30% of the samples of milk powder for baby food and, in 1989, 52% of dietary oil samples - the amount of DDT exceeded the permitted limit 5 times.

Officially, in the former USSR, the content of DDT in meat, butter, milk and eggs in general was "not allowed". However, some "temporary" rules have always been introduced. So, over a period of 15 years, after the ban of DDT, "temporary" MPC value (mg / kg) for milk in children's diet accounted for 0.05, 0.1- for eggs and meat and 0.2-for canned fish.

Although the use of DDT and other organochlorine pesticides was banned in Russia in the 1980s, they still remain in the environment and continue to accumulate in the food chains. Studies indicate that these chemicals are endocrine disruptors and can cause cancer. Some studies suggest that they are associated with an increased risk of lymphoma.

In early September 2013, an article about the effects of banned and obsolete pesticides on boys who live in Russia near the closed factories, which produce pesticides (Chapayevsk city, Samara region), or drink local milk. The article was published in Environmental Health News by the researchers from Russia and Harvard University in the USA. The aim of this study was to understand why the children's bodies contain extremely high concentration of such hazardous chemicals as DDE, hexachlorobenzene and beta-hexachlorocyclohexane.

In Chapaevsk, between 2003 and 2005, the blood of 350 boys aged 8 to 9 years was investigated. The average levels of pesticide concentrations in the blood of boys in Chapaevsk city happened to be 3 to 20 times higher than the similar levels of pesticides in the blood of their peers in America.

If boys drank milk of local production, the concentration of DDE, hexachlorobenzene and beta-hexachlorocyclohexane was 14 - 21 percent higher in the blood of boys who were breastfed for more than 13 weeks, the concentration of organochlorine pesticides was at 16-81% higher than that of boys who drank breast milk for less than 13 weeks. (Source: http://www.environmentalhealthnews.org/ehs/new-science/2013/09/russian-boys).

Considering the fact that about four children die from malaria every minute, mostly in sub-Saharan Africa, most of the doctors insisted that DDT remains the best weapon in the fight against this disease. However, there are a number of objections in this respect.

There are ongoing international initiatives to promote the development of alternative insecticidal compounds and technologies to use in the fight against malaria.

Only in those areas where alternative methods of malaria vector control are not widely available, the use of DDT may be justified. In some regions of India and

South America, mosquitoes are resistant to DDT. In some countries, impregnation insecticide-treated bed nets help in the fight against malaria.

The main objective for today is to eliminate the use of DDT in agriculture, keeping it as a reliable tool when fighting against malaria, which, however, can be used only under certain conditions until they become publicly available alternatives.

DDT was produced in the USSR, both in the form of technical product, and in a series of formulations, i.e. 5.5% and 10% of dry powder, 30% and 75% of wettable powders, mineral-oil emulsion," insecticidal" formulation, polidofen (mixture made of 20% to 40% of DDT and toxaphene) and several others.

Currently, the production of DDT in Russia (Dzerzhinsk) is inhibited, but one can make a product with the special permission for disease vector control.

Today and in the short term, DDT is used as a means of combating infectious diseases. This is explained by the danger of such natural focal diseases as plague and zoonotic cutaneous leishmaniasis. It should be noted that in the Russian Federation in the three regions of Southern Siberia, there are natural foci of plague (Transbaikalia, Tuva and Gorno-Altai foci). There is some data on other, smaller outbreaks in Russia (Southern Urals, south of the European part).

Upon the ratification of the Stockholm Convention, the Russian Federation in accordance with Part II of Annex B entered in the DDT Register maintained by the Secretariat and notified the World Health Organization about that.

Regulation of POPs Pesticides and DDT

1. The Federal Law "On the safe handling of pesticides and agrochemicals" (№ 109-FZ of 19.07.1997, as amended on 04.10.2010), approved by the Ministry of Agriculture, provides the legal framework for the safe handling of pesticides, including their storage, destruction and disposal. Under the Federal Law, any kind of treatment from pesticides and agrochemicals, which are not included in the "State catalogue of pesticides and agrochemicals".

2. Rospotrebnadzor Letter from 22.05.2009 № 01-6985-9-32 "On the burial of unusable and banned pesticides," reads as follows: recycle worn-out and (or) banned pesticides and agrochemicals (waste hazard classes 1-2), should be carried out at the sites of toxic waste by dumping or destruction by incineration at high temperature incinerators. Disposal practices must be carried out in accordance with the requirements of sanitary legislation, destruction technologies should be allowed in the prescribed manner.

3. The Federal Law "On Production and Consumption Waste" (№ 89-FZ of 24.06.1998, as amended on 30.12.2008); organization of activities in the field of waste management, including banned pesticides, the territories of municipalities formations carried out by the local government.

4. The FTP "National System of chemical and biological security of the Russian Federation (2009 - 2013)", approved by the Government of the Russian Federation on 27th October 2008, № 791. "Development of technologies for destruction (recycling) of PCBs stockpiles of pesticides and agro-not sought after in the industry and agro industry" project is being implemented. The development of technologies is to be completed in 2013 with the creation of a technological complex in technological development test center in Shihany city and testing a prototype plant.

5. The subjects of the Russian Federation

implement special programs or legislation acts so as to destroy obsolete and banned pesticides. The amount of funding for these programs in 2008 was estimated as 340 million rubles.

Activities on Inventory of POP pesticides

The priority objectives with regard to the solution of the POPs pesticides problem are as follows: conducting a full-scale detailed inventory and registration of stocks of pesticides, their locations, their containers and contaminated land. The inventory should be accompanied by efforts to identify unallocated drugs and mixtures.

Measures to ensure the security of stockpiles of POPs pesticides

Designated storage of obsolete pesticides, as well as their place of burial represent a potential danger to the environment and human health because of the migration of pesticide residues due to leaching, volatilization, and other processes beyond these locations and the subsequent circulation of toxicants in ecosystems and the food chain. These objects are a typical example of point sources (in some cases very intense) of the environmental pollution by obsolete and POPs pesticides.

Measures to ensure the disposal of stockpiles of POPs pesticides

SPP, including POPs-containing, are largely represented by multicomponential mixtures of organic and inorganic compounds. There are various methods of neutralization of SPP, including POPs pesticides. These include thermal methods (high temperature combustion in stationary and mobile applications, combustion in cement plants, plasma pyrolysis and others), physico-chemical methods (hydrolysis, ozonation, etc.) and some others.
It should be noted that so far there is no allowed for practical use method of pesticides elimination in the country.

Activities on Environmental Monitoring of storage and destruction of POPs pesticides

Monitoring of the technological state of burials, as well as periodic monitoring of ecological and toxicological areas adjacent to these graves is extremely important. Similar ecotoxicological monitoring is also needed in those facilities that store obsolete pesticides (warehouses, adapted premises, etc.). In the latter case, the area adjacent to such facilities, and often has a high level of contamination, even after the removal of these pesticide products, for a long time, can serve as a source of secondary pollution by pesticides.

In-depth inventory of the Project ACAP / ANO "CIP" on "Environmentally sound management of obsolete pesticides stockpiles in the Russian Federation"

Figure 1: Ruined warehouse on the territory of MUP DSOK "Taiga"

Figure 2: Contents of the iron container with pesticides in the former SUE "Krasnoyarsk"

Figure 3: Warehouse number 3 with an extension; village Beryozovka

Figure 4: Iron container in the Kiai village; inside view

The results of in-depth inventory of the Project ACAP / ANO "CIP" on "Environmentally sound management of obsolete pesticides stockpiles in the Russian Federation"

Table 2
The status of stocks of obsolete pesticides (in tons) in the northern pilot regions of the Russian Federation in June 2012

Region	Total number of SPP		Total number of SPP exported to landfills	Number of remaining SPP on placements in June 2012
	Identified within the project	Identified in conjunction with the region		
Arkhangelsk region	62, 8	74,8	71,0 Krasny Bor Obninsk city, Kaluga region	1,5
Altai Republic	223,5			7,5
Altay region	4 972,0 on 11.09 500 tons liquid	5012,000 500 tons liquid	216 tons exported to Tomsk and Krasnoyarsk polygons	4 299,32
Komi Republic	23, 107		20 tons to the landfill Krasny Bor in 2005	4.8 tons (including newly discovered) in a renovated warehouse in Syktyvkar
Magadan region	23, 400			0

Omsk region	540, 038			
Sakha Republic (Yakutiya)	192, 000 liquid 1 505 m	360,74	SPP 1505 and 262.4 m3 polygons Krasny Bor and the Krasnoyarsk Territory. In 2012, planned removal of 30 tons	98,27 tons
Tomsk region	120, 509			
Tyumen region	314, 400	587,600	537,000 to the landfill "Red Forest" in 2007 49, 00 to the landfill "Green City" in 2010 3 burial liquidated in Tobolsk district	1,600 tons in the south of the Tyumen region

Krasnoyarsk region	280,000		90,000 on the ground "Green City"	About 300 tons in 14 eastern districts of the region
Murmansk region			4, 800 removed in 2008-2011	In 2011, the region of SPP and unauthorized storage areas have been identified
Kamchatka region and Chukotka Autonomous District		51, 280	In 2011, 51.280 exported by OAO "Polygon" of Tomsk region	0
Total (kg)	**6 752 647** liquid mixture **1 505 m³**			

This table has been prepared based on the information of the regional offices of the Federal Service for Veterinary and Phytosanitary Surveillance, the Ministry of Agriculture and Food Policy of the Republic of Sakha (Yakutia), the Committee of industrial development, ecology and nature of the Murmansk region in the ACAP project “Environmentally sound management of stocks of obsolete pesticides Russia “ on 27.07.2012.

Preparation of SPP storage

Figure 5: The former hangar for Rockets Poplar, Altai region

Figure 7: Hangar filled repacked SPP, Altai region

Figure 8: Ruined central warehouse for the storage of pesticides in Syktyvkar

Figure 6: Hangar equipped for storage of SPP, Altai region

Figure 9: Warehouse Renovated

In the Baikal natural territory (BPT), the presence of residual amounts of obsolete POPs pesticides has also been noted. The soil contaminated by DDT was detected in all the surveyed areas of the Irkutsk region in 2011, which are located in the basin of the Angara River. The analysis results showed that the average content of total DDT in the soils studied all kinds of areas under crops was 0.15 and 0.14 in the spring of MPC autumn. Exceeding the maximum allowable concentration level of total DDT in the soils found in the territory of the Irkutsk region in the fields of "Khomutovskaya" and JSC "Shiryaevo" Where in the watershed of the river ("National Report on the State and the Environmental Protection of the Irkutsk region" in 2011).

Improvement of Legislation

One of the most convenient operating mechanisms is currently amending the relevant federal laws and regulations.

As a *basic principle* of the new system of regulation, *the transition to the best available technology* (BAT concept) must be implemented. To bring the legislation in line with the *Stockholm Convention on persistent organic pollutants*, the work should be is carried out taking into account the provisions laid down in the *Basel Convention (on the control of transboundary movements of hazardous wastes and their disposal) and the Rotterdam Convention (on the prior informed consent procedure for certain hazardous chemicals and pesticides in international trade*, which are interrelated.

In connection with the adoption of the Law on "On technical regulation", it seems that the prime direction of harmonization (unification) of national legislation, because of the ratification of the Stockholm Convention, is the development and adoption of appropriate technical regulations.

Prohibited and obsolete pesticides and waste generated during production or use, pose a significant threat to the environment, and their destruction is one of the most important tasks in terms of the environmental protection.

However, there is no generic method to solve this problem. The most common ways to dispose of hazardous waste, which can be rightly classified as pesticides, are burning and burial on specially engineered landfills. The biological, chemical and physical treatment methods are also used, which leads either to the complete destruction of toxic components, or to the substantial reduction of their hazards.

Unfortunately, the issues of environmental safety, when handling pesticides at the state level, have not received sufficient attention in the last few years. The Federal Law "On the safe handling of pesticides and agrochemicals" (Article 24) identified the need to recycle and dispose of pesticides, but bylaws provisions establishing the realization of this problem have not yet emerged. Until now, Russia does not have any existing plant for the destruction of POPs waste.

Even without a full analysis of the current situation, there is no reason to believe that it is necessary to urgently conduct an inventory of obsolete pesticides and their placement of objects, providing optimal storage conditions, increasing responsibility for the complete safety of all subsequent accounted range and deployment of the technologies, on the destruction of POPs pesticides, existing in Russia.

PROMOTING SUSTAINABLE ALTERNATIVES TO DDT FOR THE CONTROL OF VECTOR-BORNE DISEASES IN SOUTHERN CAUCASUS AND CENTRAL ASIA

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The "Demonstrating and Scaling up sustainable alternatives to DDT for the control of vector-borne diseases in Southern Caucasus and Central Asia" project, funded by GEF and executed by UNEP, WHO, Green Cross Switzerland and Milieukontakt International and participating countries is being presently implemented in Georgia, Kyrgyzstan and Tajikistan, and the WHO Regional Office for Europe is responsible for the health part of this Project.

The Project is built on the existing efforts of countries, WHO and other partners to promote cost-effective and environmentally sound national vector control policies and strategies aimed at reducing the reliance on persistent insecticides.

The main objectives of the health part of the Project is to demonstrate the viability, efficiency and cost-effectiveness of the sustainable alternatives to persistent insecticides, including DDT, in pilot areas of the participating countries, to build capacity to plan and implement vector control interventions based on principles of Integrated Vector Management (IVM) and to share the project lessons learnt and experience accumulated within and beyond the European Region.

During 2011-2013, different alternative vector control methods and techniques were monitored and evaluated in demonstration sites, and outcomes of these studies are being currently processed and analysed. Promoting such alternatives for vector control heavily depends upon active community participation and intersectoral collaboration. In recent years, a particular attention has been paid to strengthening of the national institutional and management capacities for planning and implementing vector control activities based on the IVM principles at central, intermediate and peripheral levels. A regional approach on IVM is extended within the countries of South Caucasus and Central Asia to involve non-project countries. It is expected that a final project report with conclusions and recommendations will be published by the middle of 2015.

SAFEGUARDING OF DDT AND ASSOCIATED WASTE IN GEORGIA, KYRGYZSTAN AND TAJIKISTAN

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Besides certain limitations, current POPs stocks dating from the Soviet times are unofficially still available to the general public through illegal repackaging of abandoned stocks and/or cross-border smuggling. Although official statistics do not show the use of DDT, environmental monitoring activities by the governmental institutions in some countries of the region show indiscriminate use of DDT, largely in the sector of agriculture, but also in disease control (typhus) resulting in increased health and environmental risks. In response to this challenge, the GEF-UNEP Project, entitled Demonstrating and Scaling up Sustainable Alternatives to DDT for the Control of Vector Borne Diseases in Southern Caucasus and Central Asia (in short: the DDT-project), aims to: (a) demonstrate the applicability and cost-effectiveness of alternatives to DDT for vector control in the selected demonstration sites (outcome 1); (b) develop national capacity for planning and implementation of vector control in the context of integrated vector management (IVM) (outcome 2); (c) identify and manage DDT stocks and waste (outcome 3), and (d) coordinate dissemination and sharing of country's experiences among the other countries and regions concerned (outcome 4).

In relation to outcome 3, the Project aims at:

• undertaking an integrated management approach for the participatory safeguarding of (on average) 60 tonnes of prioritised POPs stockpiles per country and the development of participatory disposal concepts (mainly DDT) as an example for similar projects in other countries of the region;

• presenting measures to safeguard stockpiles; and

• communicating on the hazards of DDT to specific target groups.

The Environmental part of the DDT project will assist participating countries with identification, inventory, priority setting, re-packaging, safe interim storage and development of plans for final disposal of DDT-containing stockpiles, taking into account respective country needs, availability of disposal facilities in the country and region, and more broad work in the area of obsolete pesticides and other relevant initiatives.

Georgia

In February 2011, the Inception Meeting for the DDT-project was organised in Tbilisi. The Ministry of Environmental Protection (MoEP) of Georgia was represented at this meeting by Khatuna Chikviladze, and the discussions about how to set up the Environmental Part of the Project in Georgia were initiated. Additional meetings took place during the HCH Forum in Gabala, Azerbaijan (September 2011) between MKI, Green Cross and a representative of the MoEP and the Ministry of Agriculture (MoA). At the Steering Committee meeting in Bishkek (Kyrgyzstan), in November 2011, the MoEP was not represented, but the

National Environmental Agency from Georgia participated in the meeting upon request of the MoEP. The last meeting then took place in June 2012 in Tbilisi with Ekaterine Imerlishvili, the successor to Khatuna Chikviladze. Despite the numerous discussions, no final joint view on the roles and responsibilities between the different project partners could be reached and as a result no activities have been carried out within the DDT-Project in Georgia so far.

During the SC meeting (September 2012) in Chisinau (Moldova) of the EU FAO Project on Improving capacities to eliminate and prevent recurrence of obsolete pesticides as a model for tackling unused hazardous chemicals in the former Soviet Union, the UNEP representative Martin Murin, MKI, Green Cross and MoEP representative Ekaterine Imerlishvili had another meeting and decided on the following steps to be taken (see also the e-mail sent by UNEP representative Martin Marin on 25.09.2012 to Ekaterine Imerlishvili and Project partners):

1. The MoEP has several times expressed the wish to complete a nation-wide inventory in Georgia. Therefore, the MoEP will send a request to Green Cross (as Executing Agency of the DDT Project) to provide support to finalising a nation-wide inventory of obsolete pesticides in Georgia with the support by the DDT project;

2. Based on a positive response, MKI, in close cooperation with the MoEP, will prepare the scope of the inventory, Terms of References, a financial plan and a time plan;

3. These documents will, after review by GC/UNEP, be approved on the level of the Georgian National Steering Committee;

4. Execution of the inventory is planned for early 2013. The national inventory will include analytical laboratory identification of samples (especially for DDT, as the DDT project plans to repack DDT or associated waste);

5. Based on the inventory data and project results from the UNDP project at the Lagluja landfill, the priorities will be agreed upon between the DDT Project partners and the Georgian National Steering Committee on repackaging. These priorities should whenever possible allow the DDT-project to reach its goal of repackaging 60 tonnes of DDT or associated waste;

6. The awareness raising campaign, which is part of the DDT project, will be planned and agreed upon by MKI and the MoEP in consultation with GC/UNEP, and agreed at the national level.

For defining the scope of the inventory in Georgia, the MoEP needs to inform the DDT-Project about the inventories that already have been undertaken in the country, the amount inventoried as well as an estimation of how many sites still need to be inventoried. The Ministry of Agriculture has recently inventoried 15 sites within the FAO GEF project on Capacity Building on Obsolete and POPs Pesticides in Eastern European Caucasus and Central Asian Countries (EECCA project). It can be that no or few additional sites for inventory will be found. In that case, the scope for finalizing the national inventory in Georgia can focus on consolidation of existing inventory data (into PSMS), on checks of existing inventory data when deemed necessary and possibly research into smaller stocks of obsolete pesticides (establish if such smaller amounts exist and estimation of amounts). In the last case, it can be that such an inventory is a part of an NGO information campaign; individual farmers and citizens will have to be approached as often individuals own smaller amounts of obsolete pesticides. The people already trained on inventory and PSMS from previous projects (e.g. EECCA-project) are

expected to be involved in the finalisation phase of a full nation-wide inventory.

As funds for POPs inventory and safeguarding are very limited, the DDT Project looks at coordinating efforts between projects (e.g. EU FAO, EECCA, FAO-TPP projects) and tries to support countries on issues that have not been or will not be addressed by the other projects. The idea is that projects will do follow-on steps and do not overlap. Persons trained in one project are involved in other projects where possible. When there is a need additional persons will be trained in the country in order to establish or broaden local capacity. For Georgia this means that the EECCA project has trained persons on inventory, PSMS, repackaging and awareness raising and supported the country in executing an inventory of 15 sites. The DDT project will - as discussed above - support the country with further inventory (with a special interest in DDT stocks and associated waste) and with a pilot project on repackaging (again of DDT or associated waste) of approximately 60 metric tonnes. Finally the above mentioned EU FAO project will support the country with disposal of these stocks. A schematic reflection of cooperation between projects in the case of Georgia is as follows:

Where possible cooperation will be established with the ongoing UNDP project at the Iagluja dumpsite in Georgia.

Kyrgyzstan

The DDT Project looks at establishing synergy between projects and tries to support countries on issues that have not been done or will not be done in other projects on obsolete pesticides. The idea is that projects will do follow-on steps and do not overlap. Persons trained in one project are involved in other projects where possible. When there is a need additional persons will be trained in the country in order to establish or broaden local capacity. The DDT project agreed to cooperate with the FAO/Turkey Partnership Programme Initiative for Pesticides and Pest Management in Central Asia and Turkey, 2010-1012 (FAO-TPP project), that is active in Kyrgyzstan as well. The overall objective of this project is to assist the countries of Central Asia, with a specific focus on Kazakhstan, Kyrgyzstan, Turkmenistan and Uzbekistan, to reduce risks to health and environment from obsolete pesticide stockpiles and from pesticides in current and future use. The project outputs will be: a) a detailed inventory of obsolete pesticides b) technical capacity building to strengthen pesticides management, and c) implementing proven methodologies for obsolete pesticide management and pesticide risk reduction.

Within the FAO TPP project, a training on inventory was held 19-29 June 2011 in Bishkek, Kyrgyzstan. Several participants from Kyrgyzstan attended this training:

1. Janybek Derbishaliev - Head of the Department of Chemicalisation and Plant Protection, Ministry of Agriculture;

2. Vladimir Pak – Deputy Head of Department of Chemicalisation and Plant Protection, Ministry of Agriculture;

3. Almaz Alakunov – Chief Specialist of Department of Chemicalisation and Plant Protection, Ministry of Agriculture;

4. Keneshbek Jumabekov - Senior Specialist, State Ecological Control Department, Ministry of Environment;

5. Gulnara Saryeva - Sanitary Inspector, State Sanitary Epidemiological Department, Ministry of Health;

6. Indira Zhakipova – NGO EKOIS and local MKI coordinator DDT project

After this training, between 11-16 March 2012, FAO consultant Khatuna Akhalaia guided the inventory team (in which all above mentioned persons took part) during the first phase of the inventory. Khatuna Akhalia visited Kyrgyzstan again between 17-23 September 2012 at the start of the second phase of inventory. The FAO TPP project conducted inventories at 119 sites in Ysyk-Kul Oblast, Narin Oblast, Talas Oblast and Batken Oblast. Jalalabad and Osh Oblasts were not inventoried in the frame work of the FAO TPP project because it was done already within a MKI project (2006-2008) and TAUW World Bank project (2008-2009). Currently a nation-wide inventory in Kyrgyzstan has been finalised.

In December 2012, a training on FAO's Pesticides Stock Management System is planned to be organised. This will provide the country with the tool to have all inventory data consolidated and to have an overview of which sites pose the largest risk with regard to pesticides and environment.

In early November 2012, MKI representative Wouter Pronk will visit both Tajikistan and Kyrgyzstan. One of the aims of this mission is to meet with the structures that can serve as the coming National Steering Committee for the DDT project and also other projects (such as the EU FAO-project Improving capacities to eliminate and prevent recurrence of obsolete pesticides as a model for tackling unused hazardous chemicals in the former Soviet Union, that has started in Kyrgyzstan already and is expected to start in Tajikistan in the near future). UNEP representative Martin Murin has visited Kyrgyzstan in July 2012, amongst others to communicate the necessity of the NSC to the country and to discuss the set-up of such an NSC. After the PSMS data are clear, MKI will make a repackaging plan and budget plan and will look to repack 60 tonnes of DDT or DDT containing waste from priority sites. This plan will be sent to the NSC for endorsement.

Based on the FAO TPP project's finalisation of the nation-wide inventory in Tajikistan and the risk priorities endorsed by the NSC, the DDT project will then take the next step and use the inventory data to make a repackaging plan for approximately 60 tonnes of DDT or DDT containing waste. The EU FAO-project will follow up with disposal of the 60 tonnes of repacked DDT and DDT containing waste, and will also research possibilities of disposal of approximately 90 tonnes of repacked obsolete pesticides that is currently stored in Osh Oblast. A schematic reflection of cooperation between projects is as follows:

A point of concern at this moment for Kyrgyzstan is the fact that cross border transport of hazardous waste may be problematic and therefore it may take time before the repacked waste can be disposed of. This may mean that the DDT project will look into possibilities of supporting the country with interim storage of the repacked 60 tonnes of DDT and DDT containing waste. A preferred solution is however to repack only once it is clear that the repacked waste can be transported immediately within the EU FAO project.

Tajikistan

The DDT Project looks at establishing synergy between projects and tries to support countries on issues that have not been done or will not be done in other projects on obsolete pesticides. The idea is that projects will do follow-on steps and do not overlap. Persons trained in one project are involved in other projects where possible. When there is a need additional persons will be trained in the country in order to establish or broaden local capacity. The DDT project agreed to cooperate with the FAO/Turkey Partnership Programme Initiative for Pesticides and Pest Management in Central Asia and Turkey, 2010-1012 (FAO-TPP project), that is active in Tajikistan as well. The overall objective of this project is to assist the countries of Central Asia, with a specific focus on Kazakhstan, Kyrgyzstan, Turkmenistan and Uzbekistan, to reduce risks to health and environment from obsolete pesticide stockpiles and from pesticides in current and future use. The project outputs will be: a) a detailed inventory of obsolete pesticides b) technical capacity building to strengthen pesticides management, and c) implementing proven methodologies for obsolete pesticide management and pesticide risk reduction.

