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DISPOSAL OF PESTICIDE WASTES AS IMPLEMENTED IN A PROPOSED CODE OF PRACTICE IN EGYPT

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SUMMARY

In the present study, an Egyptian Code of Practice for the safe use of pesticides on farms and holdings is suggested. The Code has to be issued for the purpose of providing practical guidance to citizens especially farmers and growers engaged in crop production or to the authorities of companies and plants manufacturing and formulating pesticides in Egypt. The Code will facilitate the execution of provisions of the law of agriculture No 53/1966 that regulates handling and use of agricultural pesticides in Egypt. Also the suggested Code will help people to fulfill the legal obligations of important legislations included in the Egyptian Act of Environment No 4/1994 (provision No. 29 dealing with hazardous wastes or provision No. 38 connected with pesticides). The proposed Code can be prepared in accordance to that issued in Great Britain in respect of part III of the Food and Environment Protection Act, 1985. Disposal of pesticide waste should occupy an important part in the proposed Code including the following items: (1) How can the production of waste be minimized? (2) Disposal of waste concentrate (3) Disposal of dilute wastes and washings (4) Disposal of containers (5) Disposal of waste packaging and other contaminated materials. There are three recommended procedures for disposal of pesticide wastes: Incineration, hydrolysis (for certain pesticides) and burying or dumping in an approved land-fill. Incineration is an effective and safe means of disposing of the majority of pesticide waste materials and is currently recommended as the generally preferred method. However, some pesticides such as hormone weed killers should not be destroyed by incineration, because the combustion gases may contain hazardous compounds. Some major chemical manufacturing plants and larger cities in industrialized countries have built rotary drum furnaces (kilns) or combustion rooms with ignition grate system for large-scale waste incineration. Several specialized companies are involved in designing mobile incinerators for use in third world countries. Hydrolysis of many pesticides of the organophosphate, carbamte and pyrethroid classes can be achieved by mixing with certain alkaline solutions. Before release of the effluent into a sump or sewer, it should be checked by laboratory analysis to determine whither the pesticide toxicity has been removed. Where facilities for incineration are not available and hydrolysis is not practical, burial may remain the most practical method of disposal.

INTRODUCTION

Pesticides are a necessary and integral element of modern agriculture. Appropriate use of them benefits all segments of society. However, pesticides can be dangerous if they are handled inappropriately

or applied indiscriminately. Pesticide applicators have a major responsibility to assure that they are handled and applied safely. A problem that can be a serious hazard to the public is the improper disposal of waste pesticides. In the present study, we suggest that an Egyptian Code of Conduct on the distribution and use of pesticides has to be issued. The objectives of the suggested Code are to identify the responsibilities concerning agro-pesticides of the various segments of society and to lay down standards for attitudes and behaviour which all public and private parties involved should adopt or demonstrate voluntarily.

The Code also may give guidance on meeting responsibilities under two important pieces of legislation, i.e., the Law of Agriculture No 53/1966 that regulates handling and use of pesticide and the Law of Environment No. 4/1994 (Provision No. 29 dealing with hazardous wastes or Provision No. 38 connected with pesticides). The suggested Code might solve safety problems related to exposure of pesticides during their different stages of handling. The following discussion gives a brief description of the Provisions laid down in the articles of the suggested Code of conduct with special reference to those dealing with disposal of pesticide wastes.

DISCUSSION AND RECOMMENDATIONS

I. Articles and provisions of the code:

The proposed Code can be prepared in accordance to that issued in Great Britain in respect of Part III of the Food Environment Protection, Act, 1985.

Thus, the Code may be divided into certain articles, of which the main points for attention are mentioned below with special detail for the article of disposal of pesticide waste.

Article 1. Definitions:

This article explains the meaning of concepts and important words used in the Code in order to make the legal text more understandable for the reader.

Article 2. User training and certification:

What are the duties of everyone involved with pesticides. What duties do operators have. What duties do supervisors have. What duties do employers have. What duties do the self-employed have. What training is required. Training in legislation. Training in the hazards and risks of pesticides. Training in safe working practices. Training emergency in

action. Training in health surveillance and record keeping. Where can training be obtained. How much training is needed.

Article 3. Planning and preparation:

Is it necessary to use a pesticide at all? Deciding to use a pesticide. Selecting the right pesticide. CPSHH assessment Preventing an controlling exposure to pesticides. How can wildlife and wild plants be protected? Which application methods can be used? Which methods of application demand special precautions? What should be done before applying a pesticide?

Article 4. Working with pesticides:

The use of control measures. Dangerous practices. Handling pesticide containers. What precautions should be taken when filling the equipment? The protection of honey bees. How can unwanted pesticide drift be prevented? Protection of neighbours and walkers. Monitoring exposure during pesticide application. What should be done after a pesticide has been applied? What are the maintenance requirements for exposure control measures? How should control measures be maintained? When is health surveillance appropriate?

Article 5. Keeping records:

Why should records be kept? How should pesticide records be kept? How available should records be? Assessment records. Records of monitoring. Records of respiratory protection equipment maintenance. Health records.

