

OBSOLETE PESTICIDES IN TURKEY

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INTRODUCTION

Pesticides are defined as: "Any substance or mixture of substances intended for preventing, destroying or controlling any pest, including vectors of human and animal disease, unwanted species of plants or animals causing harm during, or otherwise interfering with, the production, processing, storage, transport, or marketing of food, agricultural commodities, wood and wood products or animal foodstuffs, or which may be administered to animals for the control of insects, arachnids or other pests in or on their bodies" (FAO, 1990). As it is known, all pesticides are toxic to some or all living organisms. They are designed to prevent, destroy or control specific plants or animals that threaten crops or other useful resources. However, if beneficial insects or crops are exposed to pesticides they too may be destroyed, and farm animals, wildlife or people may become ill or even die after exposure to even very small quantities of pesticide.

Over the past 40 years, the worldwide production and use of pesticides have increased. In 1996, the global pesticide market was valued as USA\$ 30 billion. Increase rate of pesticide sales has slowed down within the past decade in highly developed and industrialized countries, but it still continues to grow rapidly in developing countries and dependence on pesticides is also increasing in these regions (Ozturk, 1997).

As reliance on pesticides increases, the human health problems of pesticide become more intense. The World Health Organization (WHO) estimates that, worldwide, exposure to pesticides causes an annual 20,000 deaths and at least 3 million cases of acute poisoning. Other estimates suggest that the annual figure for pesticide poisonings is as high as 25 million in developing countries alone (Delen et al., 1995). Mishandling of pesticide wastes and containers causes many deaths and cases of poisoning; the common practice of reusing pesticide containers to store food and water is an example of this. Pesticides that are carelessly disposed of can contaminate air, water and land, and poison people, livestock, fish and wildlife.

As countries around the world discover the dangers of chemical pesticides and remove them from use, a huge – and potentially dangerous– problem results over what to do with the obsolete pesticides. Obsolete pesticides are defined as stocked pesticides that can no longer be used for

their original purpose or any other purpose and therefore require disposal.

There are many causes of the problem and include the banning of pesticide products after being imported into the country, supply of banned products to countries in the form of aid, oversupply or duplicate supply by different aid agencies, poorly packaged or labeled products and inappropriate formulations of pesticides for local use (Jensen, 2001).

OBSOLETE PESTICIDE STOCKS IN THE WORLD

Quantification of obsolete pesticides is difficult because of their wide distribution. Therefore, there are various estimations on the amount of obsolete pesticides in the world. Some researcher estimates that the amount pesticide stockpiles in developing countries is in the order of 400,000 – 500,000 tones (Davis, 2001). On the other hand, according to the Pesticide Action Network, there are at least 100,000 tons of obsolete pesticide stockpiles in countries around the globe. Approximately 20,000 tons of these pesticides are located in Africa and the Middle East. While exact quantities are unknown, large stockpiles also exist in Eastern Europe and the Newly Independent States. Poland, for example, has 60,000 tons of obsolete pesticides stored in various locations throughout the country. In addition, in many countries un-quantified amounts of soil and building materials have been heavily contaminated by pesticides leaking from inadequate storage facilities (de Borst et al., 2001).

Obsolete stocks of some of the developing and poor countries are given in Table 1.

Country	Obsolete Pesticide Stocks in Tons
Azerbaijan	20 000
Belarusia	6 000
Bulgaria	4 000
Estonia	700
Georgia	20 000
Latvia	2 000
Lithuania	3 080
Macedonia	33 000
Moldavia	6 600
Poland	60 000
Romania	1 030
Russian Federation	20 000
Slovenia	400
Ukraine	15 000
Uzbekistan	12 000

Table 1: Obsolete pesticide stocks in various countries
(de Borst et al., 2001)

As seen from the Table, most of the obsolete pesticides exist in the former iron curtain and in Balkan countries.