Within the FAO TPP project, a training on inventory was held on the 19-29th June 2011 in Bishkek, Kyrgyzstan. Several participants from Tajikistan attended this training:

1. Vohidov Abdumavlon - The Deputy Head of the State Institute on Plant Protection and Agricultural Chemicalisation, the Ministry of Agriculture;

2. Alimardonov Qayumars - The main specialist of the Department on Control of Land Use and Protection, the Ministry of Environment;

3. Alijonov Kholmurod - The Head of the Environmental Sanitation Department of the State Sanitary Epidemiological Services, the Ministry of Health;

After this training, between 8th and 11th May 2012, FAO consultant, Khatuna Akhalaia, led the inventory team (in which all above mentioned persons took part) during the first phase of the inventory. During this phase, the inventory team visited the Khatlonski Region and the Kurgantubinskaia Zone. In total, 22 sites were inventoried. It is planned that the second phase of the inventory will take place in

November 2012; the Sogdiiskii Region (7 rayons) and the Regions of the Republican Subordination (5 regions) will be inventoried. After the second phase is over, it is expected that the nation-wide inventory of the country is completed. The DDT plans to provide financial support to eventual lab analysis of the samples. In December 2012, a training on FAO's Pesticides Stock Management System will be organised. This will provide the country with the tool to have all inventory data consolidated and to have an overview of which sites pose the largest risk with regard to pesticides and the environment.

In early November 2012, MKI representative, Wouter Pronk, will visit both Tajikistan and Kyrgyzstan. One of the aims of this mission is to meet with the structures that can serve as National Steering Committees for the DDT project and also other projects (such as the EU FAO project Improving capacities to eliminate and prevent recurrence of obsolete pesticides as a model for tackling unused hazardous chemicals in the former Soviet Union, which has already started in Kyrgyzstan, and is expected to start in Tajikistan in the near future). UNEP representative, Martin Murin, amongst others, visited Tajikistan in July 2012, to communicate the necessity of the NSC to the country and to discuss the set-up of such an NSC. After risk prioritisation has been done with the help of the PSMS, MKI will make a repackaging plan and associated budget to repack 60 tonnes of DDT or associated waste from priority sites. This plan will be sent to the NSC for endorsement.

One of the results of the FAO TPP project will be a nation-wide inventory in Tajikistan. The DDT project will then take the next step and use the inventory data to make a repackaging plan for approximately 60 tonnes of DDT or DDT containing waste. The EU FAO project will follow up with the disposal of the repacked obsolete pesticides. A schematic reflection of cooperation between the projects is as follows:

At this moment, a point of concern for Tajikistan is the fact that cross border transport of hazardous waste may be problematic; therefore, it may take time before the repacked waste can be disposed of. This may mean that the DDT project will look into possibilities of supporting the country with interim storage of the repacked 60 tonnes of DDT and DDT containing waste. A preferred solution is, however, to repack only once it is clear that the repacked waste can be transported immediately within the EU FAO project.

PROMOTING SUSTAINABLE LLIN DEPLOYMENT AND OTHER ALTERNATIVES TO DDT FOR THE CONTROL OF VECTOR-BORNE DISEASES IN SOUTHERN CAUCASUS AND CENTRAL ASIA

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Abstract

In the first years of the new millennium, applications of DDT (dichlorodiphenyltrichloroethane) for all purposes ebbed to its lowest use-rate since World War II. The 3 nations in the Americas that reported continued use of the insecticide curtained their applications to almost zero by the year 2000 due to free trade agreements. In 2001, the Stockholm convention targeted DDT and 11 other persistent organic pollutants for severe restrictions. The provision was approved without dissent by all of the approximately 150 convention delegations. It appeared that the long life of the once ubiquitous pesticide had come to an end. In fact, this supposed demise may have been misleading, since the WHOPES database[1] showing a steady decline in global DDT use did not include the data from India and Sub-Saharan nations other than South Africa (Sadasivaiah 2007).

Although the Stockholm Convention effectively ended the use of DDT in agriculture, it did leave the door open for indoor uses for disease vector control. Five years later, the World Health Organization released a position statement advocating the use of DDT for indoor residual spraying (IRS) (Sadasivaiah 2007). The trigger for this recommendation appears to be that the world public health community was not making sufficient progress on the Roll Back Malaria Partnership's goal of Millennium Development Goal of achieving near zero deaths from malaria by the year 2015. By the middle of the first decade of the new century, it was clear that the goal would be difficult to achieve in less than ten years, especially in the southern tropical regions of Africa. By mortality impact, malaria was the 5th leading infectious disease worldwide. There were, and perhaps still are, approximately 270 million people, or 8% of the world's population, at risk from malaria. In 2012, there were 207 million diagnosed cases of malaria worldwide, but most (80%) of those were in Sub-Saharan Africa(Observatory 2012).

Thus, DDT gained favour for some of the reasons that the insecticide first attracted attention in the 1940's and 1950's:

- Broad spectrum of efficacy;
- Low mammalian toxicity;
- Wide spectrum of uses or applications;
- Low cost (a significant motivation);
- Long duration (persistence).

And of course, health officials felt that the public benefit of using DDT outweighed environmental concerns due to the fact that the DDT was not intended for outdoor use (Blankespoor 2012; Meiners 2014).

If the entire region of Central Asia, Transcaucasia and the Middle East are taken into consideration as a unit, the risky side of the equation is quite different from the human vulnerability in Sub-Saharan Africa. In these Mid Eastern, Caucasian, and Asian regions, there are approximately 56, 000 deaths annually, which accounts for

1WHO Pesticides Evaluation Scheme

only 3% of the global total. In this region, the Plasmodium vivax is the predominant malarial disease; however, there are occurrences of the more deadly Plasmodium falciparum found in Yemen, Saudi Arabia, Pakistan, Iran, Afghanistan, and southern Tajikistan (Dasgupta 2012, Observatory 2012). The disease risks are different in the Caucasusian-Asian region from those in Sub-Saharan Africa. The control strategies may also need different risk-benefit analyses.

In 2012, the team of Blankespoor, Dasgupta and Lagnoou developed tools to analyse these relative risks and benefits. They began with a detailed global malaria map (Oxford University), overlaid it with Global Population Data (Landscan) and estimated economic losses due to the prevalence of malaria in a population versus the increase disease caused by IRS DDT exposures. From a global perspective, and certainly from a Sub-Saharan Africa one, the use of DDT IRS does positively impact the $69 billion (2010 USD) in lost productivity of all afflicted populations. However, the IRS spray also adds $28 billion USD from the burden of new DDT spawned diseases and heath effects. This risk benefit equation seems more justified in Sub-Saharan Africa, where the negative impact of malaria is particularly great. In the regions outside of southern Africa, such as the Caucuses or Central Asia, where the number of cases and mortality subside, the societal costs of malaria will go down. But if IRS uses DDT, then the health costs from DDT spraying will remain constant (Blankespoor 2012)

Alternatives to DDT IRS

If DDT sprays for IRS are eliminated, there are still some alternatives that do not favour increased risks in either the biosphere or the humans living and working in close proximity to regions where there are some malaria risks. Alternative controls include:

- Physical controls;
- Other pesticide choices for IRS;
- Space sprays;
- Biological controls;
- Mosquito nets;
- Integrated vector management (IVM).

Physical Controls, the fundamental tools that eliminate habitat for breeding of mosquitos, should be the first control measure put in place. Unfortunately, pesticides are often used in lieu of sound physical pest management measures. Physical controls include:

- Empty any standing or stagnant water from old tires, pots, tarps and any other place where water accumulates;
- Change the water in animal troughs at least 2 times per week;
- Recycle any unused containers of any kind;
- Clear water from low places on roofs or gutters;
- Screen cisterns or water barrels;
- Improve drainage wherever there are low-lying places where water collects.

Other pesticides could be used for IRS. This is not always a good solution. The problem is that pyrethrum insecticides are the next logical choice, and although less persistent, insect resistance to pyrethroids is now well documented and this class of pesticide would better serve as the pesticide of choice in Long Lasting Insecticidal Nets (LLINs) for as long as possible. Other chemicals are not as desirable due to possible health effects.

Space sprays are non-residual pesticides, often sprayed in an outdoor environment. These applications are recommended for urban areas where people congregate outdoors. Space sprays are recommended for epidemic malarial outbreaks only.

Biological controls consist of using or enhancing any living organisms to control water borne larvae or disrupt the mating process of the mosquitos. Larvivorous fish have been successfully used to depress the numbers of maturing mosquitoes in aquatic environments. Two examples are Tilapia nilotica and Gambusa affinis. Cultured larvicides that are effective and the most widely used are:

Azadirachta indica (neem), Bacillus thuringiensis israelensis, and Bacillus sphaericus. More recently, public health officials have released sterile male mosquitos and have effectively disrupted a significant portion of the reproductive cycle (CEAGAfrica 2006, PANGermany undated).

Mosquito Nets alone or as a part of Integrated Vector Management where nets are used in conjunction with any of the other previously mentioned intervention measures are another alternative. Although developed some years earlier, affordable Long Lasting Insecticidal Nets (LLINs) are a product of the twenty-first century. These LLINs are a subset of the broad category of Insecticide Treated Nets (ITNs). Both the parent ITNs and the subset LLINs are treated with insecticides designed to kill or repel mosquitoes. LLIN manufacturers bind or incorporate synthetic pyrethrum insecticides by one of four technologies into or onto fibres woven from 3 types of resins. Impregnation or coating of the pyrethroid minimises the necessity for retreatment (Dobson 2011).

In a recent position statement, the WHO Global Malaria Programme (GMP) describes a shift in guidance for malaria prevention by recommending that *"national malaria control programmes and their partners purchase only LLINs designed to maintain their biological efficacy for at least against vector mosquitoes for at least three years in the field (and this is key) under recommended conditions of use, obviating the need for regular insecticide treatment."* The WHO GMP acknowledges that Interior Residual Spraying (IRS), combined with LLINs, may not be completely effective in areas of halo-endemic malaria infestations in for instance, sub-Saharan Africa.(GlobalMalariaProgamme undated) In low transmission areas where all age groups are vulnerable, e.g. the southern tier of the CIS nations, a populace may benefit from intervention schemes that target geographical distribution of LLINs addressing an uneven disease pattern.

There are advantages to using ITNs in general and LLINs in particular. Five studies show that ITNs reduced child mortality by 18% (GlobalMalariaProgamme undated). Clinical incidence of malaria in all age groups was reduced by 50%. The benefits of using bed nets is not limited to the incidence of malaria but show reductions to a range of other disease vectors: against nuisance mosquitoes, head lice and bed bugs. The use of LLINs have been found significantly less expensive than the use of ITNs (less than 50%) and 4-5 times less expensive than Indoor Residual Spraying (IRS) (GlobalMalariaProgamme undated).

The universal success of employing LLINs for Integrated Vector Management (IVM) is not assured, despite these hopeful statistical gains. Bednets are distributed globally by a number of mechanisms: mass campaigns, routine distributions at clinics, and subsidy vouchers allowing lower cost purchases at retail vendors. Recent studies have looked at the societal conditions that promote longevity in the intended use of LLINs. The studies show that if the value of the netting material is

greater than the perceived risk for malaria, then adaptive uses for the LLINs/ITNs result: fish nets, garden barriers, privacy screens, and more. Impregnated nets have dossiers on acceptable risks only if employed for interior uses. There are few, if any, comprehensive studies to support low level leaching into the environment outdoors. Pyrethroids show acceptable exposure and risk assessment for humans, but are toxic in low levels to, for example: aquatic species. Recent sociological investigations have found that distribution techniques that utilize a cadre of trained health workers that go into the home and hang the nets for the first time and describe care and maintenance are the most likely methods to assure longevity for LLINs' intended purpose: sleep protection. The governments that employ these public health workers are also more likely to have a feedback system that identifies local taboos, sleeping patterns and other needs that impact longevity of use. Disease intervention efforts have been found less effective if the donors, and national public health agencies insisted in purchasing only one type or size of net, perhaps, in a colour that had a negative association (Study 2013).

As a part of deploying thousands of nets in a given area, consideration must be given to the End-of-Life management. Not only should most adaptive uses be discouraged, but also a managed disposal plan will benefit the environment. The physical condition of most LLINs reaches a critical stage usually long before the insecticide is depleted. The shards of often dirty, ripped net material, left in the open, may contribute to aquatic invertebrate suppression and the now documented resistance of anopheles mosquitoes to synthetic pyrethrums. Managed collection and recycling/ waste-to-energy are feasible as long as the controls are similar to those imposed on recovered pesticide containers (Dobson 2011) (Ng 2011).

Conclusion

Long Lasting Insecticidal Nets are one of the best tools available for Integrated Vector Management for the protection of lower risk populations from malaria. Coupled with physical and possibly biological controls, the LLIN based strategy could reduce the need to employ high-risk controls that include DDT interior spraying. Nets, like every other public heath intervention, are not without risks. For longevity of use and maximum protection for humans and the environment, proper planning, education of the users, and careful net selection and distribution can protect a local population as well as the environment.

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FAO SESSION: PESTICIDE MANAGEMENT: MORE FOOD LESS RISK

RESULTS FROM THE LEGAL ASSESSMENT OF PESTICIDES MANAGEMENT IN THE EASTERN EUROPE, CAUCASUS AND CENTRAL ASIA COUNTRIES

GCP/RER/040/EC

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Background and objective of the legal assignment

The current project is aimed at developing capacity for management of hazardous wastes through the example of obsolete pesticides and persistent organic pollutants (POPs). There is an estimated 200,000 tonnes of these materials known to be affecting the Russian Federation, EC near neighbour countries (such as Armenia, Azerbaijan, Belarus, Georgia, Moldova and the Ukraine) and the Central Asian Countries (CACs) - Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan.

Some previous work on disposal of waste from these countries was focused on exports of thousands of tones of pesticide stockpiles to high temperature incinerators operated commercially in EU Member States. Whilst this strategy meets all international environmental compliance requirements, at the same time it is prohibitively expensive. The vast distances involved for the transportation of waste from CACs to incineration facilities in Europe make that option very unattractive and urge finding a possible local solution. Under this project, a study of capacity to treat these hazardous materials is prescribed.

The idea of the Legal Component of this project is to review legal frameworks for pesticides and waste management for each of the 12 listed countries. This review was made by National Consultants (hereinafter referred as NC) and International Legal Consultant.

In order to ensure the uniform approach to the analyses of legislation, the International Legal Consultant carried out the following:
• coordinated and organized the work of the National Consultants;
• prepared guidelines and provided guidance in relation to what is expected by the ToR from the NC;
• revised, made comments on the National Reports with assessment of the legal frameworks for the management of pesticides and waste, including POPs and obsolete pesticides waste prepared by the NC.

The International Legal Expert also supported the identification, recruitment and briefing of the National Legal Consultants.

On the basis of the received National Country Reports, the International Legal Consultant will do the following:
• Prepare a Comprehensive Legal Report with the results of the reviews from 12 countries, including conclusions and recommendations to strengthen the national legal frameworks and meet the international requirements;
• Prepare a corresponding Comparative Matrix to illustrate the situation in relation to pesticides and waste management in 12 countries on the basis of the information provided from the National Legal Consultants.

Key activities completed so far with the legal component

The ToR of the FAO International Legal Consultant clearly indicated that the following activities should be organised:

• support in reviewing CVs of the candidates from the 12 countries and selection of the National Consultants;

• coordination of work of the recruited National Consultants;

• preparation of the Guidelines on relation to what is expected by the ToR from the NC;

• revision, making comments on the National Reports with assessment of the legal frameworks for the management of pesticides and waste, including POPs and obsolete pesticides waste prepared by the NC.

So far, only three National Consultants were recruited – from Armenia, Kyrgyzstan and Tajikistan. The following countries have been assessed by the International Legal Consultant: Azerbaijan, Kazakhstan, Kyrgyzstan, Russia, Tajikistan, Turkmenistan and Uzbekistan (Matrix in Excel format was completed for each of these countries).

In relation to institutional frameworks established in these countries the following can be suggested in order to strengthen and improve the work of the governmental agencies / bodies:

For Azerbaijan:

• In order to bring together all the relevant actors, an establishment of the Pesticides Board or Commission;

• Involvement of other governmental units for assistance in the implementation and enforcement of the Law;

• Collection of information on pesticides incidents, assessment of data on the use of pesticides, etc.

For Kazakhstan:

Considering the multiplicity of various agencies:

• Identifying the primary competent authority to deal with the control of pesticides (to be the coordinator of all the activities in relation to pesticides management, including disposal);

• Assigning the head of that authority to take responsibility for implementing pesticides law;

• Authorizing the competent authority to call on other governmental units for assistance in the implementation and enforcement of the law;

• Charging the authority with collecting and sharing the information on pesticides management in general and pesticides incidents in particular;

• Ensure smooth information exchange across sectors, as well as regions (particularly, in the situation when such a number of agencies is involved in licensing various activities in relation to pesticides).

Kyrgyzstan:

It is clear that the major challenge of Kyrgyzstan in relation to pesticides is coordination of work of various agencies and departments. The first steps have been made and the Coordination Commission for the correct and proper management of chemicals has been established. It is too premature to evaluate the activities of the Coordination Commission, but there are hopes that it will bring together all the relevant actors and government units for assistance in the implementation and enforcement of the legal provisions on pesticides management as well as control functions.

Russia:

It should be noted that the issues of pesticides and waste management are within the joint jurisdiction of the Russian Fed-

eration and the subjects of the Russian Fderation. In accordance with Article 76(2) of the Constitution: "On the issues under the joint jurisdiction of the Russian Federation and subjects of the Russian Federation federal laws shall be issued and laws and other normative acts of the subjects of the Russian Federation shall be adopted according to them". So, legal framework is a combination of the Federal Laws, regulations and normative acts, as well as laws of the subjects of the Russian Federation (in total 83, consisting of republics, regions, oblasts, cities of federal significance, an autonomous oblast and autonomous okrugs, which have equal rights as constituent entities of the Russian Federation). So, for effective pesticides management, better coordination between the Federal and Regional (subjects of the Russian Federation) authorities is required.

Tajikistan:
In the light of the absence of information on the specially authorized state body for the production and safe handling of pesticides and agrochemicals in Tajikistan, it is not possible to provide legal analyses of the control functions of that body or any concrete recommendations.

Turkmenistan:
For Turkmenistan, it appears that there are no new legal acts regulating managements of pesticides and it looks that de facto SanPin of the former Soviet Union is still in force - Sanitary rules on storage, transportation and use of pesticides (insecticides) in agriculture, approved by the Chief Medical Officer of the USSR September 20, 1973 N 1123-73.

Ukraine:
In October 1993, the Cabinet of Ministers of Ukraine has established the State Interdepartmental Commission for the Testing and Registration of pesticides and agrochemicals ("Ukrgoskhimkomissiya"). In November 1993, this Commission has approved a temporary position on the procedure for state testing and registration of pesticides. This Commission has no controlling functions in relation to pesticides. According to statistics in the Ukraine, over the period from 1940-1980, crop losses due to pests and weeds have doubled, while the use of pesticides has increased by 10 times.

Uzbekistan:
It is clear that the Interdepartmental Commission of Uzbekistan does not carry out any controlling functions in relation to pesticides.

In the light of that, it can be recommended to:

• Identify the primary competent authority to deal with the control of pesticides (to be the coordinator of all the activities in relation to pesticides management, including disposal);

• Assign the head of that authority to take the responsibility for implementing pesticides law;

• Authorize the competent authority to call on other government units for assistance in the implementation and enforcement of the law;

• Charge the authority with collecting and sharing information on pesticides management in general and pesticides incidents in particular;

• Ensure smooth information exchange across sectors, as well as regions (particularly, in the situation when such a number of agencies is involved in licensing various activities in relation to pesticides).

The Final Phase of the project will be the completion of the remaining country reports and preparation of the Comprehensive Legal Report (with the results of the reviews from 12 countries, including conclusions and recommendations to strengthen the national legal frameworks and meet the international requirements), as well

as Corresponding Comparative Matrix can only be completed on the basis of the National Reports as well as supporting information received from the National Consultants.

There is an apparent risk that recruitment of the National Consultants (for Moldova and Belarus) will be delayed and that will have a negative impact on the analyses and preparation of the Comprehensive Final Report by the International Legal Consultant in due time. However, at the moment, everything is being done to facilitate the timely commencement of the work and all the necessary preparations have been completed.

As part of the ToR, the FAO International Legal Expert took part in the Regional Workshop on 8th of October 2013 (originally planned to take place in Armenia, Yerevan and further moved to Kvarali – Georgia). The presentation on Legal Assessment of the Pesticides Management in the Eastern Europe, Caucasus and Central Asian countries has been made.

Major legal findings in relations to pesticides management

The Final Report will be prepared in line with the Terms of Reference and specific Guidelines for the Structure as requested by the FAO Legal Department. It presents in a concise manner all the work conducted by the International Legal Expert and National Experts of the countries during the execution of this project. The Final Report consists of four major parts:

1) Introduction with links to the International Context in relation to pesticides, participation of the counties under examination in international treaties;

2) Overview of Institutional and Legal Frameworks in relation to pesticides management prepared by the National Experts and International Legal Expert;

3) Comparative Analyses of National Legislation with major outcomes of the assessment, which briefly outlines the differences and similarities of legal aspects in pesticides management in ten countries (if there will be no National Experts for Moldova and Belarus), and provides recommendations and suggestions;

4) Recommendations and suggestions from the International Legal Expert in relation to improvement of regulatory framework of pesticide management in ten countries.

The situation in the Eastern Europe, Caucasus and Central Asia countries is not identical in relation to pesticides management, but certain common trends and similarities of particular problems have been identified during the legal analyses. This is why some recommendations and suggestions are given to particular countries – for example, in relation to Institutional Framework and Administrative Structures set up by the Governments. In relation to assessment of certain aspects of the national legislation, it was more appropriate to conduct analyses and provide comments referring to the substance of the provisions and deficiencies found in a number of countries.

The Final Recommendations of the Report will be presented in Section “Conclusions”. These recommendations concern general aspects of pesticides management in the reviewed countries and specific suggestions to particular countries in relation to the established legal frameworks.

The legal analyses of the national legislation form the bases for the following recommendations to improve the legal framework on pesticides management in the reviewed countries. It should be also highlighted that the major difficulty in the assessment of the national laws on pesticides management was in their multiplicity and overlapping scopes of various normative legal acts. Another typical feature

for all 6 countries - to find fundamental and essential provisions and principles of safe use of pesticides not in the laws, but in secondary legislation: regulations, standards, rules, etc.

Structure of the national legal acts
The structure of the legal acts on pesticides depends on the general legal system, the legal context, the Constitution of the country and existing legislation, priorities of the Government, applicable policies and resources available for implementation. For this reason all 6 countries can be divided into 2 unequal categories – 5 countries of the former Soviet Union and 1 country, which closely followed in the past few years the EU model of food safety and controls and achieved considerable progress in pesticides management.

Scope and coverage of the national laws
It can be concluded that an important drawback of all the reviewed national legal acts is in the fact that although they cover various aspects of pesticides management, however, these acts do not mention that they have been developed in order to assist the country in meeting its international obligations. There is also no reference to the need of reduction of risks due to the pesticide use or the importance of reducing overall dependency on pesticides, as recommended by the Code of Conduct (Article 1.7).

Therefore, the recommendation in light of that will be to consider the importance of the international treaties and participation of the courtiers in these international instruments more seriously and actively and overall policy objective to reduction of the pesticides use and dependency on pesticides.

Definitions of the terms
It can be generally recommended in relation to definitions and interpretations of the terms used in the national legislation to align them with the international definitions and include all the terms in relation to pesticides management.

Registration of pesticides
In relation to registration of pesticides all countries under review have provided in their legislation for mandatory registration system, however, it is not clear what is the body responsible for registration in Tajikistan. In relation to all 6 countries it can be noted that it is not clear whether the designed systems encourage the use of fewer or less toxic pesticides, and discourage the contrary – at least no specific legal provisions are found during these legal analyses. The application and registration process is set out by national secondary legislation and therefore most of the details concerning particularities of registration were not assessed by these analyses (among them confidentiality of trade secrets, types of final decisions of the registration body, etc). At the same time, it is clear that registration is always based on the conclusion of the scientific results of trials.

Import / Export
All countries under review have similar provisions with requirements to import / export only those plant protection products and agrochemicals that have been registered. However, in case of Tajikistan it is not clear which Governmental Body conducts the registration. Moreover, considering that out of 6 reviewed countries only one ratified the Rotterdam Convention (Kyrgyzstan) there are no national provisions in relation to notification of the secretariat of the Convention on the imported chemicals. Also, it is not clear how the border inspection control is conducted to enforce the provisions of the national laws in relation to import and expert (however, the issue of controls will be addressed by the specific section of this Report).

Licensing of activities in relation to pesticides

• This sector seems to be the weakest point

in the national legal systems. In Azerbaijan, the law does not require legal entities to have a license for production of pesticides or biological preparations. It is now clear if licensing of activities in relation to pesticides is covered by other legislation of Azerbaijan. If that is not the case, absence of licensing can be considered as a serious problem and a drawback in relation to management of pesticides in general in the country.