Article 6. Disposal of pesticide waste:

6.1. How can the production of waste be minimised?

6.1.1. Once it has been decided that use of a pesticide is necessary, an estimate should be made of the quantity required and the package sizes which need to be purchased. At the same time, consideration should be given to the means available for the disposal of all the wastes which will be produced and any disposal problems which may be presented by the pesticide in relation to its hazards, the shelf life of the product and its storage in a safe manner.

6.1.2. Effective management and control of pesticides should aim to produce no wastes, and practices should strive to achieve this. Even though this situation will not be obtained in practice, it should be pursued. For example, the volume of washings produced when cleaning out equipment can be reduced significantly by using an efficient flushing system, as opposed to filling the spray tank with

water and pumping it through the equipment. Such devices should be used.

6.2. Disposal of waste concentrates:

6.2.1. From time to time it can be expected that, for a variety of reasons, pesticides kept in a store will need to be disposed of. Typically, they may be categorised as being surplus to requirements; out of date with respect to shelf life; unapproved or have had approval withdrawn; split material with broken packaging; or degraded containers and the like.

6.2.3. It is false economy to continue storing unusable pesticides as an alternative to disposal, and it is illegal if the approval for its storage and use has been withdrawn.

6.3. Disposal of dilute wastes and washings:

6.3.1. All filling and washing operations should be carried out in an area designated and constructed for the purpose such that spillages cannot escape from the area. It is extremely likely that all spraying operations will produce some liquid waste. It is necessary, therefore the user of pesticides to provide arrangements for its disposal in an environmentally acceptable manner.

6.3.2. On completion of spraying, all equipment involved in the operation should be cleaned, washed and rinsed. The washing facilities provided should be designed to ensure that back-syphoning of pesticides into the water supply cannot occur. Such activities will produce a relatively large volume of water contaminated at low concentration with pesticide. If suitable, the contaminated water may be usable later for making a further batch of the dilute pesticide.

6.3.3. Alternatively, its disposal will need to be arranged in an environmentally acceptable manner. Possible disposal routes include:

a. Storage of the waste in a suitable container pending collection by a reputable specialist waste disposal contractor;

b. Use of suitable equipment designed to treat liquid waste containing pesticides, provided the treated effluent can be stored satisfactorily and reused or used for another purpose or disposed of by acceptable means.

c. Use of a properly designed and constructed soakaway, which might comprise a widely spread network of perforated or slotted pipes laid over a suitable area of land;

d. Spray on to an area of uncropped land not stubble or fallow, of minimal wildlife value, that is an area which supports only poor vegetation and without hedges, trees or bushes on it or nearby. If such an area of land is identified, its approval for use will require that it must be capable of absorbing the volume of liquid to be discharged on to it without rum off, the leaving of puddles or risk to wildlife, watercourses, groundwater, septic tanks, field drains or sewerage systems. Where necessary it must be signposted and fenced to exclude people and livestock.

6.4. Disposal of containers:

6.4.1. Empty pesticide containers should never be re-used for any purpose except possibly, if in good condition, to contain an identical pesticide transferred from a deteriorated or leaking container Containers, should always be cleaned thoroughly before disposal. They may be cleaned either in accordance with the label instructions or, in the absence of any instructions, by successive rinsing. Ideally the cleaning should take place when a working strength spray dilution is being prepared so that the rinsing liquid can be added to and form part of the spray dilution.

6.4.2. After being cleaned, containers should be punctured in several places or crushed to make them unusable. So far as is practicable, their labels should not be disfigured. The perforated or crushed containers should be stored in a secure compound-preferably not a pesticide store-pending their disposal. Where a spray dilution is not being prepared, the rinsings should be collected in a suitable container, labeled and stored in a safe place for subsequent disposal elsewhere.

6.4.3. Because of the hazardous gases which they produced on contact with moisture, empty containers in which hydrogen. cyanide gassing powders or aluminium, magnesium or zinc phosphides have been supplied or kept should not be rinsed or cleaned. Instead they should be filled with dry earth, and or other inert material. Immediately before disposal the containers should be punctured in several places. On no account should containers which are 'empty' or which have been filled with inert material be taken into or kept in a building. The treated containers may be buried.

6.4.4. Clean, perforated or crushed, containers will generally be accepted at licensed disposal sites, subject to conditions allowing acceptance of such waste.

6.4.5. Containers cleaned or treated in accordance with the requirements may be buried on premises used for agriculture which are owned or occupied by the person wishing to dispose of those containers However, the burial site must be carefully chosen, where no risk of pollution of surface or groundwater. The containers should be buried to a depth of at least 0.8 metre below the surface and below the level of any land drains. The burial area should be marked so that its location may be identified easily in the future, and a record should be kept of the type and quantity of the materials buried there.