APPROACHES TO THE OBSOLETE PESTICIDE PROBLEM

The removal and disposal of obsolete pesticides is one of the major concerns of the 21st century in most of the countries, either developing, developed or undeveloped. The only difference is that some although aware of the fact and cause of obsolete pesticides in soil and water, financial constraints hinder to take protective measures starting with collection of unwanted and excess pesticides, some have already adapted their collection pattern and have already completed their countrywide surveys on the amount of obsolete pesticides. Databases exist which highly enable the collection mechanism to run faster and efficiently. In others, the various disposal methods have been analyzed, best available and applicable technologies have started to be installed and operated, among which incinerators, cement kilns are the leading and favorable technologies (Wodageneh, 2001).

PESTICIDE CONSUMPTION IN TURKEY

Turkey is still known as an agricultural country with the highest agricultural land among the European countries, and intensive agriculture is practiced especially in the western and southern coastal regions of the country. The average annual pesticide consumption in the country is around 35 000 tons. According to the officially stated data on pesticides by year 2000, the number of registered pesticides used is 2000, and the number of active ingredients available is around 300. Considering the active ingredients, 16 of them are produced in Turkey whereas the rest are either directly imported or the individual formulations are imported. The pesticide sales in the country are around 250 million \$. However, unit pesticide consumption is still lower compared to developed countries and to European countries. For example, France and Germany consumes 9 times more pesticides than Turkey, whereas Italy 15, Holland 35, Greece 12, Belgium 21, USA 15, Switzerland and Japan 17 time more. The main reason for this less consumption is mainly due to the economical constraints. Turkey is facing for the last 5 years, the high increase of pesticide costs, and the agricultural policy of the Government is promoting such activities. Meanwhile, there also appears significant decrease in the area of agricultural land. The cultivable land is converted to industrial districts and residential areas.

OBSOLETE PESTICIDE SOURCES IN TURKEY

Pesticide application in Turkey is being realized in two ways, namely through private farmer and State applications. Farmer application in general is done by applying small amounts of pesticides by using small-scale equipments. Farmers usually buy small amounts of pesticides and completely use their stocks within the same

year or just a minor amount is saved for the following year. On the other hand, State application is handled in wider land against insects like *Eurygaster integriceps* by consuming higher amounts of pesticides. Such pesticides are either imported from different countries or in some cases are bought from the domestic market through auction. Consumption records of the previous year are basically used to determine the amount of pesticides to be bought in the next year. In years when the incidence of agricultural pest has declined, pesticides consumption tended to decrease. Thus, excess amount of pesticides are stored to be used in the following year, where some of them are never used in that year due to various reasons. This occurrence is one of the most important causes of obsolete pesticides in the country.

Surveys all around the country indicate that the majority of the obsolete pesticides generally arise from the unconsumed pesticides bought in high amounts by the State authorities for State application against pests, and minor amounts account to those unconsumed portions by the farmers and importers.

Lack of accurate assessment of pesticide requirements is one of the common reasons of obsolete pesticide stocks in Turkey as is the case in most of the countries. In some years, pest incidence becomes lower than expected and therefore lower amount of pesticides are consumed. If the unconsumed pesticides cannot be used in the next application year, they have a probability of being obsolete pesticides. Banning of pesticides or replacing by newer or more effective products while they are kept in store is other reasons of obsolete pesticide accumulation in the country. Changes in agricultural crops or pests sometimes cause remaining of stocked pesticides. Weak or absence of storage management, absence of pesticide legislation, insufficient storage capacity and unsuitable packaging of pesticides are another factors which contributes obsolete pesticide formation in Turkey.

DISPOSAL OF OBSOLETE PESTICIDES IN TURKEY

In general, the shelf life of organic pesticides is limited to 2 years in Turkey. After these two years of validity, the disposal and removal efforts differ among pesticide producers, retailers and users. Pesticide users prefer to use these over passed, expired pesticides in anyway and can no longer be considered as obsolete. Pesticide producers are obliged to send these expired pesticides to State pesticide laboratories to undergo experiments to find out whether their existing formulation is conserved or not. If any of these pesticides are proved to be almost fully conserved especially in the active ingredient distribution and concentration, they are sent back to the market for sale to be used one more year. Some of which may conserve the actual active ingredients but their percent distribution may

be decreased. This category of expired pesticides is also sent back to the market for sale but to be applied in higher dosages. That is to say higher dosages compared to their originally recommended values. The rest are spared as obsolete pesticides by the manufacturers.