• It appears that not all the activities in relation to pesticides management are subject to licensing in Kazakhstan – for example, it is not clear whether storage, labelling, packing, re-packing and transportation of pesticides can be conducted without a licence.

• It appears that not all the activities in relation to pesticides management are subject to licensing in Kyrgyzstan – for example, it is not clear whether manufacturing, storage, packing, re-packing, labelling and transportation of pesticides can be conducted without a licence.

• It appears that not all the activities in relation to pesticides management are subject to licensing in Kyrgyzstan – for example, it is not clear whether manufacturing, storage, packing, re-packing, labelling and transportation of pesticides can be conducted without a licence.

• No secondary legislation of Tajikistan on licensing was found. It is also not clear who issues such licences.

• It appears that, first of all, no specific legislation in relation to licensing of activities in relation to plant protection products / pesticides exists in Uzbekistan. There is a Decree in relation to explosives and toxic substances, materials and products with their applications, which indirectly covers pesticides. However, not all the activities in relation to pesticides management are subject to licensing in Uzbekistan – for example, it is not clear whether packing, re-packing, labelling and transportation of pesticides can be conducted without a licence.

It seems that there are no provisions in the national legislation of the countries under review backing up the licensing scheme with inspections. This undermines the entire idea of licensing, as the competent authority should have the power to revoke a licence if inspections reveal that prerequisites are not met, if there is a violation of any conditions on which a licence was granted or if new facts come to light which would have led to the denial of the application in the first instance.

Transportation and distribution

General conclusion in relation to transportation and distribution of pesticides is that national legislation of most of the countries under review does not follow international standards for the transport of dangerous goods. There are no clear provisions that prohibit the transport of pesticides in the same vehicles as passengers, animals, food and animal feed. In Tajikistan, there is a principle of free circulation of pesticides (like any other goods) established and confirmed by the law. There are no licences required for transport activities with pesticides. The distribution of registered pesticides is also permitted without a licence (with the exception of Kazakhstan). So, it can be recommended to follow international standards for the transport of dangerous goods, set out requirements for vehicles and containers, introduce licensing and inspections of the vehicles and operators that conduct transport activities.

Labelling

The overall recommendations in relation to legal assessment of national provisions on labelling of pesticides can be summarized as follows:

•The national legislation should clearly state that labelling requirements apply equally to domestically manufactures or imported pesticides and be in the lan-

guages of the country and include pictoral representations adequate to the national literacy level.

• In addition, national technical norms should address the issue of physical requirements for the label and rules for affixing labels on packages.

• There should be requirements that labels are subject to pre-approval at the registration authority during the registration process.

• For countries, parties to the Rotterdam Convention (Kazakhstan, Kyrgyzstan and Tajikistan) requirements that labels include the appropriate WCO customs code should be adopted.

It is also appropriate to note that national legislation of the reviewed countries does not mention or refer to safety data sheets (SDS). An SDS is a specific form containing information on the hazard potential of the pesticide product. There are specific obligations in relation to contents of the SDS and in order to comply with the Rotterdam Convention, an SDS must be sent to each importer. So, it can be recommended to follow these international standards, too.

Packaging and re-packaging

In light of the above presented analyses of the national legal provisions in relation to packaging of pesticide products and evident gaps in safe management, the following can be recommended:

• Specific technical requirements for packaging and re-packaging should be adopted or clearly presented in the national legal framework in line with the detailed FAO International Guidelines for Packaging and Storage of Pesticides;

• Such technical requirements for packaging and re-packaging should be incorporated into the registration process;

• Specific national technical requirements for packaging and re-packaging should require packaging that is safe, will not degrade under normal conditions, does not resemble common packaging of consumable goods, has a child safety mechanism, prominently displays the approved label and is difficult or unattractive for re-use;

• Specific national technical requirements for packaging and re-packaging should prohibit the re-packaging or decanting of pesticide into food or drink containers;

• It can be considered to ban re-packing if effective controls are not possible and require that packaging or re-packaging only take place on licensed premises, where staff is adequately protected.

Storage

In the light of the above-mentioned general legal provisions in relation to storage of pesticides, it can be recommended to:

• Differentiate between private, end-user or home storage and bulk / commercial storage (no such differentiation is found in the assessed national provisions);

• Impose record-keeping requirements on those storing pesticides (again national provisions are too general and even this important principle of record-keeping is not mentioned);

• Prohibit the reuse of a pesticide container for any non-pesticide storage reason, unless authorized;

• Indicate the type of containers required and set out the rules for construction of storage buildings;

• Establish special requirements for storage of obsolete pesticide stocks.

Advertising

In the absence of any specific provisions on advertising of pesticides in Kazakhstan, it can be recommended to set out specific

requirements for pesticides advertising in line with international guidelines and prohibit the advertising of unregistered and illegal pesticides, false or misleading advertising of pesticides or advertising contrary to approved uses or label instructions. National legislation of other countries in relation to advertising of pesticides can be also updated and amended in line with the WHO and FAO Guidelines on Pesticide Advertising (adopted in March 2010).

Disposal
National provisions in relation to disposal of pesticides contained in the presented above legal acts appear to be too general, not complete or fragmented. Assessment of specific provisions was not possible for Turkey, Tajikistan, and Azerbaijan. However, according to the FAO Contact Persons in these countries, the storage rules have been developed in line with the international requirements and the Code of Conduct. Situation with disposal in Uzbekistan appears to be not very clear – since manufacturers of plant protection products are responsible for developing methods of disposal, there are no controls foreseen over these activates and this does not follow international guidelines for disposal of empty pesticide containers, related waste and unused or obsolete pesticide stocks. It can be recommended to develop and adopt specific rules in relation to disposal obligations in line with the international guidelines.

Record-keeping and controls
It can be recommended very strongly to strengthen the system of controls in relation to management of pesticides in the reviewed countries.

Way forward – Suggestions from legal assesment

The role of the government and competent authorities in the management of pesticides is different in different countries, but needs to be strengthened in almost all the countries represented at this project. Intergovernmental / interagency cooperation is a key factor for achieving the sustainable use of pesticides and reduction of risk. The Final Report provides the following general suggestions in relation to management of pesticides at the national levels:

• The need for workshops to discuss the outcomes of the legal assessment with the national competent authorities responsible for registration and pesticides management (preferably with participation of the national representatives in the areas of health, agriculture, transport and the environment) for the development of policies, updating and modifying the legislation, strengthening registration process and control methods associated with pesticides.

• There should be increased trainings and education sessions for strengthening the political commitment to reduce the risks associated with pesticides and overall reduction of the use of pesticides.

• It is necessary to promote regional and sub-regional cooperation, exchange of information and experience in fields related to pesticides (including border inspection protection and overall control experience).

• Further support for capacity building in the field of rational use of pesticides at the national and regional levels, including the mobilization of financial resources.

• From the practical side, it can be recommended to provide support for the analysis of the country and the needs of the assessment programmes to strengthen the capacity to manage the use of pesticides on the basis of inter-sectoral and multi-stakeholder approaches.

• Crucial for safe pesticides management is monitoring of all steps after the registration of pesticides, including quality control and surveillance systems for counterfeiting and drug trafficking and use.

• Overall awareness raising in relation to the use of pesticides and possible adverse effects.

EXPERIENCES IN IMPLEMENTING INTEGRATED PEST MANAGEMENT PROJECTS IN CENTRAL ASIA

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Abstract

Many farmers do not have adequate knowledge of disease and pest control, crop and land management and also animal husbandry in Central Asia (CA) due to the specialisation during the Soviet times. FAO provides assistance in strengthening capacity of the National Plant Protection Organizations and strengthening national frameworks for pesticide management to respond to the challenges regarding pests and pesticide control in CA. FAO is promoting adoption of Integrated Pest Management (IPM) in the sub-region by implementing a number of projects and using the tool of Farmer Field Schools (FFS), which is a comparative advantage of FAO being implemented in different countries around the world. The projects under implementation by FAO in CA related to IPM are as follows: TCP/TUR/3301- Promotion of Integrated Crop and Pest Management in vegetables, fruit orchards and grapes, TCP/KYR/3403 - Development of FFS to promote modern crop management and pest control technologies, TCP/KYR/3305 and TCP/TAJ/3401 - Assistance for Capacity Development in Locust Control and GCP/INT/193/IFA - Reducing risks of wheat rusts threatening livelihood of resource-poor farmers through monitoring and early warning. In addition to the projects, activities such as technical assistance in conducting monitoring and surveillance of cereals pests and diseases is provided in the sub-region including Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan. Regional Training Workshop on the Methods of Pest Surveillance, Survey and Control, Regional Expert Consultation on Cereals Diseases, Pests, Weeds Monitoring and Cereals Disease Resistance Breeding, Regional Workshop on Save and Grow: Promotion of Conservation Agriculture and Modern Plant Protection Methods and National Conference on Promotion of IPM in Turkey were conducted.

Keywords

FAO, FFS, IPM, Pest Control, Central Asia.

Introduction

Trends on population growth in the countries of SEC sub-region demonstrate that the sub-regional challenges compared to the global one are more serious. During the last 50 years, the population increased 2.5 times, and birth rate in the most of the countries still remains high. With the purpose of responding to the food demand, the intensive land reclamation has been taking place, which resulted in the expansion of irrigated area up to 3 times and led to environmental problems. However, the area is limited, further expansion of irrigated lands is not possible and the area

under arable land per capita is declining, competition and conflicts for land and water are raising.

Based on the official statistics report, crop production in general, but let's focus on production of wheat that is slowly growing. Wheat is the main staple crop in all countries in the sub-region; thus, its consumption rate is the highest in the world – over 200 kg/year/capita. On the other hand, the production of wheat per capita is slightly declining, and wheat yields are remaining very low.

In addition, the serious infestation of quarantine and transboundary pests and diseases severely damage crop yields. Every year, the farmers observe damages caused by locust, wheat rusts, nematodes, gypsy mouth, American white fly and other dangerous pests and diseases.

To control pests and diseases, the farmers apply the pesticides, but the registration and quality control system of pesticides and pesticide applying equipment is not in place that put the environment and human health under serious risks. Thus, very often illegal and low quality pesticides are used. Another problem is obsolete pesticides. The countries in the sub-region mostly inherited from the Soviet Union a huge amount of obsolete pesticides – about 200,000 tones or 40% of world reserves that requires proper management and elimination.

Current and emerging challenges in SEC

After collapse of the Soviet Union, farmers faced with the knowledge deficiency and access problem on training in crop and land management, disease and pest control as well as animal husbandry. The extension services, credit and markets are also poor. Therefore, capacity improvement is prerequisite for further development of agriculture and improving livelihood of rural population. The current main challenges in CA can be summarized as follows:

- Rising prices of inputs (fuel, fertilizer, seed, pesticides, etc.)

- Yield of main crops is declining due to climate change and lack of superior varieties

- Lack of institution capacity and legislation

- Generation gap and lack of qualified experts

- Lack of modern knowledge and technology

FAO response to the challenges in Central Asia

To respond to the global challenges, the FAO has developed a paradigm Save & Grow (FAO, 2011) promoting growing more with less spending. This book serves as a guideline for policymakers using a holistic approach for solving the problems, efficient and sustainable utilization of ecosystem services and inputs with conserving and enhancing natural resources that reduced environmental pollution. Save & Grow provides the systems that are adaptable to specific conditions, locations and scales.

With the purpose of responding to the challenges on crop production and protection in the sub-region, Save & Grow is translated in four priority areas, two of which are focusing on pests and pesticide management;

- Strengthening capacity of the National Plant Protection Organizations

FAO is promoting adoption of Integrated Pest Management (IPM) to reduce pesticide usage by developing Farmer Field Schools (FFS), which is being implemented in different countries around the world. FAO cooperates with the countries and provides support in strengthening policies on plant protection, implementation of

international conventions and standards (e.g. ISPM) and harmonization of regional phytosanitary legislations. FAO provides support in improving capacities to control transboundary pests and diseases (locust, wheat rusts) and carrying out the monitoring, surveillance and control of wheat rusts (e.g. SMS monitoring) and supports training of young researchers from the region on plant.

- Strengthening national frameworks for pesticide management

Cooperation and support in this area covers improving registration of pesticides and pesticide applying equipment, providing the guidelines/manuals on pesticide registration, specification and quality control, improving pesticide and obsolete pesticide management, ratification and implementation of Rotterdam Convention to assure safeguard of pesticide use.

Adoption and Promotion of IPM in SEC countries

Due to being a strategic crop for CA, IPM research was started on cotton in 1980's and focused specifically on mass rearing and release of bio-control agents by a network of insectaries. However, there were neither any other special IPM programs nor conservation of natural enemies and biodiversity in the agricultural landscape. Thus, in recent years, FAO has been promoting the adoption and implementation of IPM programs by projects, workshops, conferences and studies. FAO-SEC, in cooperation with CIMMYT and ICARDA, conducted a study on the status of plant protection and conservation of agriculture in Central Asian countries. The study defined the gaps and bottlenecks for promotion of modern plant protection techniques and crop management in the countries of the sub-region. On that basis, the guidelines for policymakers and strategies on promotion of IPM techniques through FFS approach are to be developed.

Projects on adoption and promotion of IPM in CA

The Central Asia Regional Integrated Pest Management Project, funded by the United States Department of Agriculture, was initiated through IPM Collaborative Research Support Program by Michigan State University in collaboration with the University of California-Davis, International Center for Dry Areas and other institutions in CA. Components of the projects are enhancing the efficiency and product lines of bio laboratories, enhancing biological control of pests through landscape ecology/habitat management and capacity building (development of guidelines, trainings on IPM, introduction of FFS, etc.). The outputs of the project are as follows: development of experts' data base (Entomologists, Plant pathologists, Pesticide management, Soil, Plant immunity, Bio-methods), introduction of entomophages, landscaping development, guidelines for trainers, brochures, pocket books, posters and agro Entomological cartogram, promotion of IPM on wheat (Tajikistan), tomato (Uzbekistan) and potato (Tajikistan) and training abroad (MSc, PhD and season long term courses) (Maredia and Baributsa 2007).

To ensure the supply of reliable and healthy foods from farm to table in Turkey, the project TCP/TUR/3301 on Promotion of Integrated Crop and Pest Management in vegetables, fruit orchards and grapes is under implementation.

The outputs of the projects are as follows:

- Review of the problems on pests and possibilities of using safe biological agents.

- Review of the national legislation on plant protection and certification system and developing proposals for improvement of legislation.

- Review of the procedures on pesticide residue analysis and control, enforcement of certification and introduction of Blue Flag.

- Capacity building on application of IPM (ToT, FFS, Technical Days, Study Tour, etc.)

- Publication of project results, information dissemination.

- Formulation of a five-year project on IPM and ICM for Turkey financed by the government and/or donor.

- National Conference on IPM.

In Kyrgyzstan, the promotion of IPM is supported by the project TCP/KYR/3403 on Development of FFS to promote modern crop management and pest control technologies. The objective of the project is to improve farmers' capacity in adoption and promotion of modern crop and pest management techniques and the outputs are as follows:

- Development of appropriate technical co-operation between researchers, extension specialists, NGOs and farmers.

- Providing technical assistance in formulation of the national strategies on adoption of IPM and development of FFS.

- Review the dangerous pest and diseases of main crops.

- Establish per three FFS in three project sites.

- Conduct an economic analysis of introducing IPM.

- Develop training modules and materials for FFS on IPM.

- Carry out a set of a season long ToTs for facilitators on IPM FFS.

- Organize Field Days and farmers' exchange visits.

- Create IPM data base and information network.

- Publish guidelines and brochures for farmers.

In Tajikistan and Kyrgyzstan, to protect the plants from locusts in a sustainable and environmentally safe manner the projects TCP/KYR/3305 and TCP/TAJ/3401 on Assistance for Capacity Development in Locust Control are under implementation. The objectives of the projects consist in reducing locust damage on crops and rangelands to preserve food security and livelihoods, in particular of the most vulnerable rural households.

The outputs are as follows:
- National capacities of the technical staff of responsible Ministries improved in particular on: a- locust survey and forecast; b- control techniques and operations using Ultra-Low Volume (ULV) technology and c- mitigation and monitoring of the impact of pesticide use on human health and the environment.

- Locust campaigns well-prepared, implemented and monitored.

Early warning systems are an important component of the IPM approach for countrywide applications. To reduce pesticide usage and have more efficient results on plant protection, pesticides should be applied in the right time. Due to the high risky character of the wheat rust diseases that can cause epidemics and result in big food loss, the project GCP/INT/193/IFA on Reducing Risks of Wheat Rusts Threatening Livelihood of Resource-poor Farmers through Monitoring and Early Warning has an important role.

The outputs are as follows:
- Establishment of an effective monitoring and early warning system.

- Upgrading of regional laboratories; establishment and assessment of international trap nurseries.

- Regional information exchange and networking enhancement.

- National and regional distribution of wheat cultivated areas surveyed and GIS maps development.

Conclusions

To use the natural resources in a sustainable manner and to ensure food supply for people in Central Asia, adoption and promotion of IPM is important, and FAO will provide assistance and has a comparative advantage in implementing IPM using the participatory FFS approach.

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THE PEST-AND PESTICIDE PERSPECTIVE OF FAO'S PESTICIDE RISK REDUCTION TEAM

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Abstract

Farmers want to avoid losing crops to pests, diseases or competition with weeds. When problems arise, farmers need the access to effective and appropriate solutions. Good agronomic practices, including Integrated Pest Management, are key to preventing and managing pest problems. Pesticides are designed to kill living organisms and are intentionally dispersed in the environment, applied to food and often used by unskilled and untrained people. They are often not needed, and even when they do serve a useful purpose, they may be applied on the wrong crop, in the wrong doses, at the wrong time, or with wrong equipment. Poor practice in the field means higher risks to farmers, unsustainable production and pesticide residues in food and in the environment. Many of these problems exist in industrialized countries, but in developing countries, the problems are even worse. Pesticides available to farmers, or most affordable to them, are often older types that tend to be more hazardous and less selective than newer ones. The prescribed protective gear or spraying equipment is often not readily available. Oversupply of pesticides and poor stock management can lead to creation of obsolete stock threatening health, the environment and act as a barrier to sustainable development in most developing countries. Pesticides need to be managed well to reduce the risks and to be of help to farmers in protecting their crops. Using the right product in the correct way and at a recommended dose significantly lessens their negative impact on health, environment and food safety. FAO's Pesticide Risk Reduction Group helps the government, farmers and the private sector to produce and protect crops sustainably, while minimising the risks involved. This paper explores examples of how the work by FAO's Pesticide Risk Reduction Team is related to pest and pesticide management and contributing to an integrated approach to sustainable production intensification.

Keywords

FAO; Pesticide Risk Reduction; Pesticide management; HHPs; IPM; GAP; Sustainable production intensification; Food safety.

Pesticide Management – More Food Less Risk

(www.fao.org/agriculture/pesticides)

Field crops, particularly those stressed through drought, temperature extremes, poor nutrition or other factors, are also susceptible to damage from pests and diseases. Applying the methodologies advocated through the Save and Grow (FAO, 2011) approach should produce healthy and less stressed crops that can resist pests and disease attack and that are grown in ecosystems that prevent pest and disease proliferation.

Crop protection can be achieved through cultural, mechanical, biological or chemical means. In an Integrated Pest Management (IPM) regime, efforts are made to manage the cropping ecosystem in a way that ensures plant health and naturally controlled or suppressed pest populations. When an agricultural ecosystem is stressed by poor management practices and pest problems emerge, a combination of control measures are used, with an emphasis on those that are least damaging to the ecosystem as a whole.

FAO's Pesticide Risk Reduction Team (AGPMC), promotes IPM, within a sustainable crop production intensification (SCPI) context, as the most suitable strategy for crop production and protection, particularly for smallholder, resource poor farmers.

Pesticides are nevertheless used extensively in crop protection throughout the world. These chemicals are almost uniquely designed to be toxic to living organisms and are intentionally dispersed in the environment, including directly on food, by largely unskilled people.

Pesticide use presents risks to health and environment through direct and indirect exposure. It is therefore crucial to manage pesticides effectively in order to reduce these risks as much as possible and thereby make crop production more sustainable.

Effective management is achieved through a combination of both education and regulation (which includes legislation and other processes, like monitoring and enforcement). Appropriate legislation and establishment of technical and administrative infrastructures will support life cycle management and monitoring of pesticide use and impacts.

Education of end users is equally necessary to help bring needed changes at the field level.

AGPMC provides the policy and technical tools to help countries to do that through (Fig. 1):

• The International Code of Conduct on Pesticide Management – a guiding framework for life cycle management of pesticides (FAO, 2013)

• Technical guidelines expanding on specific recommendations of the Code of Conduct and other technical aspects of pesticide management (FAO/AGPMC, 2013)

• Standard setting for pesticide residue in food and pesticide quality standards that are used internationally (FAO/WHO, 2010)

• Field projects to help countries establish or strengthen legislation, policies and strategies for pest management (IPM) and pesticides management

• Tools to assist countries (e.g. databases, process guides, toolkits)

• Farmer Field School (FFS) programmes to raise awareness of risks and to help provide effective, low-toxicity alternatives

Reduced reliance on chemical pesticides, use of less hazardous pesticides and appropriate use of pesticides protects the health of farmers, rural communities and food consumers; protects ecosystems, reduces input costs for farmers and improves trading opportunities for farm produce because pesticide residue limits are observed.

Producing and protecting crops sustainably

I**ntegrated Pest Management (IPM)** is the key to the sustainable intensification of crop production. Through the participatory approach of Farmer Field Schools, millions of farmers have learnt to manage pests and diseases using ecological meth-

ods. They gain better understanding of how soil systems, water management, crop seeds and varieties, growing systems, pest/disease ecology, harvest and post-harvest strategies and market access are all interlinked. This helps farmers to maximize yields, reduce the use of pesticides and other inputs and improve livelihoods.

Making the right tools available

Farmers must have access to crop protection information and tools when they need them. FAO's Pesticide Risk Reduction Group works with governments and the private sector to promote ecologically-compatible pest management. This may include the use of natural enemies and microbial control agents, traps and behavior disruptants, plant extracts, mechanical devices and low risk chemicals. Some of these can be produced locally, generating new business opportunities for farmers.

Assisting policy makers

FAO's Pesticide Risk Reduction Group provides several tools to help governments, the private sector and others manage pesticides better:

The International Code of Conduct on Pesticide Management - a voluntary framework backed by many technical guidelines to advise the governments, industry and other stakeholders on pesticide life cycle management;

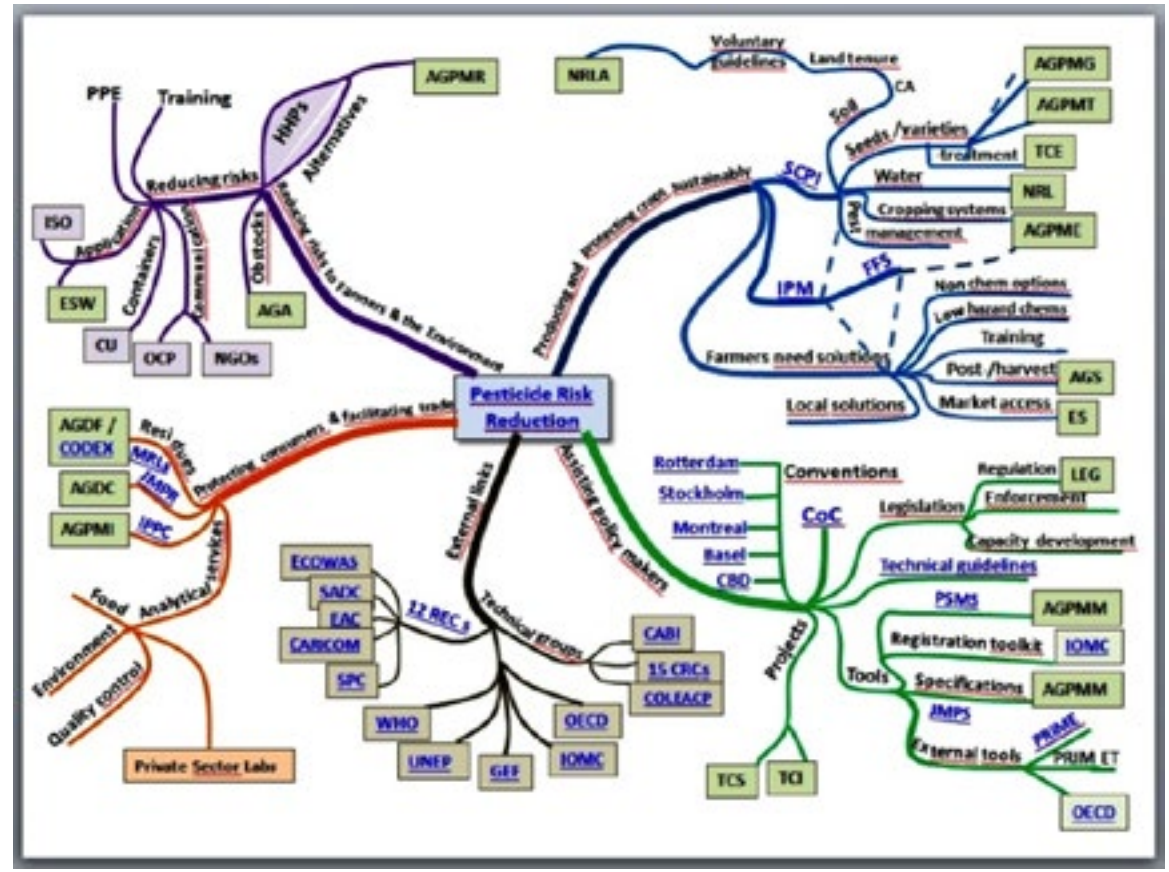

Figure 1: A mind-map showing the working and linking of the FAO Pesticide Risk Reduction Group (AGP:AGPMC)

Pesticide Specifications to check pesticide quality against internationally accepted standards;

Legislation supporting countries to bring their pesticide laws and regulations up to date;

Disposal of obsolete pesticides and Phasing out of Highly Hazardous Products (HHPs) is actively supported by FAO in

order to reduce risks to farmers, consumers and the environment.