6.4.6. In certain instances, it may be permissible to burn lightly contaminated combustible containers as a means of disposal. However, the burning of such material may be subject to national clean air legislation. Therefore, before it is carried out, advice should be sought from the authorities. Fumes and smoke may present a serious health risk, and advice from the supplier of the pesticide should be sought for any activity other than a very minor operation.

6.4.7. When waste packaging is to be burnt, the operator should ensure that:

a. Burning takes place in an open space at least 15 metres from a public highway and not in a location where any smoke produced is likely to drift over people or livestock or move towards any highway, housing or business premises;
b. Any containers are open and are placed on a very hot fire a few at a time.
c. The fire is supervised constantly;
d. Care is taken to avoid breathing any smoke produced;
e. The fire is extinguished before being left.

Any residues from the operation should be buried as described before. Products classed as 'Highly flammable'; pyrotechnic devices, such as smokes; and atomisable fluids should not be burned.

6.5. Disposal of waste packaging and other contaminated materials:

6.5.1. Packaging and other wastes, as well as discarded protective clothing resulting from dealing with spillages, will also require disposal. However, it is likely that disposal of such wastes on the premises will not be acceptable. Holders of such waste, therefore, should seek advice on a suitable authorised disposal route.

6.5.2. The disposal of spent rodenticide or other pesticide baits and carcasses should be in accordance with the requirements specified on the product label.

6.5.3. The disposal of containers which cannot be cleaned thoroughly, solid waste arising from the clean-up of spillages, including loose pesticides, heavily contaminated equipment and protective clothing, absorbents used on liquid spillages and the like should be arranged through a reputable specialist disposal contractor.

II. Observations on the technological procedures for disposal of pesticides:

Recommended procedures for disposal of pesticides wastes were frequently reported (Wolfe, 1972; Gifap (1982, 1987); Oudejans, 1991; Becker and Johnson, 1992).

There are three recommended procedures for disposal of pesticide wastes: Incineration, hydrolysis (for certain pesticides), burying or dumping in an approved landfill.

Incineration:

Incineration is an effective and safe means of disposing of the majority of pesticide waste materials and is currently recommended as the generally preferred method. However, some pesticides, such as hormone week-killer, should not be destroyed by incineration, because the combustion gases may contain hazardous compounds. If larger quantities of pesticides are to be disposed of, advice should be sought from major pesticide companies or the Association of Agrochemical Manufactures (GIFAP), or agencies such as the Food and Agriculture of the United Nations (FAO), the United States Agricultural Intentional Development Agency (USAID) and the Overseas Development National resources Institute (ODNRII) of the United Kingdom.

The temperature and time required for effective destruction of pesticide materials by incineration is specific to the type of material and therefore the type of incinerator required and method of firing.

Hydrolysis:

Hydrolysis of many pesticides of the organophosphate carbamate and pyrethroid classes can be achieved, usually by mixing with a 10 percent solution of sodium carbonate (Na_2CO_3) or 5 percent solution of sodium hydroxide (NaOH, caustic soda). The time required for complete hydrolysis is computed on the basis of the half life of a particular pesticide, which is the time needed for the chemical break-down into metabolites of the pesticide compound to 50 percent of its original concentration at a

certain pH and temperature. The required hydrolysis period can be determined by taking twice the half-life time plus some reserve. Before release of the effluent into a sump or sewer, it should be checked by laboratory analyses to determine whether the pesticide toxicity has been removed.

Burial:

Where facilities for incineration are not available and hydrolysis is not practical, burial may remain the most practical method of disposal. However, this is not associated with safeguarding public health and the environment. The main problem is to keep the buried pesticide in place, to prevent leaking that would contaminate surface run-off water and groundwater.

Local or area authorities, or waste disposal contractors, may be able to advise on suitable dumping sites, e.g. land-fills. Pesticide wastes should never be dumped on public rubbish-tips, nor in areas subject to flooding.

This procedure is the lest satisfactory of the three options for disposal of pesticide material, but is suitable for disposing of empty, decontaminated containers. Burial should preferably be on privately owned land and in any even, in an isolated place away from ponds, water-courses and boreholes. The area should be marked and a record kept of the site's position and its burial load. Wastes should be buried to a depth of at least one metre (about 40 inches).

Contaminated absorbents and surplus products should be thoroughly mixed with crystals of sodium carbonate (washing soda) to help neutralize the waste before burial. Adding powdered lime is also helpful.

III. Recommendations:

The suggested Egyptian Code provides practical guidance to whom handling pesticides (e.g. farmers, commercial crop grower, pesticide traders, employers the self employed and generally user of pesticides. Following the practical guidance in this Code will help those to fulfill the legal obligations of important legislations issued in Egypt (e.g. the Law of Agriculture No. 53/1966 and the Law of Environment No. 4/1994). The Code may be used in any legal proceedings for breaches of legislations. The suggested Code can be developed after wide consultation with all concerned ministries like, Ministries of Agriculture, Health, Environmental Affairs, Industry and Others. Disposal of pesticide wastes should be practiced adopting modern technological procedures especially for large scale wastes.

Disposal processes are preferably under taken by specialized companies or organizations.

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