There appears to be a misunderstanding, or disagreement between pesticide retailers on the removal and disposal of obsolete pesticides. Producers do not want to take back these unwanted pesticides. Therefore, most of the retailers prefer to sell these pesticides at reduced prices and some illegally dispose these pesticides in the existing solid waste landfills together with domestic wastes. However, this is a seldom practice.

AMOUNT OF OBSOLETE PESTICIDES IN TURKEY

Although obsolete pesticide stocks of Turkey are not clearly identified up to now, it is not considered as of huge amounts. The predicted annual amount is around 2 000 tons. For example, Turkey does not have any obsolete pesticide disposal area. Stocks of unwanted pesticides generally are located at the facilities of pesticide producers, practitioners and retailers rather than at large, centrally controlled obsolete pesticide sites. Several individual large scale farmers, pesticide producers and retailers have unwanted pesticides that need to be disposed and since the removal of obsolete pesticides costs about US\$ 4,000 per ton of pesticide (Davis, 2001), the most of the companies and pesticide retailer look for a low-cost opportunity to get rid of their unwanted pesticides.

There is a modern incineration plant in Turkey, IZAYDAS, used for incinerating hazardous wastes. The amount of incinerated obsolete pesticides within the past 4 years has been registered as 200 tons. The plant is located within the boundaries of Izmit province at the Gulf of Izmit in the Sea of Marmara near Istanbul and is known as one of the highly industrialized cities of the country. The main reason of installing the incineration plant at this province is that the region has a perfect transportation network by means of navigation, highway and railway transportation.

RESULTS AND RECOMMENDATIONS

Even though exact figures on the amount of obsolete pesticides generated annually in Turkey are still not known, it can be stated that the problem of obsolete pesticides is not significant as is the case in the former iron curtain and Balkan countries. However, obsolete pesticide problem cause an acute danger in the country, mainly because the users and the central government are unaware of this danger and the appropriate legal measures do not exist or are considered to be difficult to implement, or even impossible. The majority of the public and state awareness is still lacking on the significance of this problem. Most recently, local efforts have been paid to collect back obsolete pesticides in an organized and controlled manner.

Studies have been initiated to organize the collection procedure and to decide on the disposal alternatives. Urging the adoption of voluntary industry-friendly interpretation of integrated pest management (IPM) is the way to defeat pests by laws which would decrease the generation of obsolete pesticides to a great extent. In no way, even if generated in minor amounts, the best available and applicable technology for final disposal of obsolete pesticides must be implemented.

The other problems related to the removal and disposal of obsolete pesticides are,

- the necessary financial sources are either scarce or do not exist,
- there is only one destruction facility in Turkey.

The areas where Turkey must focus its efforts, at that moment, are known to be the following if the necessary funds can be supplied.

1. Organizing a national effort to investigate the exact amount and location of stockpiles of obsolete pesticides in the Country.
2. Disposing the existing obsolete pesticides, thus tend to render further accumulations
3. Providing monitoring services to ensure that contractors comply with international safety and environmental standards, especially in compliance with the European Union (EU) criteria as Turkey is on the way to join the Union
4. Establishing more effective cooperation among the central government, the agrochemical companies and the retailers, whom all must consider the share of responsibility for the current situation
5. Giving high priority to promoting methods of pest management that will reduce the reliance on pesticides, which highly needs the improvement of education and training
6. Recommending that selection of agrochemical companies to supply pesticides under aid arrangements be limited to those that are willing to take back or help disposal of unused products
7. Seeking and mobilizing funding sources for disposal operations.

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