The tools include the following:

Pesticide Stock Management System (PSMS), an on-line database for countries to use in managing pesticide registries, new and old pesticide stocks and storage sites;

Registration Toolkit being developed to help countries evaluate and make decisions about which pesticides to permit;

Pesticide Risk Mitigation Engine to rank pesticides according to risks to health and the environment and help make decision on pest management strategies; and

Field Projects helping countries to solve complex problems

Protecting Consumers and Facilitating Trade

Pesticides can pass into plants or stay on their surface leaving residues. This can affect human health. FAO and WHO work to set Maximum Residue Limits (MRL) for pesticides in all foods. They also advise on how to minimize the risk that excessive residues are left on a crop.

Importing countries may reject products that have residues above the accepted MRL, causing farmers to lose income. Consumers have the right to eat safe food, so systems must ensure that farmers use pesticides properly. Adoption of Good Agricultural Practices helps avoid trouble with residues and hygiene and meet other trade requirements. High standard laboratories are needed to monitor residues in food and produce for export. FAO's Pesticide Risk Reduction Group helps countries to access or establish suitable facilities.

When agricultural products are traded, there is a risk that pests and diseases will be transferred with shipments. Effective pest management should ensure that only un-infested produce is exported. We collaborate with the International Plant Protection Convention to protect farmers and the environment and to facilitate trade.

Reducing Risks to Farmers and the Environment

FAO's Pesticide Risk Reduction Group helps governments build capacity to educate farmers. Farmers learn to identify and apply alternative options to the use of chemical pesticides. Or, when there is no alternative, to apply low risk products work with skilled people and use the right equipment. Our guidelines, projects, advice and training help countries realize these good practices.

Highly Hazardous Pesticides cause great harm to health and the environment. Millions of people are poisoned by pesticides each year, mostly in developing countries. AGPM assists governments to replace such pesticides with less hazardous alternatives.

After pesticides are used, empty containers must be disposed of safely and not be used for storage of water and food or for any other purposes. AGPM helps countries to set up container management schemes.

International bans, oversupply and mismanagement of pesticides have resulted in the accumulation of over 500,000 metric tonnes of obsolete stockpiles globally. Since 1994, FAO's field programme partnered with bilateral donors, the European Commission, national governments, the Global Environment Facility, NGOs, the private sector and other UN agencies to reduce the risks to public health and the environment from these highly toxic materials.

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List of acronyms

FAO divisions and department/groups as shown in Figure 1:

AGP: Plant Production and Protection division

AGPMC: AGP – Pest and Pesticide Management Group

AGPME: Ecosystem Approach to Crop Production Intensification group

AGPMG: Plant Genetic Resources and Seeds group

AGPMI: The International Plant Protection Convention (FAO IPPC secretariat) group

AGPMM: Locust and transboundary plant pest and diseases (EMPRES) group

AGPMR: Rotterdam Convention (FAO RC Secretariat) group

AGPMT: The International Treaty on Plant Genetic Resources (ITPGRFA) group

AGA: Animal Production and Health division

AGS:Rural Infrastructure and Agro-Industries division

AGDC: Advisory Group for Data Communications unit

A**GDF (CODEX)**: Food Safety unit

ES:Economic and Social Development department

ESW: The Gender, Equity and Rural Employment division

LEGN: The Development Law service unit

NRL: Land and Water division

NRLA: Land Tenure Management unit

TCE: FAO's Emergency division

TCI: FAO Investment Centre division

TCS: Policy and Programme Development Support division

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CHALLENGES IN ASSESSING PESTICIDE LIFE-CYCLE MANAGEMENT AND KEY ARABLE FARMING PRACTICES IN SELECTED EASTERN EUROPEAN AND CENTRAL ASIAN COUNTRIES AND RECOMMENDATIONS FOR MITIGATION MEASURES

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Abstract

In the context of a regional FAO project (GCP/RER/040/EC) covering a wide range of possible issues regarding pesticide management (i.e. from a survey on legal aspects of pesticide registration to management of obsolete stocks), the authors, both in their capacities as international consultants (IC) of FAO, report on the first results on the sustainability of selected key arable crop scenarios based on a model (DEXiPM®) and on the implementation of the International Code of Conduct on Pesticide Management (the Code) and regulatory status of highly hazardous pesticides in three eastern European (Armenia, Georgia, Moldova) and in some central Asian (Kyrgyzstan, Tajikistan) countries. The methodology chosen included the use of templates and questionnaires which were then filled by national consultants (NC), analysing the data obtained, identifying the needs for each country and providing recommendations eventually endorsed by National Governments and stakeholders. These recommendations are to be converted into projects specifically addressing the most urgent needs of these countries. Significant differences in the profiles of the countries were identified. Numerous challenges were encountered – starting with the selection and recruiting of national experts, and the communication between the ICs with NCs in a multilingual and multicultural environment. As an example, the term "cropping system" is used to describe crop rotation. In some countries, this term and its translations into national languages is neither known nor practiced (e.g. wheat is often grown year after year). These continuous cropping systems show low sustainability as judged by unbalanced nitrogen fertilizer use and high herbicide/fungicide use and comparatively low yields. Specific recommendations to strengthen pesticide management and the sustainability of arable land use are given.

Keywords

FAO; Pesticide Risk Reduction; Pesticide Management; HHPs; IPM; GAP; Sustainable production intensification; Implementation of the Code of Conduct.

Introduction

Pesticides are products designed for the control of pests, pathogens and weeds in crop production with the aim of higher yields and better quality of crops. However, the improper use of pesticides may pose risks to users, lead to residues in crops and have adverse effects on the environment. Most countries have therefore implemented a risk-benefit evaluation in registering pesticides in combination with a pesticide life-cycle management to control and, if necessary, reduce the risks associated with the use of these products. The Code (FAO and WHO, 2013) is the global benchmark with recommendations on the life-cycle management of pesti-

cides. In the context of a regional project, FAO has initiated a survey on pesticide life-cycle and arable crop farming practices to assess the current situation in selected Eastern European and Central Asian countries. The objective is to identify the strengths and weaknesses of the implementation of the Code and of current arable farming practices to better be able to respond to the needs of these countries.

Sustainability of selected key arable cropping systems in eastern European countries

DEXiPM® (Pelzer et al. 2012) was used as the tool to assess sustainability of key arable systems of the different countries involved in this project. This is a model that assesses all the dimensions of sustainability (economic, environmental and social) through a qualitative multi-criteria assessment, based on the DEXI software (Bohanec 2009), and identifies the strengths and weaknesses of cropping systems. This tool was developed by the French National Institute for Agricultural Research (INRA) and within the EU project ENDURE (European Network for Durable Exploitation of Crop Protection Strategies;) (http://www.endure-network.eu.).

The economic assessment showed that all cropping systems in all countries are not economically sustainable. These weaknesses were mainly linked to the lack of potent cultivars (i.e. more productive and less sensitive to pathogens) due to underdeveloped seed industry or seed quality control system, unbalanced fertilization use that does not cover the crop requirements, high production costs (i.e. cost of fuel due to deep tillage and use of outdated equipment, cost of pesticides) and low financial security of the farms that restricts them to no investments.

Overall, the environmental sustainability of the cropping systems assessed received a "very low" score and was linked to the high frequency of pesticide applications, doses of application (i.e. use of maximum recommended doses for pesticides), pesticide eco-toxicity (i.e. use of products known to have adverse effects on health and on the environment) and lack of appropriate pest monitoring that leads to unnecessary interventions increasing production costs and the impact on the environment and farmers' health. These results ranged from the highest pesticide-input systems for both systems in Georgia to the low-input systems (CS1 and CS2) in Armenia that had a "high" environmental sustainability score. The differences between systems per country for various environmental indicators as impacted by the pesticide load can be seen in Figure 1.

Evaluation of the social sustainability of the systems indicated that all cropping systems are not sustainable. Overall, the weaknesses in these systems stemmed from 1) the significant health-related risk for the farmer (i.e. high pesticide use risk), 2) the low 'access to knowledge' (i.e. lack of farmers' knowledge and skills, no affiliation to a farm support network, and low availability of relevant advice for the strategy), and 3) the limited 'access to inputs' especially for seed material of good quality but mainly due to financial reasons. The only exception was the continuous potato system in Armenia that received a "medium" score due to the high interaction of this system with the society in terms of contribution to employment, an existing affiliation to a farm support network (e.g. cooperatives) and the easy 'access to output market' (market flexibility and product quality compliance with health requirements).

Recommendations to improve sustainability of cropping systems – The need for development of IPM is sound especially for both systems in Georgia and the continuous potato system in Armenia as crop protection is mostly pesticide-based. More

diverse crop rotations using winter and spring-summer crops that provide varying patterns of resource competition and crop protection management is overall recommended. The introduction of monitoring systems for pests, and scouting for weeds and disease incidence together with related economic thresholds that help in the decisions 'if', 'when' and 'what' to

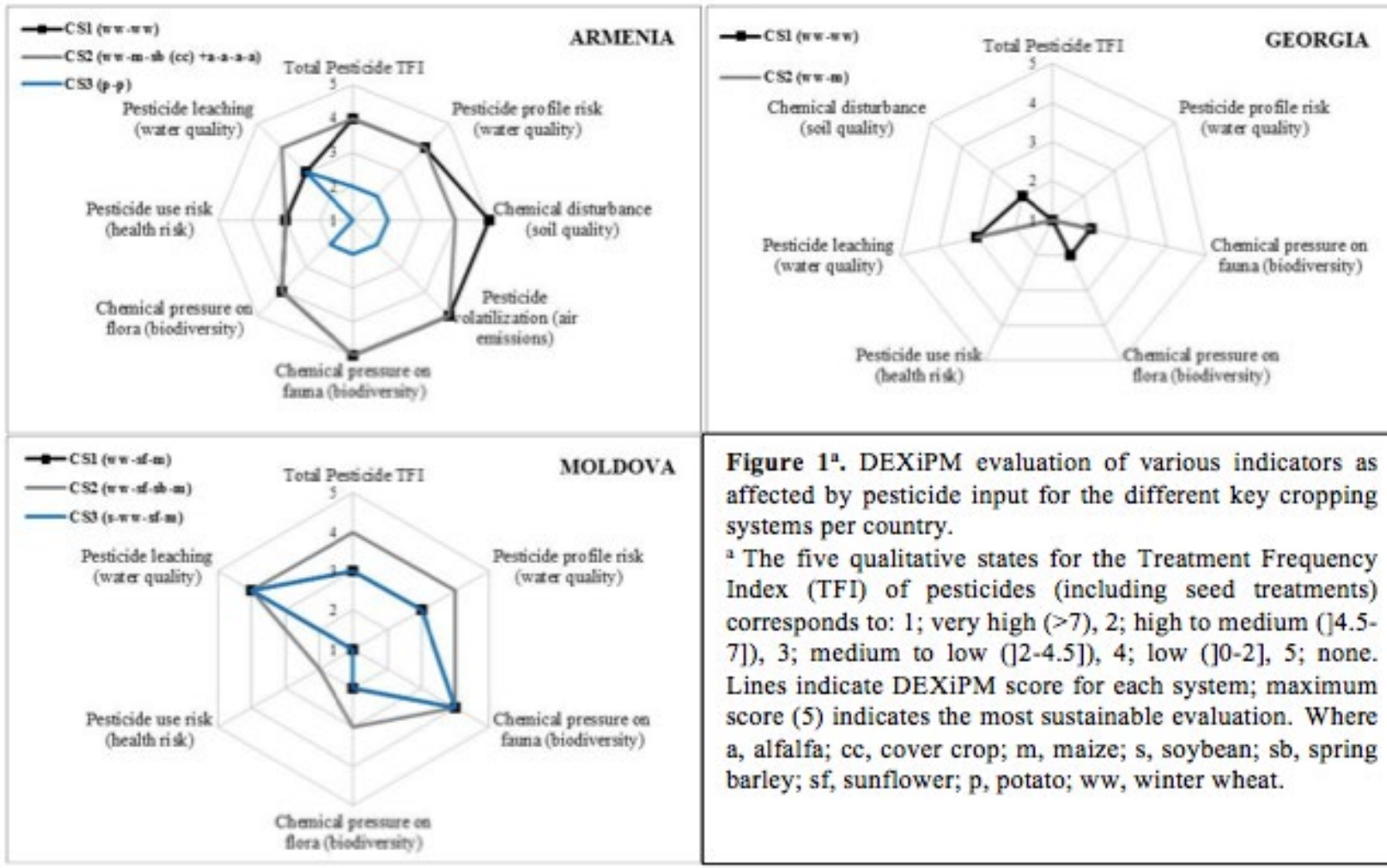

Figure 1[a]. DEXiPM evaluation of various indicators as affected by pesticide input for the different key cropping systems per country.

[a] The five qualitative states for the Treatment Frequency Index (TFI) of pesticides (including seed treatments) corresponds to: 1; very high (>7), 2; high to medium (]4.5-7]), 3; medium to low (]2-4.5]), 4; low (]0-2], 5; none. Lines indicate DEXiPM score for each system; maximum score (5) indicates the most sustainable evaluation. Where a, alfalfa; cc, cover crop; m, maize; s, soybean; sb, spring barley; sf, sunflower; p, potato; ww, winter wheat.

spray or control mechanically depending on the pest, weed and disease infestation each year is strongly recommended. All the above issues are linked with the lack of farmer knowledge and skills when it comes to crop production issues (i.e. availability of alternatives to pesticides, crop requirements) that certainly need to be tackled. Farmer training programmes are strongly recommended to provide them with knowledge on crop specific guidelines, IPM principles and the sustainable use of pesticides.

Implementation of Pesticide Management according to the Code and Status of Highly Hazardous Pesticides

The "International Code of Conduct on Pesticide Management" is structured in 12 Articles, each of which contains several sub-articles. The Code defines an entire landscape of pesticide management. Each Article gives detailed guidance for all stakeholders involved – governments, industry, farmers, public interest groups and international organizations – how their role in pesticide management can best be filled.

The Articles 3 to 11 with their sub-articles had been transformed into a questionnaire where answers to specific questions on actual situation on pesticide management could be given as "definitely yes" or "definitely no". All questions had the same direction so that in a theoretical complete implementation of the Code in a country, all questions would have been answered as "definitely yes". Answers were graded from a 4 for "definitely yes" to a 0 for "definitely no". Answers were coded in accordance with the grades, inserted in excel spreadsheets and the degree of implementation was calculated by the average for each individual article. In addition, weak points (0 and 1 for "definitely no" and "rather no" respectively) could be easily identified.

Thus, degrees of implementation of the Code were determined, where percentages ranged from 40 % to 80 %. These values allow to define a kind of country profile with strengths and weaknesses and to formulate specific recommendations for strengthening pesticide management in the country in agreement with available FAO and WHO Guidelines addressing specific issues in pesticide life cycle management.

Article 3: Management of pesticides

Essentially, all countries in the survey have the competence to regulate the use of pesticides. However, the official quality control of pesticides, labelling and packaging and also monitoring of product stewardship by industry are the serious challenges for the majority of the countries for several reasons, such as budget-capacity and expertise-wise.

For example, for packaging and labelling, the National authorities in the registration process, are expected to conduct an evaluation of the data package and have to make instructed decisions on pesticide packaging (size, leak- and children-proof, compatibility of the packaging with the pesticide formulation, labels, instructions for use etc. hazard warnings) which then have to be implemented by pesticide industry. Most of these points are risk-assessment and risk-reduction decision making where agronomists, chemists, toxicologists, legal and administrative staff have to work together to achieve an adequate implementation of the regulations. Unfortunately, the survey clearly shows that both the number of staff and its expertise in national authorities as well as in the industry is lacking to carry out these activities in these countries.

Article 4: Testing of pesticides

The access to unbiased test results on intrinsic properties of pesticides in terms of physical-chemical, environmental, residue forming and toxicological properties is a prerequisite for a sound and transparent risk assessment and, if possible, risk management. The answers to the questions addressing the status in the countries point to some shortcomings: the strongly felt need is the lack of residue studies covering the actual use and climatic conditions in these countries. As use rates, pre-harvest intervals, cultivars, epidemiology of pests and climatic conditions may not be adequately reflected in the residue studies submitted, a proper evaluation of residue formation is not possible. This may lead to excessive exposure of the general population to residues of pesticides.

Article 5: Reducing health and environmental risks

The majority of responding countries report on the lack of a systematic evaluation of worker exposure and integration of suitable personal protective equipment (PPE) into the leaflet. Equally important is the lack of maintenance of spray equipment, good practice in using field sprayers and of alternative control measures and IPM strategies. A number of other issues were identified, like weak product stewardship from the side of industry and lack of systematic re-examination of pesticides on the market and risk reduction measures like replacement of more hazardous formulations with the same active ingredient with a less toxic and hazardous formulation (e.g. replacement of an insecticide emulsifiable concentrate with a product formulated as capsule suspension).

Article 6: Regulatory and technical requirements

This article deals with regulatory requirements – often met in most countries – and technical requirements like inspection services and laboratories for quality control of pesticides and for monitoring of pesticide residues in food, significantly more challenging to establish and maintain in good working order. Here again, there is a general lack of expertise and funding. Equally important is the managerial aspect – to make best use of the information gained in the laboratory work to create a positive feedback loop to the registration committee taking the decisions. Furthermore, technical recommendations are either not available or outdated, providing inadequate guidance to pesticide industry preparing the dossiers for registration.

Article 7: Availability and use & highly hazardous pesticides (HHP)

Restricting or withdrawing the registration of HHP and risk reduction are the two sides of a medal. Whereas HHP are withdrawn from sale in most countries (HHP questionnaire) and less harmful alternatives had been found, the limitation to availability and use restrictions is an on-going task in most countries.

Article 8: Distribution and trade

The points under Article 8 bundle a range of activities where the focus is mainly on licensing of pesticide distributors and product stewardship from the side of industry. In most countries, there is little or no pesticide industry – therefore, traders and subsidiaries of multinational companies are the major stakeholders. Apparently, the cooperation and exchange of information on the import and sale of pesticides is considered as having room for improvement.

Article 9: Information exchange

The due information exchange on regional and sub-regional level, between the government, international organizations and other stakeholders is essential for taking adequate measures to control and reduce the risks associated with pesticide storage, use and disposal.

Article 10: Labelling, packaging, storage and disposal

The accumulation of obsolete stocks is a major concern in the countries covered by the survey. In the last years, considerable effort has been invested by the international organizations to inventorize and dispose of obsolete stocks. Equally important, however, is the routine use and disposal of small amounts of pesticides and packaging. The apparent lack of a collection and disposal system for used containers leads to dispersion of these containers to the environment and leaching of significant amounts of remaining pesticides to soil and water.

Article 11: Advertising

Wrong or misleading advertising does not seem to be considered a major issue in most countries.

Conclusions

In conclusion, the self-evaluation revealed degrees of implementation of the Code of conduct between typically 40 % and 80 %. The questionnaire was transformed into a country profile in the form of a status and needs assessment and was provided to national authorities for endorsement during national stakeholder meetings. The needs were translated into recommendations based on available FAO- and WHO Guidelines and serve as a basis for technical notes for future activities by FAO to specifically address the most urgent needs of the countries.

In that way, the project team is convinced to best assist these countries to strengthen pesticide management in these countries with optimal targeted activities addressing short, medium and long term needs. Ideally, the present survey serves as a baseline assessment that could be followed by an impact assessment in a couple of years to monitor the progress achieved by means of these activities.

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REDUCING THE USE OF HAZARDOUS PESTICIDES IN GEORGIA

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Abstract

In Georgia, approximately 4 kg of pesticides on average are yearly applied on tilled soil, whereas various used pesticides are produced in Europe and their analogue pesticides in China, India, Turkey or Bulgaria. From August 2010 to July 2012, the project entitled Reducing the use of hazardous chemicals in developing countries: potential of implementing safer chemicals including non-chemical alternatives - tools for Georgia and the EECCA region, was implemented by WECF and its Georgian partners. One of the core aims of the project was to invest the usage of pesticides in agriculture in Georgia, its legislative regulation and to identify and demonstrate the usage of non-hazardous bio pesticides in agriculture.

As found by means of the project, in Georgia, the liberalisation of legislation in the field of hazardous chemicals has been done through a very simplistic approach, and in many cases, the only action to be taken was the elimination of this or that law. At the same time, Georgia became party to a number of international conventions and treaties and country made important commitments on proper chemicals management. One of the findings of the project was that pesticides available on the Georgian market are partly not authorised, most of them being low quality chemicals. Packaging and marking of pesticides are neither regulated nor controlled. Distribution networks, users and consumers are unaware of the risks related to pesticides application. Interventions are indispensable, such as awareness raising, establishment and implementation of strict regulations on marking, packaging and labelling of harmful chemicals. Current regulations related to harmful chemicals and chemical substances should be reviewed. The first step undertaken by the project team was the responsibility to develop a handbook with a pesticide database in Georgian language. Besides developing information materials on substitution of harmful pesticides, the project established a demonstration plot on organic farming and a safe pest management for the cultivation of crops and vegetables.

Keywords

Legislative regulation, authorisation, pesticides, agriculture.

Introduction

Georgia is situated in the South Caucasus region, bordered by Armenia, Azerbaijan, Russia and Turkey. Georgia had 4.4 million inhabitants in 2011, 49% of which lived in rural areas. According to

statistical data, total area of tilled soil in Georgia is 472 thousand ha, with 100.215 ha under perennial crops. Up to 370.000 ha of this area (excluding the farms with small parcels up to 0.2 ha) is potential user of pesticides. From August 2010 to July 2012, the project Reducing the use of hazardous chemicals in developing countries: potential of implementing safer chemicals including non-chemical alternatives - tools for Georgia and the EECCA region was implemented by the Georgian NGO Greens Movement Georgia, SEMA, the Georgian Environmental and Biological Monitoring Association (GEBMA) and coordinated by WECF. The project received financial support from the SAICM Quick Start Programme Trust Fund. The aim of the project was amongst others to invest the usage of pesticides in agriculture in Georgia (Caucasus), its legislative regulation and to identify and demonstrate the usage of non-hazardous bio pesticides in agriculture. The presented project was based on 2 approaches: Firstly, investigation of the legal aspects of hazardous chemicals and its implementation; secondly, providing recommendations and information, accompanied by awareness raising, demonstration on substitution of hazardous chemicals in agriculture.

Legal aspects of hazardous chemicals

Before 2003, the legislation of Georgia was mainly based on the approaches and norms remaining from the Soviet period, which made the requirements for production, use and disposal of hazardous chemicals stricter than in following period. After 2003, in line with general liberalisation of the legislation, the laws in the field of production, use and disposal of hazardous chemicals were also liberalised, which had a negative influence on the issues of protection of human life, health and economic interests. The project observed that liberalisation of legislation in the field of hazardous chemicals in Georgia has been done through a very simplistic approach, and, in many cases, the only action was eliminating a certain law without providing a substitution. The following laws were abolished:

The Law on Licensing of Activities in the Field of Production of Agrochemicals, Trade with Agrochemicals, Laboratory Activities in the Field of Agro-chemistry and Soil Protection and Detecting the Quality of Agrochemicals and on Issuance of Import and Export Permits for Agrochemicals; the Law on Licensing Production of and Trade with Pesticides and Permits for their Export/Import, as well as for Import and Transit of Phytogenous Products Subject to Control; the Law on Hazardous Chemicals and the Georgian Sanitary Code.

At the same time, Georgia became party to number of international conventions and treaties, and country-made important commitments, including those in the field of hazardous chemicals. These international conventions, including 2001 Stockholm Convention on Persistent Organic Pollutants that obliges Georgia to ban 9 most hazardous for the environment pesticides (endrin, toxaphene, aldrin, dieldrin, heptachlor, chlordane, mirex, DDT and benzachlor) and extremely hazardous chemical group (polychlorinated biphenyls).

Despite the fact that in Georgia issues covered by the Stockholm Convention are regulated by not less then 4 ministries and many lower level state authorities, there still is not any legal act in place that corresponds to the obligations outlined in the convention. For example there is no regulating relation between these structures, and the rights and responsibilities of the Focal Point are not defined, neither the requirements for accountability and creation of unified national database. Since 2004, Georgia is a party to 1998 Rotterdam Convention on the Prior Informed

Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, which regulates international trade procedures for 37 hazardous chemicals. Amongst others the Rotterdam Convention sets out the following:

• Procedures for including new chemicals into the list of chemicals controlled by the Convention;

• Measures for raising public awareness, educating and informing the population of the countries on hazardous chemicals and cooperation between the countries in this area;

• Measures for improving efficiency of hazardous chemical monitoring and studies.

Convention also allows for exemptions:

• Upon request of the country, it can use one of the banned pesticides for a certain period of time;

• If the country registers its intention, it can produce or use DDT within the strictest framework of WHO requirements and only in cases when the purposes are local and the substance cannot be replaced by other accessible, efficient and allowable alternative means.

To summarise, at the current stage, the level of compliance of Georgia with the regulation of hazardous chemicals is far from satisfactory. Serious deficiencies in the field of informing the consumers have been identified.

Status of enforcement of the hazardous chemical import regulations

It was observed from the obtained documents that despite the legal ban, large quantities of the chemicals included in the list of the banned materials of the Ordinance No 133/n (26.03.2001) of the Minister of Labour, Health and Social Security are still being imported to Georgia. The investigation demonstrated that a number of chemicals banned are represented just by a generalised code; for instance, code 3808 50 000 00 includes the list of banned pesticides. Despite the ban, those chemicals are being imported under the general code and it is impossible to identify which substances in particular and for which purposes have been imported. In the period from January to March 2011, a total amount of 563 kg chemicals with the code 3808 50 000 00 were imported mainly from Turkey and China. Further, some of the chemicals included into the list of the Ordinance No 133/n (26.03.2001) of the Minister of Labour, health and Social Security are not coded at all.

Georgian pesticide market

According to the official state statistical data, the total area of tilled soil in Georgia is 472.000 ha, with 100.215 ha under perennial crops. Up to 370.000 ha of this area (excluding the farms with small parcels up to 0.2 ha) are potential users of pesticides (approx. 4 kg/ha)

Currently, in such a small country as Georgia, up to 190 active substances and about 400 of their various derivative complex preparations are being registered. The total annual quantity of imported pesticides is about 1300-1500 tons, whereas in 2010, approximately 8000 kg of chemicals regulated by Rotterdam and Stockholm Conventions were imported to Georgia (based on the Customs Office data).

Year	Insecticides (kg)	Fungicides (kg)	Herbicides (kg)	Germicides (kg)	Rodenticides (kg)	Other (kg)	Total kg
2011	*264 589*	773 051,6	328 076,2	32 917	*25 775*	84 920,4	1 509 329
2010	240 337	804 266	166 387	780	39 054	54 640	1 305 464

Table 1: Overview of import of pesticides in 2010 into Georgia by types. (Source: web page of the Ministry of Finance)

Various pesticides from Europe produced by the companies like BASF, Syngenta, Bayer, Newfarm or Dupont, and their analogue pesticides produced in China, India, Turkey and Bulgaria, are being sold at Georgian market. In the experts' opinion, the European products are of higher quality, technologically purified and respectively expensive. As for Chinese, Indian and Turkish products, both, in terms of their price and purity and affectivity, the quality is relatively low; hence, their reliability is doubtful and their impact on the environment and human health due to unfiltered additional substances even more adverse. For the purpose of importing cheap chemicals, some importers register several analogues of one and the same chemical produced. For example, Fungicide "Acrobat" produced in China is much cheaper and its quality is much lower compared with its European analogue. Active substance of the widely used preparation "dust" is Deltamethrin is registered in veterinary, but applied for plants protection as well, against various sucking mites and gnawing bugs. Though there are about 150 specialized pesticide shops, farmers' houses, and distribution networks, consumers are unaware of the risks related to pesticides' application, storage and disposal. Further packaging and marking (Georgian text and application instructions on the labels) of pesticides are neither regulated nor controlled.

Adequate measures are needed

To mitigate the risks of harmful environmental impacts of the pesticides, the project identified the following required measures:

• The strictest regulations of marking and labelling the harmful chemicals should be established, providing maximum information about harmful properties of such substances;

• Current regulations of storage, packaging, distribution and application of harmful chemicals and chemical substances should be reviewed;

• Mechanisms necessary for implementation of monitoring of turnover of the harmful chemicals within the country should urgently be introduced ;

• To achieve full transparency of turnover of the harmful chemicals, the codification system and mechanisms should be improved;

• Extensive campaign should be arranged to improve the awareness of population of pesticides' application safety rules;

• Personal protection means should be

available at all specialized shops, and such personal protection equipment should be offered along with the application instructions, and their use should be compulsory;

• A reliable data base on the properties of authorized pesticides should be made available in Georgian language to importers, retailers, authorities and farmers;

• A campaign on the substitution of harmful pesticides should be initiated.

Steps moving forwards: Set up of a pesticide database in Georgian language

Due to the observed illegal import, the low awareness on the risks of pesticides among authorities, users and other stakeholders, the project took the responsibility to develop a handbook with a pesticide database in Georgian language. The Handbook presents the basic principles on pesticides toxicity and safe use, and on safe alternatives of hazardous pesticides. For each in Georgia registered pesticide of the main groups, namely organo-chlorines, organo-phosphorus compounds, carbamates, organic mercury compounds, copper and arsenic contained compounds and pyrethroids, information is given on its chemical formula, CAS, IUPAC numbers, physical and chemical properties, preventive and first aid measures, etc. It is intended for practitioners, agricultural workers, toxicologists, health physicians, teachers and students of universities, scientists and others. Synonyms and trade names of pesticides are arranged in alphabetical order.

Steps moving forwards: Substitution of harmful pesticides

Unlike artificial technologies, currently ecologically clean production is being significantly promoted and demand for them grows annually all over the world. Adaption and implementation of the regulations on pesticides, dissemination of information on substitution of harmful pesticides should be the main task for a safer agriculture in Georgia. Therefore, the project started with providing the information about the alternative pesticides, their reliability and effectiveness in order to mobilise decision makers:

• A booklet with practical instructions on how to prepare plant tinctures for crop protection, as safe crop protection was developed for farmers, NGOs, training and extension services.

• The effectiveness of local-made preparations of bio-pesticides was demonstrated The impact of crop rotation, intercropping and features of permaculture were made visible.

• One Georgian company has developed successfully certified bio-pesticides against mildew, false mildew and phytophtora and were launched on the market.

• The project has inventoried the policy vacuum on chemicals management and brought together stakeholders. A document with policy recommendations in cooperation with a wide range of stakeholders was produced and presented to all relevant policy-makers.

• The project raised awareness with the European Commission on chemical safety. The European Commission is negotiating the accession contract with the Georgian Government, where Georgia has to adapt its legislation to the EU legislation. This includes a proper legislation on harmful chemicals.

Conclusions

The project has been a major advance in promoting chemical safety in Georgia. The vacuum in policy created by political and economic transitions in recent years, has created a situation in which there is little awareness of chemical safety issues,

and public ability to regulate chemical use and protect workers and the public has declined.

The project has raised awareness both among policy makers and the public, built alliances among government, private sector, and non-governmental staff, demonstrated viable alternatives to the most hazardous chemicals in the agricultural sector, and raised the capacity of public officials and NGO staff to continue dealing with the daunting issues of chemical safety across the country

Though this project was an extremely important first step, it created political will in several departments of the ministries. However, there is still a limited number of people, organizations, companies, and government officials who recognize the scope of the problem and the urgency of alternatives. So work like this will need to continue to raise awareness and introduce new solutions, policies and practices.

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MAINSTREAMING SUSTAINABLE CHEMICALS MANAGEMENT IN AGRICULTURAL SECTOR IN THE REPUBLIC OF MOLDOVA

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Integration of environmental requirements in the agricultural policies

With the goal of reduction of risks for public health and environment, improvement of state of agricultural ecosystems, increasing of the quality of agricultural products and solving the problems of prior pollution are among the priorities of the sustainable development of the agro-industrial sector of the Republic of Moldova. These measures will have at their background the principles of Sound Chemicals Management. The goals of SCM in the agricultural sector of the country have to be oriented at the following major institutional strengthening, legal enforcement and practical actions:

• Transposition of the provisions of the Directive 2009/128/EC on sound use of pesticides and of the EC Regulation 1107/2009 in the Law on the phytosanitry products and fertilizers nr. 119 of 22.06.2004;

• Development of the Guide on the implementation of the International Code of Conduct on the Distribution and Use of Pesticides, FAO, 2002 (http://www.fao.org/agriculture/crops/core-themes/theme/pests/code/en/);

• Application of the provision of the FAO Guides (Guidance on Pest and Pesticide Management Policy Development (2010), Guidelines for the Registration of Pesticides (2010) etc (http://www.fao.org/agriculture/crops/core-themes/theme/pests/code/list-guide-new/en/);

• Organization and continuous conduction of repackaging, transportation, elimination of the remaining obsolete pesticides and clean up/remediate the contaminated sites, with an action plan for 2014-2020, based on the ongoing projects, financed by the development partners and the Government. Dissemination at country level

of the available experience of the 6 pilot cleaned-up sites.

The article describes the current state and specific elements which could be taken in consideration during the process of mainstreaming the environmental requirements into agricultural policy and legislation in the Republic of Moldova.

Recommendations on the integration of sustainable chemicals management (scm) in agriculture

Integration of environmental requirements in agricultural policy, with the goal of reduction of risks of environmental degradation and improving the quality of agricultural ecosystems – is one of the priority directions in the framework of promotion of sustainable development of the country and strengthening of the agricultural complex. These measures have to be based on SCM provisions.

The Objective of promotion of SCM in agriculture included the following:
• promotion of the efficient production, treatment and management of ecological agricultural products in such a away, which will increase the income and life conditions of the farmers;

• stimulation of treatment and trade of primary agricultural products with the support of investments, which have the following goal: encourage agricultural products which protect the environment, which deliver useful goods for the society and promote the rational use of natural resources, development of new technologies and promote innovations, compensate the owners of lands from the state protected areas;

• carrying out training programmes and awareness campaigns for the farmers (development of the necessary infrastructure for the application of sustainable agriculture, support of small and medium scale models in the North, Centre and South of Moldova);

Development of the environmentally inoffensive agricultural technologies and infrastructure:

• establishment of the mechanisms for checking of the quality of water, used for irrigation;

• ensuring an integrated plant protection process against pests and diseases;

• applying conservative agriculture techniques;

• using agricultural vehicles with Euro standards on emission;

• sustainable management of the agricultural wastes;

• finalizing the process of elimination of POPs stockpiles and remediation of contaminated sites.

In addition, the following EU requirements will be applied:

– Integration of environmental objectives in agricultural policies;

– Reduction of the risks of degradation and ensure the sustainability of agricultural ecosystems;

– Reduction of water pollution, of soil and air pollution, chemicals and waste management;

– Conservation of agricultural biodiversity;

– Rural Development.

For 2007-2013, the EU planed the allocation of 20 milliards Euro for agroecological measures (22 % from the total allocations for the rural development).

Among the inaction costs, we could mention the following:

- Use of chemicals was justified by the higher volumes of harvest;

- At a global level, up to 97% of river and lakes pollution is a result of using chemicals in agriculture;

- According to WHO, 2 million poisoning cases from pesticides are registered annually in the world;

- The chemical substances are present not only in vegetal, but also in animal production;

- Lack of knowledge of the appropriate techniques of application of chemicals, taking into consideration the security norms;

- Lack of control from state authorities on the import of chemicals and their application according to the international standards;

- Not corresponding condition for the storage of the obsolete pesticides, with the risks of soil and surface water pollution;

- No deposit-refund and recycle schemes in place for the pesticides packaging

- Pesticides wastes, including packaging are placed on landfills and serve as an additional risk for animals and people.

The Benefits of implementation will cover the following:

- Increase in quality and less harmful agricultural products;

- Increase of exports of fresh and treated products;

- Protection of water, soil and air from contamination with chemicals;

- Improvement of the public health and reduction of health care costs as a results of exposure to agricultural chemicals;

- Increase of the incomes of the farmers and of the economic agents, which will increase the trade of agricultural products at the local and regional level;

- Creation of new jobs and increase of local budgets.

Brief Assessment of the policy documents in the sector

The National Strategy for the sustainable development of the agro-industrial secotr of Moldova for 2008-2015 was approved by the Governmental Decision nr. 282 on 11 March 2008.

The General objective of the Strategy is to ensure a sustainable growth of the sector, as well for the improvement of the life quality in the rural area, by increasing the competitiveness and productivity of the sector.

The Strategic Program of Actions of the Ministry of Agriculture for 2011-2015

The Ministry of Agriculture and Food Industry, based on the current state, internal and external factors in agriculture, developed the following mid-term priorities:

• Implementation of the reform in the food security sector;

• Restructuring in the wine making sector;

• Support the development of a modern market infrastructure;

• Implementation of the conservative agriculture;

• Reform of the meat and milk sector;

• Support of the added value agriculture;

• Support for recycling of agricultural wastes;

• Restructuring of the education and research capacities in the domain.

The Food Safety Strategy for 2011-2015, approved by GD nr. 747 on 03.10.2011 have the general objective to protect hu-

man health and ensure the interests of consumers related to the food safety. It is planned to carry out the following specific actions:

a) Improvement of the legal base;

b) Establishment of a national authority;

c) Strengthening the control procedures.

Program for the promotion of the production and trade of ecological products (HVA)

For the Republic of Moldova, the ecologic agricultural production is a real chance for the access to external markets. Thus, this is an new priority element, which, for the next 5 years, is including the following three years of conversion (with certification) and three years of support (with market access and export).

Legal and regulatory base

The adoption of the Law on the ratification of the Stockholm Convention on POPs (as of 19 February 2004) concluded and strongly supported the preparatory work, performed in Moldova for the evaluation of the existing situation and development of planning and normative documents in this domain. By this law, the MoE was nominated as the national authority responsible for the coordination of the implementation of the provisions of the convention.

The strategic directions on the reduction of the negative impact of POPs, regulated by the Stockholm Convention and other POPs related treaties on the environment and human health in Moldova, are reflected in the National strategy for the reduction and elimination of POPs approved by Government Decision No. 1155 as of 20 October 2004. In order to implement the Article 7 of the Convention a National Implementation Plan for the Stockholm Convention on POPs was developed and approved by the above Decision as well. The facilitation of the ratification of the Convention and the development of the Strategy and NIP was possible due to the support obtained from the GEF through the WB.

The Strategy is oriented at the establishment of a nation-wide chemicals safety management system and solving of the POPs priority problems. The national policy is calling for phased approach and well-developed implementation plans of significant treaties related to the POPs risks. The policy has two key management objectives: 1) remediation and elimination of POPs from the environment and 2) management of POPs throughout their entire life cycle, to avoid, prevent or minimize their release into the environment.

Existing regulatory gaps have to be filled-in and legislation has to be amended to ensure cross-sectoral and media consistency and timely transposition of international obligations. The legislation shall address specific POPs issues, which are not currently covered by existing legal and regulatory framework, both at the national and sectoral levels.

Implementation regulations, procedures, standards and guidelines shall be drafted in an integrated manner, clarifying monitoring, reporting, control, implementation and enforcement responsibilities of the respective ministries and agencies, and creating a unified and integrated computerized system of tracking regulated POPs, dangerous and toxic substances throughout their life cycle.

As a part of administrative management, a possibility of establishment of the centralized database should be explored. This should be based on the upgrade of centralized monitoring and laboratory capabilities and complemented by the focused training of selected staff. Coordination, compatibility and integration of monitoring, laboratory and control capabilities shall be enhanced, in order to improve

POPs cycle information and data management and facilitate more effective and efficient national programming, planning and decision making in this domain.

The NIP priority provisions on information and monitoring foresees the following actions:

• To prepare realistic and needs oriented research, development and monitoring programmes;

• To improve the institutional and technical capacity for monitoring of POPs and related priority sources/major releases;

• To monitor reduction of releases as an indicator of NIP implementation success.

The NIP underlines the need for establishing an adequate information dissemination mechanism, ensuring public participation, development of specific awareness programs and involvement of industry and other users.

For the first time, the definition of POPs was included in the draft Law on environmental protection in 2010 (based on the proposal from the Sustainable POPs Management Office and Pollution Prevention Division of the MoE). The law included and special Chapter on the Management of POPs, which introduced the conditions for the management of POPs with the goal of eliminating the negative impact of these substances on environment and public health at the local, national and global levels, as well as a ban, taking out of use as soon as possible, limitation of production, import or use of these substances. Among the responsibilities of the central environmental authority in this domain is the implementation of the monitoring mechanisms for PCBs, PCDDs and PCDFs.

An important institutional strengthening, proposed by the draft Law on environmental protection was the establishment of the Environmental Protection Agency (EPA). Among other functions, the EPA, which will be subordinated to the MoE, will be responsible for the organisation and coordination of the Integrated Environmental Information System and of the Integrated Environmental Monitoring System. The EPA will carry out the centralised development of databases and additional information, will develop national reports and will transmit them to the central environmental authority.

According to the National Program on the Sustainable Chemicals Management (GD No. 973 as of 18 October 2010) the establishment of the Chemicals Management Agency (hereafter “CMA”) is planned for the 2010-2015 period.

The National Program on Sustainable Chemicals Management has the following provisions in the field of information management and monitoring:

1. Establishment of the Information System includes the following:

• Providing equipment to the central public authorities for the access to the international databases on chemical substances, in order to improve the efficiency of the actions to eliminate the consequences of the chemical accidents.

• Creation of a database on accidents and fires with the involvement of the chemical substances, which will serve for the development of the measures for the elimination of risk and of the impacts on environment and human health.

• Revision, adjusting or development of the statistical forms for the management of chemicals and wastes in order to report within the international conventions.

2. Development of the research and monitoring capacities includes the following:

• Improving the capacities of ESS and other institutions for the management of accidents with chemical substances, which will ensure the elimination of their impacts.

• Development of the integrated monitoring programme of chemical substances in the environmental components, which will allow for planning and ensure measures of supervision and control of the potential toxic substances, including POPs, other dangerous substances and heavy metals for the monitoring of emissions and transfer of pollutants; improving the laboratory capacities.

• Development of a database on the emissions of chemicals and provision of the online access to the database, which will eliminate the gaps in distribution and exchange of the information.

• Development of a programme of monitoring and research of the impact of the chemical substances on the public health, which will be used to plan actions for the determination of the effects of the pollutants, including POPs, on environment and public health.

The Annex II to the Programme, Action Plan for the implementation of the Stockholm Convention for 2010-2015 foresees the following actions:

• Strengthening of the national monitoring capacities in the field of POPs;

• Development of the monitoring programmes for POPs in environment, drinking water, food, air and human body;

• Strengthening of the capacities of the IES laboratory;

• Promotion of the standards for sampling;

• Update of the inventory of POPs emissions.

At the time of writing this report, all proposed drafts, laws and regulations were completed, and the MoE was working to put these documents in the procedure for coordination and approval.

The requirements of the POPs monitoring are included in the draft Regulation on the Development and Functioning of the National System of Integrated Environmental Monitoring in the Republic of Moldova and Programme on Environmental Monitoring for 2010-2015, developed by the SHS in 2010.

In the field of POPs, monitoring these draft documents are focused on:

• POPs in surface water and sediments (as a part of water monitoring);

• POPs in soil;

• POPs in the atmospheric air and precipitations (trans-boundary air pollution);

• PCBs in soil and oils (electro-energy equipment).

In the period when the Law on environmental protection will enter into force, by mandate of the MoE the EPA will be responsible for fulfilling environmental POPs reporting obligations to the Secretariat of Conventions Stockholm, Rotterdam, Basel Convention and UNECE Protocol on POPs and UNECE PRTR Protocol.

Conclusion of finding on POPs in Moldova:

Priority actions needed:

• Adoption of the new legislation on chemicals and wastes;

• Strengthen institutional capacities in the field of POPs (in the MoE, EPA (planned), SEI);

• Repackaging, transportation for elimination of the remained obsolete pesticides;

• Remediation of POPs contaminated sites (warehouses, solution preparation points and contaminated soil);

• Protection and monitoring of the pesticides landfill site in Vulcancesit;

• Improvement of POPs and PCBs monitoring capacities;

• Improve capacities for international reporting;

• Awareness and information for population.

Major issues within the need for improved legislation for chemicals management in Moldova

include the following:
- Insufficient application of the Law on the administration of hazardous substances and products (lack of a register of chemicals, lack of evidence of their use etc), incompatibility of these with the international initiatives and actual requirements essential for chemicals management vis-avis production, trade, packaging, classification and labelling of chemical substances;

- Even though the procedure for imports is authorized by the Chamber of License and approved by some relevant Ministries according to the requirements, a re-examination of procedures is needed. Establishing a database which would register the quantities of imported and used chemicals should be a significant step in estimating risk associated with their use. The establishment of registry of chemical substances/products, is mentioned in the Law on the regime of dangerous products and substances, and will be an important component in the management of chemicals;

- The existing control system, including the procedures for licensing of chemical imports (does not regulate the spectrum and quantity of imported substances) doesn't comply with the principles of Globally Harmonized System of Classification and Labelling of Chemicals which sets out the basis for a global security programme for chemical products and substances;

- Issues raised at the international level related to management of waste, specific to substances such as asbestos from construction and demolition waste, the content of heavy metals in diverse products such as batteries, paints, mercury, etc., are not in the focus of central public administrative authorities;

- Sectoral management of chemicals (by branches of the economy) does not correspond with agreements of international conventions ratified by Moldova (there are no restrictions on the use of some chemicals (POPs, heavy metals, etc) and use of chemicals is not regulated in accordance-with accepted international standards;

chemicals used in industry are not subject to supervision by the central public policy bodies with the exception of hazardous chemical substances;

- Legislation specific to the issue of chemicals management, including strategies and national policies do not include provisions vis-a-vis promotion of SAICM initiatives for sustainable chemicals management, including achievements of the Millennium Development Goals, including education and public awareness activities.

Considered through the concept of sustainable development and the perspective of adhering to EU legislation the new approach for chemicals management in conformity with ratified agreements and conventions is required. European legislation is the starting point for a number of states for the elaboration of national legislation and successfully represents a cooperative model between states.

One of the most important strategies for the achievement of sustainable development is the promotion of a legislative system coherent with current requirements at the international level.

Proposals for the promotion of SCM in the agricultural sector:

For the strategic documents till 2020 there are proposed the following objectives and actions:

• Introduction of SCM in action plans in force and which will be developed;

• Implementation of the provisions of the Law on chemicals and of its regulations;

• Integration of pesticides classification provisions and implementation of the CLP Regulation;

• Information and training on classification requirements of all companies, involved in import and trade of pesticides and fertilizers in Moldova;

• Harmonisation with Directive 2009/128/EC on sustainable use of pesticides and of the Regulation 1107/2009 on the plant protection products trade in the Law on phytosanitary products and fertilizers, nr. 119 din 22.06.2004, and relevant regulations;

• Proposals for the development of an action plan for the implementation of the National Program for the sustainable management of the chemicals for 2016-2020, in the agricultural sector;

• Development of the Guidelines – on the base of FAO International Code of Conduct on the Distribution and Use of Pesticides, FAO, 2002 (http://www.fao.org/agriculture/crops/core-themes/theme/pests/code/en/);

• Clean-up of the POPs contaminated sites, with an action plan for 2014-2020, and total elimination till 2025, inventory and mapping of contaminated and cleaned sites. Replication of clean-up pilot projects.

• Inventory of the new POPs, in the Annex A to the Stockholm Convention (http://chm.pops.int/Implementation/NewPOPs/TheNewPOPs/tabid/672/Default.aspx);

• Strengthening institutional capacities of the institutions involved in the agricultural secor in SCM.

• Transposition of requirements of Guidance on Pest and Pesticide Management Policy Development [2010], Guidelines for the Registration of Pesticides [2010], Guidelines for quality control of pesticides [2011], Guidelines on good practice for ground application of pesticides [2001], Guidelines on management options for empty containers [2008], Guidelines on Prevention and Management of Pesticide Resistance [2012]);

• Transposition of the provisions of the Directive 2009/128/EC on sound use of pesticides and of the EC Regulation 1107/2009 in the Law on the phytosanitry products and fertilizers nr. 119 of 22.06.2004;

• Development of the Guide on the implementation of the International Code of Conduct on the Distribution and Use of Pesticides, FAO, 2002 (http://www.fao.org/agriculture/crops/core-themes/theme/pests/code/en/);

• Application of the provision of the FAO Guides (Guidance on Pest and Pesticide Management Policy Development (2010), Guidelines for the Registration of Pesticides (2010) etc (http://www.fao.org/agriculture/crops/core-themes/theme/pests/code/list-guide-new/en/);

• Organization and continuous conduction of repackaging, transportation, elimination of the remained obsolete pesticides and clean up/remediate the contaminated sites, with an action plan for 2014-2020, based on the ongoing projects, financed by the development partners and the Government. Disseminate at country level the available experience of the 6 pilot cleaned-up sites.

FAO SESSION: PESTICIDE MANAGEMENT: MORE FOOD LESS RISK

CONCLUSIONS AND RECOMMENDATION

J. Breithaupt
FAO

The six presentations at the FAO session explored different examples of successful pesticide risk reduction and demonstrated how the risk mitigation measures are connected to pest and pesticide management and contributing to an integrated approach to a sustainable production intensification.

Different **aspects of successful pesticide risk reduction approaches** are documented, focusing on numerous stages and aspects **throughout the pesticide life cycle** and contributing to **reducing the adverse effects of the use of pesticides to health and the environment.**

Initial results of an ongoing regional project (GCP/RER/040/EC) entitled Improving capacities to eliminate and prevent recurrence of obsolete pesticides as a model for tackling unused hazardous chemicals in the former Soviet Union identified the strengths and weaknesses of the countries within the pesticide life cycle management and made some recommendations with regard to addressing key issues and challenges the countries face. One goal is to establish a regional forum geared towards providing resources for full-scale clean-up and a region-wide system capable of dealing with challenges posed by pesticides. Activities will include the disposal of stockpiles, but the priority lies in building capacities from passing legislative reform, implementing awareness-raising programmes, improving pesticide registration and regulatory processes, to the promotion of alternatives to the most hazardous chemicals in use.

Recommendations to improve the legal and regulatory framework on pesticide management in Eastern European and Central Asian countries are presented and suggestions for future actions are provided by the experts.

The importance of integrating environmental requirements in the agricultural policies in Moldova is documented in order to reduce risks for public health and environment posed by pesticides, while, at the same time, improving the state of agricultural ecosystems, increasing the quality of agricultural products and solving the problems of pollution in the past.

In Georgia, the project entitled Reducing the use of hazardous chemicals in developing countries: potential of implementing safer chemicals including non-chemical alternatives - tools for Georgia and the EECCA region (implementing agencies WECF, Greens Movement and GEBMA) conducted a pesticide life cycle assessment, identified the weaknesses and implemented or anticipates pesticide risk mitigation measures. The project activities and results could serve as a success story for the wider region in Eastern Europe and Central Asia.

The Presentations underline that is essential that farmers should gain a better understanding of how water management, soil systems, farming/growing systems, crop seeds and varieties, pest/disease ecol-

ogy, harvest and post-harvest strategies and market access are all interlinked.

It becomes evident that only a holistic approach to pest- and pesticide management will help farmers to maximize yields, reduce the use of pesticides and other inputs and improve livelihoods.

All the presented examples and recommendations, tools, guidance documents and policies contributing to a successful pesticide risk reduction can help countries develop their own action plans towards a sustainable production while preventing adverse effects on human health and on the environment.

FAO promotes Integrated Pest Management (**IPM**) within a sustainable crop production intensification (**SCPI**) context as the most suitable strategy for crop production and protection, particularly for smallholder and resource poor farmers.

It is FAO's hope that through effective **implementation of the new *International Code of Conduct on Pesticide Management***, we can achieve significant reduction of risks to health and the environment from pesticides, while improving the productivity, sustainability and livelihoods of farmers everywhere.

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STATE OF THE ART AND LATEST DEVELOPMENT IN FORMER SU STATES AND CENTRAL EUROPEAN REGIONS

DISPOSAL OF OBSOLETE PESTICIDE STOCKS - CASE STUDY IN ROMANIA

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Abstract

Over the last decades, Romania has been dealing with the legacy of the obsolete pesticide stocks due to the extensive production and use of especially organochlorine pesticides.
Determined to stop the negative effects of over-usage of pesticides, in 2001, Romania joined the Stockholm Convention, which, at that time, included nine POPs pesticides. The Convention became effective starting from the 17th of May 2004. National Implementation Plan and its strategy of implementation was one of the first policies dealing with obsolete pesticide stockpile management and elimination in Romania.

In supporting the elimination of obsolete pesticide stocks, EU provided Romania with a grant of 3.5 million EUROs through the PHARE-program to implement a project aimed to dispose the pesticides stocks. The total project cost was 4.8 million EUROs, the difference between the EU grant and the total project cost was provided by the Ministry of Agriculture and Rural Development.

The PHARE Project carried out over the period from December 2004 to November 2005 collected and transported about 1735 tonnes of obsolete pesticides for destruction to Germany spread over 114 locations in Romania. To date, it is one of the largest cleanup projects of its kind in Europe, based on a professional project team and high-quality implementation routines.

Beside the stockpiles disposal, another important outcome of the project was the setting up a National Strategy and Action Plan for preventing new build-up of pesticides waste stocks in future.

Therefore, for the period 2007 to 2012 the Romanian Government focused on the implementation of its National Strategy and Action Plan.

Activities like campaigns on awareness raising and training of farmers for sustainable and safely use of pesticides currently placed on the market, establishment of container management system, implementation of the safe use of crop protection products initiative, combating counterfeiting of plant protection products, development of the Code of Best Agricultural Practices contributed to the successful implementation of the National Strategy and Action Plan at the national level.

Moreover, the best way to ensure that no pesticide stocks are built up and human and wildlife are not exposed to pesticides is organic farming[1], the amount of organ-

1 http://www.fao.org/docrep/003/ac116e/ac116e02.htm

ic farms in Romania has increased from 50 farms in 2000 to 9691 farms in 2011 with a total area of approximately 250,000 hectars.[2] The National Sustainable Development Strategy Romania 2013-2020-2013 highlights the potential of organic farming as a comparative advantage of Romania with regard to increased agricultural production.

The establishment of organic farming is the most comprehensive approach for the reduction of pesticide exposure to human and the environment which also guarantee that no pesticide stock are generated for these farms. This approach is, at the same time, a cornerstone in the development of sustainable production and consumption in Romania.

Approach, Achievements and Results

Since 1948, OCPs have been used in Romania. Products were mainly based on aldrin, chlordane, dieldrin, endrin, heptachlor and toxafene as active ingredients. All these products were imported, except those based on DDT and heptachlor, which were produced at the integrated petrochemical plant in Borzesti. They have been used on large agricultural areas, on meadows and alpha-alpha cultures (also called lucern).[3] For seed treatments in particular, Dieldrin based pesticides were used in Romania[4] between 1965 and 1970. Among the persistent chlorinated pesticides, one of the most used products were the ones based on heptachlor. After 1988, these types of products have not been consented in Romania . Concerning lindane, significant quantities were produced and used as insecticide on a wide range of plants, for foliage treatment, for trees and wood treatment and against ecto-parasites in human and veterinary treatment8 in Romania. After 2006, the production and use of lindane was banned on the Romanian territory according to the provisions of EU Regulation (EC) No. 850/2004 on persistent organic pollutants.[5]

In supporting the elimination of obsolete pesticide stocks, EU provided Romania with a grant of 3.5 million EUROs through the PHARE-program to implement a project aimed to dispose the pesticides stocks. The total project cost was 4, 8 million EUROs, the difference between EU grant and the total project cost (1, 3 million EUROs) being provided by the Ministry of Agriculture and Rural Development.

The project *"Disposal of pesticides (re-packing, collection and elimination of pesticide residues on the Romanian territory) EUROPEAID/115815/D/SV/RO – Obsolete pesticides"* comprised of two distinct components: supervision of obsolete pesticides clean-up action and, technical assistance to the Government in policy and strategy development in order to prevent new pesticide stocks from developing. The project was also linked to the elimination of pesticides stockpiles and waste which was identified as the Key Objective 1 in the Romanian National Implementation Plan. The project implementation implied following the steps, which are described below.

Step 1 – update of the pesticide inventory

As the international experience shows, inventories often underestimating the size of stocks - or other chemicals than recorded are present at the site. This was also the case of Romania, where the reassessment provided up-dated information and were

2 EkoConnect (2012) Organic agriculture moving East. Länderbericht Rumänien

3 http://en.wikipedia.org/wiki/Alfalfa;

4 http://chm.pops.int/Implementation/NIPs/NIP-Submissions/tabid/253/Default.aspx

5 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2004R0850:20120710:EN:PDF

additionally identified amounts of obsolete pesticides which needed to be disposed.

Step 2 – remediation of the pesticide stockpiles

Initially, the contract covered the elimination of 1409 tonnes of obsolete pesticides as it was provided by the existent national inventory. After the reassessment of the inventory due to the additionally identified amounts, another 1107 tonnes were disposed.

Therefore, the PHARE Project carried out over the period December 2004 – November 2005 collected and transported for destruction to Germany about 2516 tonnes of obsolete pesticides spread over 227 locations in Romania. It was one of the largest cleanup projects of its kind in Europe to date, based on a professional project team and high-quality implementation routines.

The project team comprised of: the Ministry of Agriculture, the Forest and Rural Development, as PHARE Project Implementation Unit; the Ministry of Agriculture, the Forest and Rural Development, Phytosanitary Units and local branch offices; the Ministry of Finance, as Central Finance and Contracts Unit; European Commission Delegation to Romania; SAVA Brunsbüttel (BRD), as Contractor; Ramboll (DK) in consortium with Tauw (NL) and UBA-Austria, as Supervisor, with IHPA as Sub-consultant.

Sound project management and supervision was obtained on the basis of a good contracting framework, as well as good partnership and cooperation between the Contractor, the Supervisor, and the Implementing and Contracting Authorities. The implementation routine contributed to a large extent to the successful implementation of the project. It consisted of the following:

1. Re-assessment of the inventory: The re-assessment provided up-dated information for the Contractor's take-over of the site (logistics, contents) and gave a clear picture of the situation at take-over, making possible for the Contractor to improve the planning and the supervision's cost control. The new inventory was managed by Waste Information Management (WIM) System of Tauw (NL). The site take-over from the Authority to Contractor (Site Takeover Document) required the agreement on re-assessed amounts, the agreement on Contractor's liability, signature of parties involved (legal representative of the Ministry of Agriculture – local phyto-sanitary Director, Contractor - Site Manager, Supervision - Engineer).

2. Repackaging, weighing, temporary storage: The project ensured that the pesticide waste was repackaged in UN approved packaging materials, under strict occupational health and safety measures. An on-site laboratory for identification of waste composition was set up. The transport of the waste was done according to ADR rules, and the disposal was performed in a licensed incineration facility (SAVA in Brunsbüttel, Germany). The final proof of destruction has been issued by SAVA to the Ministry of Agriculture and Rural Development.

Pesticide store and repacking in Romanian PHARE project (Source: John Vijgen, IHPA)

3. The site hand-over from Contractor to Authority/Owner: The Hand-over document required an agreement of repackaged amounts, returning into Authority's liability, signature of parties involved (legal representative of the Ministry of Agriculture – local Phyto-sanitary Director, Contractor - Site Manager, Supervision – Engineer). The Contractor's payment is based on Site Take-over and Hand-over forms (Euro/tonnes), as well as on the export lists.

Pesticide store and repacking in Romanian PHARE project (Source: John Vijgen, IHPA)

Step 3 – prevention of build-up of new Pesticide stocks

Besides the stockpiles disposal, another important outcome of the project was the setting up a National Strategy and Action Plan for preventing new build-up of pesticides waste stocks in future. This included 5 dedicated tiers:

1. Tier 1 - Further development of the legal framework in terms of Government's Role in sustainable use of pesticides and in hazardous waste management;

2. Tier 2 - Establishing of a national stakeholders platform and ensuring maximum participation;

3. Tier 3 - Campaigns on awareness raising and training of farmers;

4. Tier 4 – Empty Container Management System;

5. Tier 5 – Follow up activities for good agriculture practices among Romanian farmers.

Accession within the EU, starting with 2007, made an outstanding contribution to the implementation of the measures and actions included in the National Strategy and Action Plan developed under the above-mentioned project. The stakeholders involved in the development and implementation of the National Strategy and Action Plan implementation were the following: the Ministry of Environment and its subsidiary bodies such as the National Environmental Protection Agency and the National Environmental Guard, the Ministry of Agriculture and its Phytosanitary Units, the National Agency for Agricultural Consultancy, the Ministry of Health, plant protection industry, farmers and Romanian Crop Protection Association.

Tier 1 – further development of a legal framework

One of the important step was the consolidation of the legal framework in terms of Government's role in sustainable use of pesticides and in hazardous waste management (e.g. approximation of the EU Directive on plant protection products, the Directive on sustainable use of pesticides, the Waste Framework Directive, the Hazardous Waste Directive, Directive on the incineration of waste, the National Strategy and National Action Plan for Waste Management, etc.).

Tier 2
– National stakeholder platform

National stakeholder's platforms/working groups to ensure maximum participation in the field of pesticides (National Committee on Plant Protection Products Permitting, national working groups on waste, etc.) were developed.

Tier 3
– Campaigns on awareness raising and training of farmers

In order to prevent the occurrence of obsolete pesticides, the Ministry of Agriculture and Rural Development together with Romanian Crop Protection Association (AIPROM) periodically runs awareness raising and farmers' training campaigns on how to use the pesticides that are currently placed on the market in a sustainable and safe way. For example, the European Crop Protection Association (ECPA) began implementing the safe use of crop protection products initiative since 2002 (so called "SUI"). In Romania, the project started in September 2010 with the support of ECPA, with the initiative of the AIPROM and the relevant authorities and in consultation with other key partners in the industry. The project aims to protect the health of farmers and the environment by improving knowledge of the principles of fair use of plant protection products, the use of protective equipment certified and

to comply with the rules of transportation, storage and application. One of the first actions was the development of a study of marketing at farm level in Romania, followed by a site visit to examine the situation in detail. Taking into account the differences between farms on technology in Romania, were determined the critical points and farming segments were the action plan of the project, which had to be focused (i.e. labeling, using only the products approved and from reliable sources, storage and transport of products, application equipment, protective equipment and not least triple rinsing and delivery of used packaging).

Romanian Crop Protection Association took the initiative to combat counterfeit products used for plant protection by a 3-year project, supported by the ECPA. The project aims to address the distributors and users of plant protection products in particular, but also the farmers and authorities. The project was entitled "SCUT" (eng. SHIELD) signifying the effect hoped against counterfeiting expansion of plant protection products, trade and usage.

Among the project objectives, we can include the followings: changing attitudes and counterfeiting based approach to plant protection products to both distributors and farmers plant protection products and the authorities, under the slogan "Toward zero tolerance for plant protection counterfeit products"; sustainable development of agriculture by reducing adverse effects on human health and the environment; improving national phytosanitary legislation by proposing specific anti-counterfeiting measures.

In order to achieve these objectives, several activities took place at the national level, such as: running sustainable campaigns in order to inform and educate the public, particularly distributors and farmers; providing customized anti-counterfeiting training to control agencies, distributors and farmers; providing expertise and training materials on anti-counterfeiting practices with attention to parallel trade and repackaging; changing the relevant legislation in this field; preventing and reducing illegal trade of counterfeit plant protection products by educational projects and developing an open market alert system.

Tier 4 – Empty Container Management System

Concerning the management of empty packages and containers, as proposed by the National Strategy, several actions have been taken. Romanian Crop Protection Association (AIPROM) took the lead and developed the empty container management programme, so called "SCAPA", which is currently running. All services, such as collection of the empty containers and packages from farmers as well as distributors, are free of charge provided by the SCAPA. Implementation of SCAPA is organized and financially supported by AIPROM member companies and companies participating in the system.

Tier 5 – Follow up activities for good agriculture practices among Romanian farmers

All three initiatives, i.e. "SCAPA","SUI" and "SCUT", support the implementation of the EU Directive 2009/128/EC on sustainable use of plant protection products. The most important measures taken were related to the certification of users, defining the professional users of plant protection products, verification and certification of protective equipment, best practice in the application of plant protection products, empty container management system settlement and combating plant protection products counterfeit.

Moreover, to support the farmers, the Ministry of Agriculture and Rural Development has developed the Code of Best Agricultural Practices, which is periodically updated.

This all together ensures that pesticide stocks are not build up again and that the overall pesticide management is developed to the extent possible including the management of empty containers. However, still pesticide use is associated with the threat to human health and the environment trying to balance external costs and benefits.

The best way to ensure that no pesticide stocks are built up and human and wildlife are not exposed to pesticides is organic farming . Within the last ten years, organic farming has gained momentum in Romania. According to the data report of the Eurostat and the Ministry of Agriculture and Rural Development, the amount of organic farms in Romania has increased from 50 farms in 2000 to 9691 farms in 2011 with a total area of approximately 250,000 hectares.[6] The National Sustainable Development Strategy Romania 2013-2020-2013 highlights the potential of organic farming[7] as a comparative advantage of Romania with regard to increased agricultural production.

Conclusions and Lessons Learnt

The conclusions and lessons learnt from the Romanian experience can be summarised as follows:

• A comprehensive strategy and action plan at the national level is the key for an efficient implementation of relevant policies and for providing the appropriate funding resources.

• A key to success is the cooperation and communication among the relevant stakeholders (ministries, agencies, producers, retailers, private owners, control bodies) involved in the pesticides and obsolete pesticides management.

• A comprehensive assessment and establishment of a detailed inventory is essential to have a control over the pesticides stocks.

6 http://www.fao.org/docrep/003/ac116e/ac116e02.htm;

7 EkoConnect (2012) Organic agriculture moving East. Länderbericht Rumänien;

• Streamlining of the existing policies in the field of pesticides and POPs management and development of subsequent legislation is essential for ensuring the effectiveness of the implementation.

• Awareness raising activities are crucial both in the clean-up activities as well as in the prevention of re-occurrence of obsolete pesticides. It can act as a driver for these change progresses.

• During the clean-up activities, it is important to get the local authorities' commitment and participation in facilitating of works execution.

• Clean-up activities are only sustainable if they are combined with a strategy for avoidance of the re-occurrence of obsolete pesticides.

• It is necessary to establish an empty container management scheme/system as part of the "life-cycle concept" to minimize the risks to both humans and the environment.

• The establishment of organic farming is the most comprehensive approach for reduction of pesticide exposure to human and the environment which also guarantee that no pesticide stock are generated for these farms. This approach is at the same time a cornerstone in the development of sustainable production and consumption in Romania.

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PRESENTATION ON OBSOLETE PESTICIDE REMAINDERS IN AZERBAIJAN REPUBLIC

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According to the order of the Cabinet of Ministers of Azerbaijan Republic from May 7, 2012, the Ministry of Emergency Situations, the Ministry of Ecology and Natural Resource and the Ministry of Agriculture established a working group consisting of representatives involved in developing proposals for disposal of pesticide remnants.

According to the decision of Cabinet of Ministers of Azerbaijan Republic from December 3, 2012, the Ministry of Emergency Situations became involved in pesticide remnants removal.

According to Regulation 8.48.1 approved by Presidential Decree No. 394 from April 19, 2006 the Ministry of Emergency Situations and other relevant state authorities are involved in the implementation of state control over the protection and maintenance of pesticide and biological agent production plants:

According to the Law on Technical Safety of Azerbaijan, approved by Decree No. 357 from November 2, 1999, the potential threat to the safety of objects is under state control, and according to Law Fire Safety approved by decree No. 313-IQ from June 10, 1997, fire safety control of these objects is carried out by the relevant bodies of the Ministry of Emergency Situations of Azerbaijan.

Technical and fire safety inspections of pesticides and agro-chemical storage tanks in the Republic are carried out by the State Agency for the safe conduct of work in industry and mining control, and State Fire Control Service of Ministry of Emergency Situations.

By the Law No. 554-II from December 09, 2003, on accession of Azerbaijan Republic to the Stockholm Convention on "Persistent Organic Pollutants" from May 22, 2010, among the 12 basic substances are only DDT, PCB and Dioxin/Furan present in Azerbaijan. From these substances only the DDT was produced in our Republic and since 1982 the use of it was suspended and was prohibited.

In 1989-1990, considering that a lot of obsolete pesticide remnants were still in the areas, there was a need to build the Jangi Pesticide Disposal Polygon in the framework of the former "Azerkandkimya". For construction of such polygon, a special area was allocated in the foothills 53 km away from Baku, 4 km away from Jangi village in the Absheron district.

Till the closure of the former "Azərkəndkimya" Scientific Production Association, 8,000 tonnes of obsolete and prohibited pesticide waste (DDT, calcium arsenate, calcium Cyanamid, hexachloran, granazone, xomesin, sineb, etc.) were collected from different regions of Azerbaijan and buried.

After closure of "Azerkendkimya", due to the lack of control until 2005, the concrete covers of the concrete containers were illegally opened and more than 4,000 tonnes pesticide waste was carried out

to the markets and sold to the people as fertilizers, and the rest was kept without using.

In 2006, when the initial inventory was implemented, it was found that pesticides were scattered in the land fill and approximately 3,500-3,700 tonnes of pesticide waste were still present in the bunkers.

According to the Decree No170 of Cabinet of Ministers from July 25,2007 Jangi Pesticide Landfill was given to the State Phytosanitary Control Service under the Ministry of Agriculture, and measures were taken into consideration to improve storage conditions, some of pesticide waste was gathered from the regions and buried in Jangi landfill. However, the problem is not yet solved so far: considerable amounts of pesticide waste are still present under dangerous conditions which can harm people and environment.

According to the order of the Cabinet of Ministers, a working group was established consisting of the representatives of the Ministries of Emergency Situations, Ecology and Natural Resources and Agriculture, in order to discuss current situation. Following materials were discovered in the country:

1,520 tonnes dust illustrated, 1,064 m³ buried unknown pesticide, 1,000 drums with liquid pesticide, 73,116 m² soil contaminated with toxic substances, 28,428 m² contaminated warehouse floor surface were determined.

The absence of information on small unknown landfills does not mean that in the future during excavations these substances still have to be found.

• Salyan district center: In the storage of supply base of chemical products in the former "Azərkəndkimya" Unity – 200 tonnes mixed pulverized pesticide. 500 rotten polidofen (20%DDT) drums scattered around the area of 13,975 m² contaminated with liquid pesticide. 300m³ - unknown pesticide remnants buried in the soil;

• Salyan district Dayikend settlement area - Some of unknown pesticide remnants and the polidofen (20% DDT) drums from the former "Azərkəndkimya" pesticide storage were buried in the well. 9,800 m² area was contaminated with unknown pesticide remnants;

• Neftchala district area–Lower Garamanli area- Half ruined fertilizer storage of the former "Azərkəndkimya" 5 tonnes natrium propinat herbicide was found;

• Jalilabad district Uzuntapasettlement area -The former "Azərkəndkimya" Pesticide warehouse approximately 40 tonnes and 10 tonnes unspecified powder pecticide remainders were found. Besides that approximately 450-500 pieces 20 litre -200 litre of liquid dalapone (herbicide) drums corroded in different parts of the territory. 2,350 m² plots of land, at the same time around 4 storage building areas, approximately 5840 m² contaminated area by a variety of chemical products;

• In Aghjabadi district Hindarkh settlement area- Approximately 2500 m² area of the storage of the former district village chemistry union contaminated with pesticide, in other part approximately 40 tonnes unspecified pesticide mixture was found;

• Beylagan district Khalaj village area-During collapse of the pesticide storage of the Former "Azərkəndkimya" Union, some remainders of the pesticide left under the destroyed storage, other part left under the soil layer and dispersed nearby areas. Some part of the area was dug and approximately 900 m² area was contaminated with mixture of pesticide. There are approximately 60 tonnes of a mixture pesticide in the area;

• Füzul idistrict Horadiz city area - After the collapse of the storage of the chemistry

products of the former “Azərkəndkimya” Union pesticide remainders contaminated 16,100 m² area. There are more than 500 tonnes pesticide remainders (DDT, hexachloran, izofen etc.);

• Goranboy district Dalimammadli settlement area-3,600 m² area of the half destroyed fertilizer storage of the former “Azərkəndkimya” Union was contaminated with pesticide remainders to a depth pf 15-20 cm. Outside of the storage an area of 4,800 m² and 2,100 m² soil was contaminated with pesticide remainders;

• Ujar district central area-3450 m²2 area of the storage of the former “Azərkəndkimya”was contaminated with the mixture of pesticide soil. 50 t sharp smell pesticide mixture (the main part –izofen) was found. Ujar district Mususlu settlement area-Fully destroyed pesticide storage of the former “Azərkəndkimya” Union pesticide remainders were spread around and contaminated 2400m²2area.

• Yevlakh district area-In the area of the fully destroyed storage of the former “Azərkəndkimya” Union 5 places approximately with 100 t unknown pesticide mixture and 1000 m²2 area was contaminated with the spread of pesticide remainders.

• Aghdash district Laki settlement area-In the destroyed storage 100 tonnes pesticide mixture (mainly butifos and fentiuram) were spread in and outside of the storage. 100 tonnes pesticide mixture were carried to another nearby area, where an area of 5600 m² was fully contaminated with pesticides;

• Khachmaz district Lajat village area (10 km far from Khudat) - In the storage of the former “Azərkəndkimya” Union pesticide remainders were buried in an area of 168 m³ and covered with soil. Entering this area a strong smell of pesticides can be observed. Black spots on the soil can be clearly seen;

• Siyazan district area - 876 m² area including storage of the former “Azərkəndkimya” Union, the entrance of the city on the side of the railway was contaminated with the pesticide remainders. Outside of the storage 5 tonnes of unknown pulverized pesticide mixture was found

• Sumgayıt city “Azərikimya”Union area of SOCAR – In the factory of Sumgayt, DDT, lindane and hexachloran were produced from 1958-1980. Besides the use in the Republic these products were also was sent to other cities in the Soviet Union;

• Samukh district area - 300 m² area of three pesticide storages of the former wine-growing factory were highly contaminated by pesticide remainders;

• Kolayır village –in the storage of the former “Azərkendkimya” Union of Samukh district chemistry union an area of 98 m³ was excavated: izofen, chlorofos, hexochloran were buried - Near the houses 100 tonnes of the hexochloran pesticide mixed with fertilizer are in the open air.

• Shamkir district Dallar settlement area - In the half destroyed storage of the former “Azərkəndkimya” Union 90 tonnes in the form of a ball. There is a 20-30 cm thick layer of pesticide on the bottom. Outside of the storage, in the open air approximately 30 tonnes pesticide remains were found.

• Aghstafa district–half destroyed fertilizer and pesticide storage of the former “Azərkəndkimya” union. Approximately 35 tonnes of pesticide remains and 25 tonnes of fertilizer mixed with pesticides were found. The contaminated area around the storage is approximately 600 m².

Activities that have been implemented to improve the situation of the pesticides during 2008-2011:

As the result of the monitoring:

• 3,084 tonnes obsolete, highly toxic and prohibited pesticide powder was found and repackaged between 2008 and 2010 (In 2008 from the districts: Aghjabadi, Yevlax, Ujar, Zardab-2,048 tonnes, in 2010 – from Aghjabadi district 1,036 tonnes) they were carried to Jangi pesticide range;

• Liquid polidofen (1,180 drums and 200 pieces contaminated poddon) in Ganja city was re-packed and carried to the storage built on the same site;

• In Zardab 1,143 m³ area was contaminated with different types of chemical substances around the building for the disabled people. The contaminated area was excavated and the material was carried to the range;

• In November, 2011 the EECCA GEF-pilot project "Re-pack of obsolete, highly toxic and prohibited pesticide remains" was implemented in Azerbaijan Republic. From 3 regions of the Republic 70 tonnes pesticide waste was repacked and carried to the range according to FAO standards.

The project included training and supervision by an international expert.

POPs FREE MOLDOVA: 10 YEARS OF EFFORTS

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Abstract
The article presents the actions undertaken by Moldova and the results obtained in the last 10 years in POPs stockpiles management and elimination of the risks caused by them in relation to the environment and human health.

Practical measures in this regard began in 2003, following a special decision of the Government, and concur with signing and ratification of the Stockholm Convention on Persistent Organic Pollutants by the Republic of Moldova. These actions have been funded by the Government, but they have been substantially supported by international organizations and Governments of development partner countries.

During that period, all known stockpiles of obsolete pesticides including POP pesticides were collected and approximately 3,350 tons of waste was stored. Of these, 1,500 tons were evacuated abroad and destroyed. These activities are still continuing and in the next two years almost all remaining stocks from warehouses will have been eliminated. More than 930 tons of PCB containing capacitors were removed. The national inventory and mapping of POPs contaminated areas (cca.1,600 sites) and inventory of PCB in transformer oils of approximately 30,000 units of electric power equipment were conducted.

Progress is being made in the modernization of the legal framework on chemicals and waste management. As a result of extensive information and awareness campaigns on POPs, the level of education and awareness at all levels increased substantially.

In achieving these objectives, the Ministry of Environment, Ministry of Agriculture and Food Industry, Ministry of Defense, Ministry of Economy, local authorities, research institutes, international and local consulting companies and experts, NGOs are involved. Over 20 projects have been implemented in this area.

All these actions have a continuous and sustainable character and aim at achieving European and international standards on safe management of POPs, hazardous chemicals and wastes in general.

Keywords
Persistent organic pollutants (POPs), POPs management, obsolete pesticides (OP), polychlorinated biphenyls (PCB), contaminated sites, POPs database, Stockholm Convention on POPs

Introduction
Moldova has never produced pesticides, including POP pesticides, but has a long tradition in agricultural production and hence used large amounts of pesticides in the past. It is estimated that between the 1950s and 1990s about 560,000 tons of pesticides were used in the Moldovan agricultural sector, including 22,000 tons of organochlorine pesticides. In the absence of an adequate pesticides management

strategy, like the prevention of new stockpiles accumulation, more than 3,000 tons of now banned and useless pesticides have been accumulated over the years in storage facilities all over the country. The number of those facilities stood at about 1,000 in 1990. Subsequently, the warehouses have been dilapidated in many cases. The passage of time and exposure has resulted in the deterioration of the packaging material. Studies have shown conclusively that these materials have contaminated the sites and surrounding soils and nearby surface waters. When obsolete pesticides were placed in storage, they were generally indiscriminately mixed with each other in bags and drums. This resulted in a mixture of POPs pesticides and non-POPs pesticides and there is no economically viable way of determining the compositions of all the resultant mixtures in the repackaged plastic and steel drums. Representative sampling/analysis indicated that the average amount of POP pesticides in the obsolete pesticide stock in Moldova is about 20-30%.

Main stages and results of POPs management and elimination

The Moldovan Government initiated a strategy to address POPs issues in 2002 based on its own financial and human resources by approving a special decision on additional measures for centralized storage and neutralization of obsolete pesticides /1/. Having signed the Stockholm Convention on Persistent Organic Pollutants on May 23, 2001, the Republic of Moldova became eligible for international support in solving these problems. In the following period, all the actions in this area were based on cooperation with international institutions and experts, financed from the national budget, but with strong support from the international organizations. Over the last 12 years more than 20 projects in the area of management and elimination of POPs and other dangerous chemicals and wastes have been or are currently implemented.

The main objectives of the implemented projects were to protect human health and the environment by safely managing and disposing of POPs contaminated pesticides and PCB stockpiles, establishing sustainable POPs stockpiles management and strengthening the regulatory and in-s¬titutional arrange¬ments for long term control of POPs and other toxic substances in line with the requirements of the Stockholm Convention and related other conventions and protocols ratified by Moldova. The amount of funds used for these purposes up to now is approximately US$18 million.

The Ministry of Ecology and Natural Resources (now: the Ministry of Environment) was the central national environmental authority designated as the Stockholm Convention competent authority and as such is responsible for coordinating the POPs-related activities of all government bodies involved in chemicals management issues. Such responsibilities are borne also the Ministry of Agriculture and Food Industry (MAFI), the Ministry of Economy, the Ministry of Defense (MoD), the Ministry of Health, the Department of Emergency Situations (DES), the Customs Service, other central public authorities, as well as the local authorities. A National Coordination Committee (NCC) for the implementation of the Stockholm Convention, bringing together senior officials from the key ministries and led by the Ministry of Environment (MoE), was established in July 2002 to provide overall guidance and coordination for NIP development and implementation. An inter-ministerial group for the repackaging, collection and centralized storage of obsolete pesticides, led by the MAFI, has been in action since November 2002 (See also /1/).

All actions taken in the area of management and destruction of obsolete pesticide stockpiles can be divided into the following stages:

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All actions taken in the area of management and destruction of obsolete pesticide stockpiles can be divided into the following stages:

Stage 1 – Inventory of Obsolete Pesticide stockpiles and development of NIP for the Stockholm Convention

The first inventory of OP stocks in Moldova had been made between 2002 and 2004 with the support of a GEF/WB grant for enabling activities regarding the implementation of the Stockholm Convention and was based on the documents available at that time to the Ministry of Agriculture and Food Industry. The inventory results revealed 1,700 tons in 350 poorly equipped warehouses, and approx. 4,000 tons that were buried in a landfill in the South of the country, most of them mixed or of unknown composition. After the completion of the repackaging and storage measures of OP, it was found that the amount collected from the various warehouses was twice as large as expected because of their inadvertent mixing with fertilizers due to inadequate storage condi-

tions and damaged packaging materials.

Also, under this grant the National Strategy on the reduction and elimination of POPs and the National Implementation Plan for the Stockholm Convention on POPs have been developed and approved by the Government on October 20th, 2004 and later on, on February 19th, 2005, the Moldovan Parliament ratified the Convention.

Stage 2 – Repackaging and temporary storage of OP stockpiles

In November 2003, the Ministry of Defense (MoD) and the Department of Emergency Situations started the repackaging and transportation of the obsolete pesticide stockpiles from about 350 warehouses scattered across the country to the newly selected centralized district storage facilities, one in each administrative districts. These warehouses were chosen based on a number of criteria to ensure safe storage. Each of the warehouses was examined during the environmental assessment of the project to evaluate their integrity. While this system of centralizing the storage of obsolete stockpiles is an improvement, it is not a long term solution. Centralizing the hazardous matter allows for improved security and monitoring and will facilitate ultimate disposal, which has to remain the goal.

The expenditures for these measures were covered initially by the National Environmental Fund (NEF) and the national budget. Starting from 2005, they have been funded within the NATO/OSCE "Project for the destruction of pesticides and dangerous chemicals" implemented by MoD. In one district, these activities have been carried out within the Regional Project „Elimination of Acute Risks of Obsolete Pesticides in Moldova, Georgia and Kyrgyzstan", implemented by Milieukontakt International.

As a result, by the end of 2008, approximately 3,350 tons of obsolete pesticides had been relocated to 37 guarded central district warehouses.

Stage 3 – Strengthening the regulatory framework and capacity building for POPs management

Between 2006 and 2010, a GEF/WB "Persistent Organic Pollutants Stockpiles Mana¬ge-ment and Destruction Project" was implemented by the Ministry of Environment in Moldova, based on a GEF grant of $6.35 million and a counterpart contribution of $3.72 million from the Moldovan state's budget and National Ecological Fund, including $1.6 million allocated for disposal of obsolete pesticides. To facilitate project implementation, a special team, POPs Sustainable Management Office, was established under the MoE, based on the team which was working in the field of POPs since 2002, ensuring that use is being made of capacity once it's built.

This project was the cornerstone in strengthening the policy and regulatory framework for POPs management and control in the Republic of Moldova. Through his project the main objectives of the NIP have been achieved. The project assisted the Government of Moldova in confining stockpiles of pesticides in such a way that harm to the environment or human health is largely prevented. Furthermore, the regulatory framework and institutional capacity to address POPs related issues has been strengthened.

The major results achieved in these activities are as follows:

• New or revised national policies and regulations, like the National Programme on Sound Chemicals Management, Law on environmental protection, Law regarding the regime of harmful substances and products, Law on plant protection, Law on production and domestic waste, Law on payment for environmental pollution as well as guidelines have been developed. Among the materials published are the Handbook on inventory and mapping of

POPs contaminated sites and the Handbook on remediation of POPs contaminated sites. Over 12 packages of draft legal and regulatory documents, including a Law on Environment Protection, a Law on Chemicals and a Law on Waste, have been completed and are in the process of coordination and approval;

• A National Concept of the Information Manage¬ment and Reporting System on POPs has been developed;

• Two modern laboratories have been equipped with high resolution equipment used for monitoring and identification of POPs in environment components;

• Environmental, plant protection and energetic inspectors have been trained in enforcement and compliance with the POPs convention requirements based on the new legal documents on POPs management;

• Organic farming has increased after the introduction of a regulation on organic farming in 2005. While in 2003 there were only 11 certified farms practicing organic farming, this number has increased to 253 farms and 35,000 hectares in 2010, thus avoiding the pesticide use on this land. The National Strategy for Sustainable Development highlighted organic farming as one of the priorities for R&D of the Moldova.

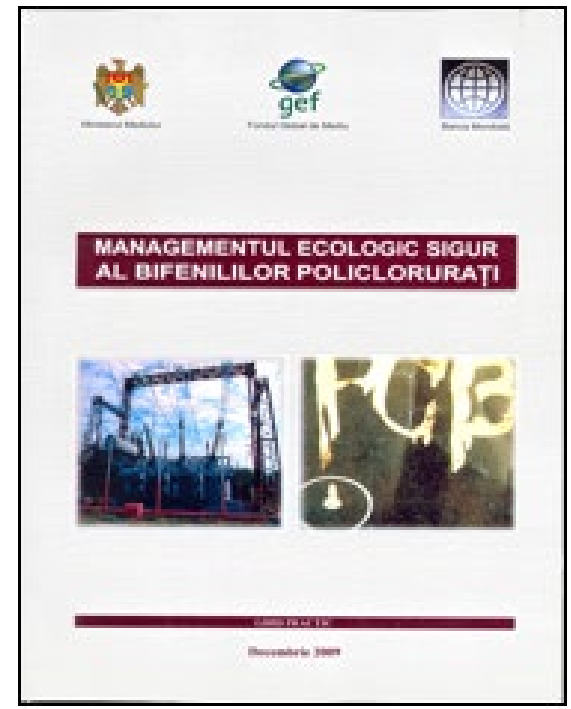
• A public awareness and information campaign has been conducted trough local, regional and national seminars and conferences, radio and TV programs, documentary movies and TV ads, articles in local and national newspapers, project website www.moldovapops.md, etc. The special surveys showed a significant increase of public awareness in the field of POPs;

• Results obtained have been presented within more than 70 local, national and international workshops and conferences, including the last six International HCH and Pesticides Forums.

Stage 4 – Elimination of POPs stockpiles

Elimination of POPs stockpiles in Moldova began in 2006 under the POPs Stockpiles Management and Destruction Project. At that time, the priorities were established on the evacuation and destruction of over 3000 tons of OP from 37 central district warehouses and of approx. 1000 tons of PCB-containing electrical capacitors from 13 transformer stations.

In the following two years, all 18,660 electrical capacitors containing PCB found in the country (934 tons, including highly polluted soil) have been dismantled/excavated, shipped and destroyed abroad. Remediation works at the biggest transformer station have been carried out, too.



Source: POPs Sustainable Management Office, Moldova

In parallel with elimination of PCB, 1292 tons of pesticides and contaminated packaging from 11 districts were exported and incinerated. These activities were taken up again in 2011 within the projects implemented or coordinated by the MoE, MoD and MAFI, with financial support from the national budget and from international organizations such as Czech Develop-

ment Agency (CzDA), NATO, OSCE, the European Commission (EC) and FAO. At the moment, the amount of pesticides destroyed stands at about 1500 tons. The details can be found in Table 1.

Thus, presuming a successful completion of all projects that are now under implement-tation, all stocks of pesticides stored in warehouses will be eliminated by the end of 2015.

Stage 5 – Inventory and mapping of POP pesticide polluted areas and PCBs in transformer oils

One of the tasks of the POPs Stockpiles Management and Destruction Project refered on a national inventory and mapping of POPs polluted sites. The objective of this study was to identify the POPs polluted areas posing the highest environmental and health risks, as well as mapping of those areas using a GIS tool. These activities were carried out in 2008-2010.

An original methodology of POPs pollution study and hazards assessment was developed aiming at: (i) identification and assessment of potentially POPs contaminated sites all over the country; (ii) creation and completing of the POPs database as well as mapping and visualization of acquired data; and (iii) establishing common reporting formats and assuring database support.

Project	Financing Agency	Implementing/ coordinating Agency	Period of elimination works	Amount of OP eliminated, tons	Present status (Oct. 2013)
• *POPs stockpiles management and destruction*	• GEF/WB • MD Gov • NEF	• MoE (POPs PMT)	• 2007-2008	1293	• Finished
• *Remediation of environmental burdens caused by pesticides in Moldova:* - *Stage 1* - *Stage 2*	• CzDA	• CzDA • MoE (POPs PMT)	 • 2011-2013 • 2013-2015	 202 250	 • Finished • Ongoing
• *Elimination of obsolete pesticides stocks with major risks (liquid OP)*	• NEF	• MoE (POPs PMT)	• 2013-2014	200	• Ongoing
• *Disposal of dangerous pesticides from the Transdniestrian Region of Moldova*	• OSCE	• OSCE Mission to Moldova • MoE (POPs PMT)	• 2013-2014	150	• Ongoing
• *Destruction of pesticides and hazardous chemicals in the Republic of Moldova*	• NATO/ OSCE • NEF	• NATO • MoD	• 2013-2014	1269	• Ongoing
• *Improving capacities to eliminate and prevent recurrence of OP as a model*	• EC/FAO	• FAO • MAFI	• 2013-2015	250	• Ongoing

Table 1: Elimination of OP stocks in Moldova, source: POP's Sustanaible Management Office, Moldova

All potentially contaminated sites identified were described based on a unified questionnaire; the coordinates of the POPs sites were determined using GPS; photo images and composite soil samples were taken at each site before being further analyzed for POPs in a certified laboratory. About 1600 contaminated sites were identified and described.

An integrated GIS system for POPs data mapping and analysis has been developed allowing effective storing, managing and presenting of POPs-related information, such as the geographic locations of the sites, concentrations and other related parameters, as well as distribution of health and environmental hazards. The database is available on the Ministry of Environment website: http://pops.mediu.gov.md. The information on POPs-polluted sites gets periodically updated by environmental authorities.

With the POPs database, the central and local authorities got a new tool which significantly improved the management of contaminated sites. It effectively supports the policy and decision making process in the field of contaminated sites management /3/.

A national inventory of PCBs in dielectric oils from power equipment had been conducted in 2008-2011 with the financial and technical support of the Global Environmental Facility and Canadian International Development Agency through the World Bank and the Moldovan National Environmental Fund.

Oil samples were taken and analysis made on the PCB content from about 30,000 units of power equipment, owned by eight companies of generation, transmission and distribution of electricity, as well as by consumers /4/.

An inventory registration system and national database for electrical equipment containing or contaminated with PCBs above a concentration of 50 ppm have been developed and will serve for its further management and gradual elimination, as required by the international agreements and national legislation.

Stage 6 – Remediation of POPs polluted site

In parallel with the inventory of contaminated sites, in 2008-2009, within the CIDA/WB Project "Remediation of POP pesticide polluted areas and inventory of PCB contaminated oil in power equipment", several pilot remediation activities had been carried out.

This study on the remediation of POP-pesticide-polluted areas was carried out as a complementary measure to the actions undertaken in the field of sustainable POPs management and has the following specific objectives: (i) to identify Best Available Technologies (BAT) for of POP pesticide polluted areas, taking into account technical, financial and ecological aspects; (ii) to assess their potential environmental/health benefits and impacts; (iii) to implement appropriate remediation techniques at a few selected sites.

Based on the assessment, which included aspects of practical and economic feasibility of implementation, taking into account costs, expected performance, efficiency and potential impacts on the environment and human health, two techniques – isolation in controlled soil stockpiles and biological treatment with the Daramend technique – were selected and tested/validated at three pilot demonstration sites in order to identify the most appropriate methods for Moldova with a view to recommendation of remediation strategies for other OP sites throughout the country pending the availability of financial resources /5/.

Based on practical experiences, the Guidelines for local environmental authorities were compiled on how and when to carry out remediation measures on areas polluted with POP pesticides.

Conclusions and lessons learnt

The conclusions and lessons learnt over more than one decade of experience in the management and disposal of POPs in Moldova can be summarized as follows:

• A comprehensive strategy and action plan at the national level is the key for an efficient implementation of relevant policies and for providing the appropriate funding resources;

• A key to success is the cooperation and communication among the relevant stakeholders (ministries, agencies, control bodies, local authorities, retailers, private owners) involved in the POPs management;

• The establishment of a reliable cooperation with the donors at an early stage was important. Due to this fact, transparency and better planning of project activities in terms of finance and procurement have to be established;

• The approaches and decisions that led to successful achievement of the objectives were based on the fact that all initiated projects and measures carried out had continuity in time and trained personal. All parties have to respect their commitments and activities and complement each other and complete their tasks within the set time frame;

• A comprehensive assessment and establishment of a detailed inventory is essential to have a control over the POPs stockpiles;

• Streamlining of the existing policies in the field of POPs management and development of subsequent legislation is essential for ensuring the effectiveness of the implementation;

• From a practical implementation point of view, one of the important decisions was the establishment and maintenance of the project management team (e.g. POPs Sustainable Management Office under the Ministry of Environment) that, once established, continued to work in order to ensure the sustainability and effectiveness of Stockholm Convention implementation. This unit is responsible for fiduciary activities of POPs projects and additionally has been involved in the implementation of other environment projects;

• The selection and contracting of qualified consultants, both local and international, facilitated the successful implementation of planned activities and transferring knowledge to personnel;

• Compliance of and contribution from the government and the partners who have agreed to support projects are non-negotiable for the successful implementation of activities.

• Awareness raising activities at all levels of society are crucial throughout the entire process of approaching and solving of POPs issues;

• Based on the results obtained, the international institutions and experts involved in POPs management consider Moldovan projects a success in that most objectives were achieved as planned. As a result, the experience and the knowledge gained has been analyzed and taken as a blueprint by other governments in the region, as they follow the approaches developed and partly hire the trained experts as consultants.

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OVERVIEW OF POST-DISPOSAL PROBLEMS WITH OBSOLETE PESTICIDES IN POLAND

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Abstract

Completion of the pesticide tomb disposal program in Poland is definitely a milestone in the process of eliminating environmental risks caused by pesticide waste. But can we consider the case closed?

This presentation discusses current issues related to pesticide waste and how far we have come in solving them. It specifically describes the effectiveness of the tomb disposal program in Poland, which is now complete with the exception of a few sites. This presentation also reviews efforts being taken to eliminate risks caused by the "Rudna Gora" pesticide landfill in Jaworzno, Poland and the stage of work on developing regulations dealing with the historic contamination of the ground. Currently, the lack of clear legislation regarding the issue and disputes over the responsible authority hamper taking any restorative measures around the landfill even more than the lack of funds.

A separate issue discussed in the presentation involves a stunning case of importing from Ukraine to Poland over a dozen thousand tons of HCB in the form of soil mixed with HCB waste for thermal disposal. Due to violations of official procedures and standards for safe transportation, storage and utilization of this type of waste, the case ended up being prosecuted by the authorities and was widely reported in the media.

Key words

Pesticide waste disposal, unwanted pesticide, pesticide landfill, tombs, Rudna Góra landfill, HCH and HCB waste, expired pesticides, testing of pesticides, biobed.

Introduction

From 2009-2011 Poland made a huge progress in disposing of its pesticide waste stockpiled over many years when it used thermal incineration as a major method of disposing of pesticides contained in underground storage tanks, the so-called tombs. The process of removing the tombs took many years and during the last HCH Forum we presented the problems encountered along the way and what was accomplished as of June 2011 [1]. But can we consider that enough was done to end the problem with obsolete pesticides in Poland? We might think so, judging from the "National Waste Management Plan for 2014", where we find no mention that any further actions in this respect are necessary. The plan does not indicate the need to complete the tomb removal process, neither does it recognize the Rudna Gora site in Jaworzno, which is the EU's largest landfill of pesticide post-production waste. The issue of tombs was formally considered closed and the problem of "historic waste", including reducing the environmental impact of the Rudna Góra landfill, was ignored. But how does it look in reality?

Tombs – historical pesticide dump sites

In the beginning of March 2012, the Office of Inspector General in Poland issued a report on the outcomes of the National Waste Management Plan for 2010. The Plan envisioned that the tomb removal process would have been completed in 2010. The report gives specific data on the stage of completion as of 30.06.2011, which indicate that as of the date,18 516 tons of pesticide waste were disposed of, 890 tons were undergoing disposal and for 11 out of 242 registered tombs the removal process have not yet started. The amount of waste still to be disposed of was estimated at 305 tons. The report underscores that the disposal process conformed to all substantive and legal requirements, but it alerts to some serious shortcomings in monitoring of the sites from which tombs were removed and a failure to include a plan for the disposal of the remaining tombs in the National Waste Management Plan for 2014. The latter shortcoming was partially taken care of by putting the tombs located on areas owned by the National Treasury on a list of so-called "ecological bombs", which are disposed of with the support of the National Fund for Environmental Protection and Water Management under the program named "Remediation of environmentally degraded areas and removal of contamination sources that have particularly adverse effect on the environment" that was carried out in 2011 - 2016. According to the information received from the Ministry of Environmental Protection, in the end of October 2013 there were still five tombs to be disposed of with around 50 tons of waste (plus contaminated rubble and soil), out of which three are located on privately owned land. There are some tombs which were not found, and the search is still running. Some tombs, whose location could not be confirmed, were crossed out from official lists - it is possible that in the future they will be found and will need their disposal. Removal of those tombs might pose a problem, because it is difficult for private individuals to get public funding and support for remediation projects. Nevertheless, we can say that despite the many shortcomings and difficulties, the tomb disposal program has progressed successfully and is coming to an end. It is worth mentioning that close to 100% of funds used for tomb removal and site remediation projects came from Poland's resources and the National Fund for Environmental Protection and Water Management. Poland spent close to 50 million euros (including VAT) on the cleanup projects, which on one hand speaks well of Poland, but also questions the reasons for not making a good use of EU grants.

Rudna Góra Landfill

The situation is very different for the Rudna Gora industrial landfill in Jaworzno, which for years has remained Poland's most serious problem when it comes to pesticide waste. The site, which was mentioned on numerous occasions during the past HCH Forums [2, 3] contains over 160 000 tons of mixed hazardous waste and takes up an area of around 20 ha. The landfill site belongs to the Organika-Azot Chemical Plant, SA, and in part to the City of Jaworzno. Cleanup of the landfill is extremely difficult not only because of the high costs expected with a project of this magnitude, but also because of a complicated ownership status and insufficient legislation. For the past two years, there has not been any breakthroughs that would allow for an optimistic look into the future, nevertheless we can report on a few facts that might be of interest to those following the history of the site. The important, but not the best news, is about the results of FOKS (Focus on Key Sources) international research project which was carried out in different locations including Jaworzno and ended in the first quarter of 2012. The project failed to meet its expectations with respect to developing a

comprehensive technical solution for closing the landfill. The results were limited to a general conclusion that an optimal solution would involve erecting a vertical, impervious, bentonite barrier to prevent the contaminated underground water from flowing towards the Przemsza valley, covering the landfill with an impervious mineral liner (geomembrane) to protect the waste stockpiles against precipitation, and regular collection and treatment of waste water coming from the landfill. This very perfunctory idea makes it difficult to set the required conditions of tender to develop a technical design for the project and makes it impossible to estimate costs of the project, even in very rough figures. On a positive note, we also have information that in mid-2013 the National Fund for Environmental Protection and Water Management provided funds to the President of the City of Jaworzno that would allow to continue testing around the Rudna Gora landfill and other places of pesticide storage, as well as develop project designs and perform legal analysis. Currently the City is working on the tender specifications for contracts involving further field studies and case reports. Since it was impossible for the Organika Azot Chemical Plant to independently reduce the environmental impact of the landfill, the Plant filed a request with the Silesian Province Marshall's Office to change its so called "Restorative Decision", which made the Plant solely responsible for the problem. The Office is currently in the process of deciding whether to dismiss or modify its "Restorative Decision" in a way that would allocate responsibilities with respects to further actions. The process receives support from the Plant's Hazardous Waste Task Force, established by the Silesian Province Marshall's Office. The situation is made more difficult by the lack of progress in passing amendments to the legislation on the so called historic contamination caused by state-owned enterprises before Poland transitioned to the free market economy. The interpretation applied to current regulations makes it impossible for the country to provide financial assistance to successors of state-owned enterprises because of the limitations imposed on public funding. According to this interpretation, involving the state in solving the problem would necessitate the Plant to file for bankruptcy. The bankruptcy, not without its undesirable social impact, would only worsen the situation with respect to the environment since the Plant monitors contamination around the site, maintains the technical infrastructure of the landfill and through its treatment facility treats waste water from the landfill site. Presently the Ministry of Environmental Protection is working on a bill replacing the current Environmental Protection Law. Amendments being proposed right now do not include language that would be satisfactory for the problem at hand. Recently, as a result of the work done by the Plant's Hazardous Waste Task Force, a decision was taken that the Marshall's Office would petition the Ministry of Environmental Protection to introduce the desired language into the bill. Right now, it is hard to say when, and if at all, the proposed amendments will become law.

Newly-generated pesticide waste

Beside the problems with the historical contamination, there are some other issues with the disposal of pesticide waste. The use of chemicals for the protection of crops in agricultural practice always results in small amounts of pesticide waste. This fact cannot be ignored in the national action plans for sustainable use of pesticides. The waste can be divided into four groups:

− expired crop protection products,

− products that do not conform to formal requirements and technical specifications,

− pesticide-contaminated materials (water, soil, plants, items of clothing),

− leachates from filling and rinsing of the sprayers.

Expired pesticides are the result of errors in their distribution and planning of treatments. Until 2013, Poland was using a system for expanding the expiration date, based on testing the active substance content and the most important physical and chemical properties that ensure the proper use and action of the product. The system was a long tradition, with over one thousand samples analyzed every year, some of them representing commodity of substantial amount and value. Products which lost their usability due to prolonged storage were about 1-2% of all tested samples. The new Act on plant protection products of March 8 [4], 2013 introduced a provision that an expired plant protection product must be withdrawn from the market with a decision by the Plant Health and Seed Inspection Service. The product must also be treated as waste. This created a situation, where waste is being generated since not every batch of expired products is picked up by the manufacturer to be further reprocessed or disposed of at the production plant.

The second group of products, which results from all sorts of irregularities or fraudulent activity needs to be addressed, since every year in Poland there are a few dozen cases related to complaints filed by pesticide users, inspections by the Plant Health and Seed Inspection Services or investigations by the authorities (police, customs offices, prosecutor's office and border patrol). Products included in this group have insufficient usability (e.g. a lower level of active substance or presence of non-standard impurities) or cannot be approved for use on the market (e.g. products with labels in a foreign language, products with missing labels, counterfeit products).

Waste in the form of contaminated materials is generated incidentally, mainly due to failing to take precautions recommended by the plant protection good practice guidelines [5]. Waste generated this way can be quite dangerous due to potential risks for humans, animals and the environment.

Management of the above mentioned groups of pesticide waste must be very orderly. Its key element is ensuring their proper security, pickup by a special licensed company and disposal at a proper incineration plant. Poland has a good system that provides a solution to the problem. There are a number of companies authorized to pick up pesticide waste and some hazardous waste incineration plants adapted to dispose of this type of waste.

Filling of a sprayer and washing it down are processes posing potential risk for the environment from the use of pesticides, both being a source of the so called point-source pollution. The aim is to introduce an environmentally safe procedure for filling and washing sprayers and to evaluate the efficiency of pesticide decomposition in the biobed mix. The project realized at Plant Protection Institute intended to introduce an organized and orderly procedure to be followed during filling and washing of sprayers and it was necessitated by both Polish regulations and the European Parliament's Directive on the sustainable use of pesticides. The project resulted in construction and start-up of a sprayer filling and washing station. The station serves a practical as well as experimental purpose: it meets the IPP needs for sprayer washing and allows to conduct a study on the rates of decomposition of active substances. It also has an eco-friendly effect in terms of protecting the environment against the point-source pollution of soil and underground water.

HCB waste import to Poland

Beside the problems with the historical contamination and newly-generated pesticide waste there are some other incidental events, as exemplified by the stunning case of importing over a dozen thousand

tons of HCB waste from Ukraine to Poland. In 2011, around 15 thousand tons of waste containing HCB was imported to Poland. Import declaration documents stated that the waste was supposed to be HCB-contaminated soil with HCB concentration of around 1.5%. The waste ended up at a hazardous waste incineration plant. The waste was stored in damaged and leaking big-bags all over the plant's area instead of the designated locations and it produced foul smell around the incinerator, located close to the Baltic Sea, which alarmed local residents and the media. An investigative report by a newspaper lead to the prosecutor looking into irregularities in administrative decisions issued in connection with the import and storage of waste. There were also questions about the way waste was stored and incinerated. Prosecutor's investigation revealed that the plant violated operating requirements by burning amounts of waste that exceeded the permit limit, which resulted in HCB residues found in incinerator ashes. Independent reports indicated multiple violations of the daily capacity and emission limits for the incinerator. Moreover, it turned out that post-incineration cinders and ashes were not stored at a hazardous waste landfill, instead they were illegally stored in a gravel pit, contaminating the ground and surface water. Right now, according to the information from the Environmental Inspection Service there is still around 4500 tons of waste to be disposed of and the disposal will continue until the end of 2014. Within a period of two years, the Environmental Inspection Service fined the incineration plant several times and performed a number of inspections and the plant is still under investigation with multiple leads.

Summary

Polish tombs with pesticide waste were first named "ecological bombs" in 1992. Back then experts from the Institute of Plant Protection defined the risk for humans, animals and the environment caused by the emission of toxic substances from those sites. Since then, Poland, using its own funds, closed most of the tombs, disposed of their content in hazardous waste incinerators and placed contaminated soil on sufficiently secured landfills. We took an important step towards eliminating the risks, but the accomplishments were not error-free.

The problem of pesticide waste generated as a result of crop protection is also solved from its technical and organizational side. The waste can be disposed of through contracting with companies picking up waste at Polish hazardous waste incineration plants. A solution was also found for the so-called point-source pollution caused during rinsing and filling of sprayers - all we need to do is to implement it into the common practice.

The outstanding problem is the Rudna Gora landfill, which the largest site of this kind in Europe. According to many experts it is Poland's major task in the area of eliminating the risks posed by hazardous waste landfills. Much is being done in this case, but we need to break an impasse, which is in the way of the real remediation activities. The impasse is connected to Rudna Gora's legal status and the complicated nature of future restorative measures.

The case of importing to Poland large quantities of HCB to be disposed of shows how important it is to be aware of the risks associated with improper handling of pesticide waste. A valid purpose of hazardous waste disposal should be achieved in a way that ensures safety on each and every step of the process.

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HIGHLY HAZARDOUS PESTICIDES: PUBLIC OUTREACH AS AN IMPORTANT TOOL TO REDUCE EXPOSURE

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1. The international community well recognizes environmental and health-related risks caused by exposure to highly hazardous pesticides (HHPs). HHPs emerged as a topic of great concern by many countries at the Third International Conference on Chemicals Management (ICCM3) in September 2001 when a large number of countries from all UN regions supported actions on HHPs, including developing a priority list of substances for a progressive ban and substitution with safer alternatives. Countries of Eastern Europe, Caucasus and Central Asia face serious problems caused by exposure to HHPs because of the large volume of agricultural chemicals including pesticides used in the region and large number of workers employed in agriculture. These countries are also faced with problems related to huge amounts of obsolete pesticide stockpiles accumulated in the region as a toxic legacy from the Soviet times.

2. Pesticides in developing and transition countries have significant impacts on human health and economics. WHO experts estimate, that there are possibly one million cases of serious unintentional pesticide poisonings each year[i] . However, this is just a fraction of the real problem. Experts state that in reality there could be as many as 25 million agricultural workers in the developing world suffering from some form of occupational pesticide poisoning each year. Many of these cases are not registered. These health outcomes have economic impacts.

A recent UNEP report noted that the cost of inaction related to pesticide use in Africa is greater than the total Official Development Assistance to general health care in Africa, excluding HIV/AIDs[1]

i Acute Pesticide Poisoning: A Major Global Health Problem, J. Jeyaratnam, World Health Statistics Quarterly, Vol. 43, No. 3, 1990, pages 139-44, http://www.communityipm.org/toxictrail/Documents/Jeryaratnam-WHO1990.pdf

3. There are several key activities that could advance chemical safety and the SAICM goal. These activities could be implemented in the intersessional period between ICCM4 and ICCM5.

These activities include the following:

1. FAO paper on alternatives to HHPs

Safer alternatives, particularly ecosystem-based approaches to pest management, are a key part of phasing-out HHPs. Countries would benefit a great deal from an information paper on replacing HHPs, prepared by FAO. At the very least, the paper should include HHPs used in the highest volume, or that are otherwise a priority for replacement. One source of information for ecosystem-based alternatives has already been approved by the Stockholm Convention COP6 for work on alternatives to endosulfan.[2]

1 UNEP. 2013. Costs of Inaction on the Sound Management of Chemicals.
2 UNEP/POPS/POPRC.8/INF/14/Rev.1;

2. Surveys of HHP registrations, uses, restrictions, and prohibitions
Tackling HHPs requires knowledge of which HHPs are used in the country. A simple survey would help to identify HHPs among current registration lists and/or patterns of pesticide use in the country, and those which have been estimated as particularly hazardous for use under their conditions. The regional coordination group could develop a simple questionnaire, which would be sent to all national SAICM focal points in the region. National SAICM focal points could work with personnel from the Ministry of Agriculture to examine pesticide registration lists to determine which potential HHPs are present and which pesticides have been banned in the country. If no registration information exists, then the information on pesticide use could substitute.

3. Collection of success stories on HHP phase-outs
Countries can benefit a great deal from the experience of other countries. A successful HHP phase-out could provide some useful information on substitutes and processes for phase-out in the region. For example, Stockholm Convention Parties will be obligated to phase-out endosulfan, an HHP. Experiences with this process could be collected by the regional focal point and then re-distributed to national focal points and personnel from the Ministries of Agriculture to permit more efficient actions in the substitution process. These success stories could also be added to the clearinghouse described above.

4. Clearinghouse of HHP registration, bans, and restrictions from surveys
It would very helpful to countries if the results of the surveys could be organized and made available on-line. Regulators would benefit from knowing which substances have been banned in other countries, particularly neighbouring countries or countries growing the same crops. More importantly, the clearinghouse would help define future activities on HHPs by outlining country experiences. For example, the need to define alternatives for certain crops might be informed by clearinghouse information that indicates widespread registration or use of a substance. Overall, the clearinghouse would provide a sensible one-stop location for the survey results and pave the way for further solutions.

II.
Russian NGO Outreach Campaigns on HHPs

Starting from 1997 NGOs from Eastern Europe, Caucasus and Central Asia (EECCA) have been successfully working on addressing chemical safety problem in the region. Being a Hub of the International POPs Elimination Network (IPEN) Russian based NGO Eco-Accord coordinated and supported more than 90 EECCA NGO projects in the region focused on POPs and other toxic chemicals including mercury, lead, and endocrine disrupting chemicals directly linked to. Eco-Accord also conducted a first of its kind review on persistent organic pollutants (POPs), including obsolete pesticide stockpiles in Russia.

EECCA NGOs organize press-events, outreach campaigns, awareness and capacity building workshops and trainings obsolete pesticides and other POPs and toxic chemicals.

1. In 2004, Eco-Accord together with Women Network in the Urals conducted a project on public participation in primary inventory of obsolete pesticide stockpiles. A workshop in Cheliabinsk with participation of local authorities, NGOs, experts

http://synergies.pops.int/2013COPsExCOPs/Documents/tabid/2915/language/en-US/Default.aspx

and local community groups helped to initiate a dialogue between decision makers and civil society groups on pesticide management, including the following:

- official obsolete pesticide inventory in Cheliabinsk region;

- public involvement into identification of illegal obsolete pesticide storage and use;

- discussion of the Methodological recommendation on public participation in primary inventory of obsolete and banned pesticide stockpiles (Eco-Accord, Moscow 2003 http://www.ecoaccord.org/pop/mr/index.htm) ;

- identification of pilot regions for the implementation of the methodological recommendations ;

- elaboration of recommendations for further public involvement into primary inventory of obsolete and banned pesticides.

Later Cheliabinsk NGOs conducted activities that resulted in the identification of the additional amount of obsolete and banned pesticides and pesticide contaminated sites in the region.

Methodological recommendations on public participation in the primary inventory of obsolete and banned pesticide stockpiles were further approved and used by many regional state environmental control bodies in different parts of Russia and other EECCA countries.

2. Information and educational projects on pesticides health and environmental hazards were conducted in 11 out of 12 EECCA countries. Since 2004, numerous materials, which are a valuable source of information for civil society groups and governmental agencies working on pesticide management in EECCA, have been prepared.

3. EECCA NGOs cooperate a lot with the scientific community in the region. This cooperation helps to produce education materials for institutes and universities on issues of pesticide health and environmental risks, including inter alia ”Global agro-ecological problems: security of agricultural products”, “How to produce environmentally safe food products on contaminated sites”, etc.

NGOs participate in the discussions and round tables on pesticides, including inter alia “Agro-2012” round table and international exhibition “International chemical assembly – ICA 2012. Green chemistry”, workshop on «Green Chemistry – Global challenges – request for innovations », Moscow 2012, round table on “Future of sustainable development of agriculture: WTO requirements”, August 2013.

4. A draft resolution on Highly Hazardous Pesticides was prepared by NGOs and presented at the fifth regional meeting of the Strategic Approach to International Chemicals Management (SAICM) held in Macedonia in September, 2013.

5. At a meeting of the leading environmental organizations in Russia (more than 100 organizations from all regions of Russia) - Conference “Ecology, Politics and Civil Society in Contemporary Russia” (“Yablokovskie Debates 2013”) held on October 5th in Moscow, also discussed the problem of reducing the risks of for man and the environment from pesticide pollution and the problem of management of stocks UP in light of the performance of the Russian and international legislation.

HISTORY AND PROBLEMS OF KANIBADAM OBSOLETE PESTICIDES BURIAL SITE IN NORTHERN TAJIKISTAN

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The development of agriculture in Tajikistan is closely related to a history of widespread use of pesticides for the control of plant diseases and unwanted field weeds. Tajik agro-climatic conditions are favourable for rapid development of different pests. It was even found that the potential crop losses in case of low effectiveness of protective measures can account for about 30% of Tajik harvests.
Pesticides were never produced in Tajikistan. Plant protection products were always imported from abroad and by the end of the 1980s import and distribution of pesticides was carried out in a centralized manner through a network of state organizations under the name of "Tadjikselhozkhimiya"(literally translated:"Tajikagrichemistry"). This organization had the full responsibility for ensuring proper storage, efficient use and stock administration of pesticides waste. In the period 1965 – 1990 imports of pesticides into Tajikistan ranged between 7 and 14 thousand tons annually (calculations based on 100% active substance).

Problems

- A serious problem is the fact that people in Tajikistan still use the prohibited and obsolete pesticides and also its containers. Pesticide residues are a source of environmental pollution and can cause negative health effects.
- Particularly dangerous are the stocks of POPs pesticides in warehouses, former agricultural airfields and burial sites. There is, however, little reliable information available on the state of the different obsolete and POPs pesticide sites in Tajikistan.
- In order to prevent the negative impact of obsolete and POPs pesticides on human health and the environment, and the fact that DDT was officially banned in 1969/1970 by the Soviet government, the Government of the Soviet Republic of Tajikistan adopted resolution №104 on 13 March1970 for the construction of the Vakhsh and Kanibadam burial sites for the disposal of the republic's stocks of obsolete pesticides.

Kanibadam burial site

- Kanibadam burial site is located at 275 meters above Kanibadam city and at a distance of almost 6 kilometres from the first houses. From the burial site the fields slope towards the city in north-west direction carved by two main canals the Isfarinka canal and Great Fergana irrigation canal (GFC). There are numerous wells in between the burial site and the city that have been constructed for different purposes. The total area of the burial site is 1.4 hectares. The area relief consists of branching dry ravines. This area can be considered as a territory with possible rains, mudslides and other natural phenomena that cover the part of the city territory to the GFC and Isfarinka canals. The Kanibadam burial site lies within the territory of a natural pro-

tected area, the Kayrakkum Reservoir which is internationally protected by the Ramsar Convention.

The burial area for toxic wastes is a trench of 3-4 meters depth, and is not waterproof and without any cover. According to data provided by JSC "Kanibadam-Kimiyo" this burial site was in use from 1973 to 1990 and had a national importance. The main pesticides buried are calcium arsenate, HCH, DDT, butiphos, CCC (Chlorocholine chloride), copper trichlorophenolate, nitrophen, ground sulphur, microbiological preparations and many other substances used in the Sughd Region and the Gorno-Badakhshan Autonomous Region.

- From its construction on in 1973 until 1989, the Kanibadam burial was operated without any compliance with sanitary norms of health and environmental safety. A project design for the burial site has never been found.

- According to data provided by the JSC "Kanibadam-Kimiyo" the total amount of pesticides received before the burial site was closed in 1990 was around 4,000 tonnes of pesticides and more than 3,000 empty pesticide containers. The burial site is reported to contain also a large number of biological preparations.

- Disposal of toxic chemicals at Tajik burial sites was mainly carried out by dumping. Sometimes stocks were burned on the location. At the Vakhsh burial site about 7,500 tonnes of pesticides (including about 3,000 tonnes of DDT) were buried between 1973 and 1991. At the Kanibadam burial site 4,000 tonnes, including 1,000 tonnes of biological preparations were buried. A significant amount of the toxic chemicals that were buried contain POPs, especially DDT.

- A serious concern is the extremely poor state of maintenance of the sites. In recent years they were virtually not guarded and there was no control whatsoever at the sites. Lack of proper fencing around sites makes them still today accessible to local people and animals. Water runoff drainage systems built previously on the burial sites territories to counteract rains and mudslides, were not maintained and have been completely destroyed. As a result, there is a considerable risk for human health and the environment on and around the sites.

- High temperature in summer and intense solar radiation contribute to evaporation and decomposition of pesticides. Repetitive winds of local origin and often storms lead to the transfer of harmful substances from burial sites for considerable distances.

GEF/UNEP Project"Implementation of theActivitiesfor the Preparation ofa National Implementation Planon PersistentOrganic Pollutantsinthe Republic of Tajikistan" (2006-2007)

- Within the frame of this project the soil at Kanibadam burial site was analysed. A presence of pesticides in the soil mixtures was reported at 2,195 mg/kg to 31,831 mg/kg, including POPs from 327 mg/kg to 8,024 mg/kg. The percentage of DDT and its metabolites was reported to be between 17 to 35%, and isomers of HCH – between 3 to 13% of the total amount of toxic chemicals. In the majority of samples (85%) dieldrin was found at 0.05 to 1.14 mg/kg. Presence of HCB and eptam (thiocarbamate), ovex, acrex, dinoseb and dursban was reported.

University of Applied Sciences of North-western Switzerland Tox-Care-Project: "Management of Hazardous Substances and Goods in Central Asia, Tajik working programme" (2012 – 2015)

In the frame this project a risk assessment training was carried out In cooperation with the Dutch engineering companies Tauw and Witteveen+Bos and the International HCH and Pesticides Association (IHPA) in 2012.

- The Kanibadam burial risk assessment shows that the level of soil contamination decreases with the distance from the site. At 100 m distance, concentrations of DDT and BHC exceeded the maximum permissible concentration (MPC) by 8 times, at a distance of 1,200 m DDT exceeded the MPC by 3.5 times, and the BHC content – by 1.3 times. At a 2 km distance only the presence of DDT has been detected in amounts that are not exceeding the MPC.
- In cooperation with the Committee for Environmental Protection under the Government of the Republic of Tajikistan, IHPA and Milieukontakt International in 2015 recommendations for short term risk reduction and long-term disposal were made based on the 2012 risk assessment.

Field Activities during risk assessment in 2012 at the Kanibadam site.

GEF Small Grants Programme project implemented by the Tajik NGO Bono to construct a temporary cover at Kanibadam burial site (2013)

In 2013 as part of a GEF small grant project, the Tajik NGO Bono organised a first action to cover the landfill with a layer of 0.5 m soil from nearby slopes in order to stop the major odours and dust emissions.

This created a temporary but no permanent solution. The work of Bono can be used as a good starting point to find international donors that would be interested in financing a long-term solution for Kanibadam burial site.

Recommendations to mitigate the impact of the burial site on the environment and possible next steps:

1. to organize local permanent monitoring at the burial site for the toxic chemicals;

2. to put warning signs on all sides with brief information about the burial site and its risks for public health and the environment.

3. to raise public awareness about health and environmental risks (seminars, trainings, meetings, articles, speeches on radio and television, publishing brochures, booklets, leaflets, etc.);

When these steps are fulfilled and the basic structure for actions has been created the following steps are proposed

4. to develop and implement effective measures to reduce negative impacts on public health and the environment;

5. to fence the burial site off with barbed wire and make sure that the territory is guarded;

6. to cover the burial site temporarily to prevent spreading of pesticides to air, water, surface water and groundwater;

7. alternatively it could be possible to cover the surface temporarily by bentonite clay, as deposits are located in the village of “Kim”, in the nearby Isfara district;

8. to construct a drainage basin for rainwater and surface meltwater collection to prevent the water from entering into natural water bodies and groundwater;

9. to determine the contamination level of surface soil (there is no vegetation at the surface of the burial site, which could be an indicator of the soil contamination);

10. to clarify the exact dimensions of burial site.

STATE OF THE ART AND THE LATEST DEVELOPMENT IN FORMER SU STATES AND CENTRAL EUROPEAN REGION

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This session took place during the last day of the 12-th HCH and Pesticides Forum. The Session was chaired by Tomasz Stobiecki and Stanislaw Stobiecki (Institute of Plant Protection – National Research Institute Sosnicowice Branch – POLAND). We had six presentations from five different countries:

1. The Republic of Moldova: "POPs free Moldova – 10 years of efforts: results, continuations and plans" presented by Liudmila Marduhaeva from the Ministry of Environment. The presentation summarizes the achievements and presents current activities related to the liquidation of inventories of POPs in Moldova.

2. Romania: "Disposal of obsolete pesticide stocks - case study Romania" presented by Mihaela Claudia Paun - Policy Adviser for Impact Assessment and Pollution Control Directorate Ministry of Environment and Climate Change. Big clean-up activity for obsolete pesticides stockpile disposal, starting from inventory through remediation, re-inventory, repackaging, final destruction and final steps of prevention of build-up of new pesticide stocks are described and discussed in this presentation.

3. The Republic of Poland: "An overview on obsolete pesticides problems in Poland after completion of main disposal actions" presented by Tomasz Stobiecki from the Institute of Plant Protection – National Research Institute Sosnicowice Branch. This presentation discusses current issues related to pesticide waste: newly generated pesticides waste, Rudna Gora landfill, import of HCB from the Ukraine to Poland and the problem with leachates from rinsing of the agricultural sprayers. It also specifically describes the effectiveness of the tomb disposal program in Poland, which is now complete, with the exception of a few sites.

4. The Republic of Tajikistan: "Kanibadam burial site of obsolete pesticides: History and problems" presented by Murodjon Ergashev from the Foundation to support civil initiatives (FSCI, Tajikistan). The presentation describes the storage of obsolete PPP in the biggest such a place in Tajikistan. It also provides the information on the origin of the landfill, the quantity of waste disposed of and the measures taken to inventory waste and diagnose the problem.

5. The Russian Federation: "The current situation of environmental pollution by pesticides in the Russian Federation and measures to resolve it" and "Extremely dangerous and obsolete pesticides: what the public need to know?" both presented by Oxana Tsittser from the Ministry of Natural Resources and Environment of the Russian Federation. The first presentation describes the results of environmental monitoring for contamination of PPP in the territory of the Russian Federation.

The another one describes the risks posed by the storage of hazardous waste, the possible solutions and the steps taken by various organizations in the Russian Federation.

The presentations provide a picture of the activities undertaken in the region in order to eliminate the old inventories of POPs. In some presentations, the methods for treatment of waste currently generated as well as the activities aimed at preventing the formation of new waste, are described. The information presented give the opportunity for an optimistic view on the possibility to solve the problem in the former SU states and Central European Region.