MANUAL FOR THE INSTRUCTOR DEALERS COURSE
SAFE AND CORRECT USE OF PLANT PROTECTION PRODUCTS/IPM

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TIME DISTRIBUTION

Unit # 1 Presentation of the course .................................................. 30 minutes

Unit # 2 Dealers’ role and responsibilities ...................................... 30 minutes

Unit # 3 Pest concept and Integrated Pest Management (IPM)........... 45 minutes
  Chapter # 3.1 Pest organisms ...................................................... 15 minutes
  Chapter # 3.2 Integrated Pest Management (IPM).......................

Unit # 4 Generalities about plant protection products ......................
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Unit # 5 Label and pamphlet of plant protection products .......... 45 minutes

Unit # 6 Plant protection products: Risks to humans and environment

  Chapter # 6.1 Risks to humans.................................................. 45 minutes
  Chapter # 6.2 Risks to the environment ..................................... 15 minutes

Unit # 7 Risks, responsibilities, hygiene, health and safety of the dealers of plant protection products ....................... 60 minutes

Unit # 8 Purchase, transportation and storage of plant protection products, as well as elimination of their empty containers... 45 minutes

Unit # 9 Management and maintenance of application equipment ... 60 minutes
INTRODUCTION

One of the main objectives of CropLife is the development and enforcement of Education and Training programmes on the Correct Use and Management of plant protection products and Integrated Pest Management (IPM).

Since 1991, with this objective in mind, the first projects have been under way and, to date, they have been extended throughout several regions. This important contribution from the industry, has been of great benefit for the production process and the environment, and also to improve the knowledge of farmers and their families on the correct use of plant protection products and integrated pest management.

Aware that our Education and Training programmes have been accepted for a long time by governmental authorities, non-governmental organisations and producers associations, who need didactic material to fulfil their educational needs, this important manual has been prepared so that the interested parties can have a source of updated information to orient growers/farmers on how to protect their crops within production schemes that protect their health, the consumers health and the environment. CropLife International developed this manual based on the experiences acquired during a whole decade, in the process of training dealers’ staff, master trainers, technicians, growers/farmers, housewives, teachers and school children from rural areas, so they are able to orient farmers on Sustainable Agriculture practices.

This manual has nine units that cover all necessary subjects so that the dealers of plant protection products can give proper advice to their customers about the responsible use of the products, in harmony with the principles of a sustainable agriculture.

We are confident that this manual will be a real and effective contribution to rural development and that it will be broadly used by persons working in projects and programmes dedicated to this type of activity.
UNIT # 1

PRESENTATION OF THE COURSE
PRESENTATION OF THE COURSE

REVIEW

The main objective of this training course is to educate dealers on integrated pest management and the correct use of plant protection products, to increase their safety as well as the safety of the consumers and to reduce environmental risks derived from their use.

The training consists of the following aspects:
(1) To transmit the knowledge to participating dealers (2) To have participants take part in the discussions, problem solution, team work and supervised practices, and (3) Active and direct participation of farmers in training meetings.

During this presentation, the fundamental study units of the course should be presented and the communication process among participating dealers, trainers and financing institutions must be initiated.

The presentation must cover the following points:
A. Officially inaugurating the course.
B. Formally introducing participants, trainers and special guests.
C. Distributing necessary material to develop the course.
D. Indicating the title and objective of the course.
E. A general explanation of the programme and work methodology.

OBJECTIVES

At the end of the course participating dealers should be able to:
- Say the title of the course and indicate its objective.
- Identify his fellow students, name of the trainer or trainers and financing institutions

EQUIPMENT AND DIDACTIC MATERIAL

- Course programmes
- Flip chart paper
- Cards with participants’ names
- Note books and pens
- Adhesive tape

TIME REQUIRED

30 minutes
Note for the Trainer: A representative of the supporting organisation should be invited to inaugurate the course. After inauguration, ask the participants to introduce each other one by one and to write their names on a card or paper. Distribute the stationery to start the programmed activity.

Write the title of the course on the board and mention its final objective. At this stage take some time to explain how this objective will be reached. With the programme on your hand, explain briefly the structure and content of the course.

Explain to the dealers that all of them can contribute to the desired success of the course by sharing their experiences and that their participation is very important.
UNIT # 2

DEALERS’ ROLE AND RESPONSIBILITIES
UNIT # 2
DEALERS’ ROLE AND RESPONSIBILITIES

REVIEW

In this unit the dealers should know, that when they are employed or when they have a firm of this type, responsible attitudes are expected from them with the management and safe use of the crop products that they sell or distribute. They should also recognise that those stores that have trained personnel, that follow the personal security rules, who know the pest problems, that sell and manage the products in original containers in good condition, with guarantee seal, that keep their store and warehouse clean and in order, that obey the valid local legislation according to the establishment of this kind of business, it has a higher valuation for the consumer, than those who put aside these rules.

The titles of the main subjects are:
A. The role of the dealers
B. The responsibilities of the dealers

OBJECTIVES

- Identify, recognise and fulfil its role.
- Identify, recognise and fulfil his obligations

TIME REQUIRED

30 minutes

STEP # 1 PRESENTATION AND DISCUSSION: THE ROLE OF THE DEALER.

A firm or business of any type, is an operation between the owner, the employee and the client; everyone has the right to receive a retribution for his inversion. The owner is paid for the money invested, the employee for the salary that receives for his work and the client for the quality and the effort that is being accomplish for the work and the service that has been paid. In this way the employee has a more direct influence over the client than any other representative. Anyhow for the client, the employee is the company. He sees the client regularly and gets to know him very well. His actions, his appearance, and the work site appearance (in this case the store), thus his work fulfilment, is of great importance to conserve good relations between dealer and clients. For this reason it is important the time that is invested in the work organisation and the one that is invested in qualifying activities to improve the fulfilment of this.
For the instructor: With this base, organise a discussion with the participants, in which they give ideas over the manner to improve the fulfilment of the dealers work. Emphasise your work importance with respect of giving guidance over the benefits and the management and responsible use of plant protection products.

STEP # 2 PRESENTATION: THE RESPONSIBILITIES OF THE DEALER.

If you are adequately prepared to make your work in a professional way, it is good time to program a regular routine for the fulfilment of his daily activities. There are many daily moments in which the seller should question himself to make sure that he is offering a good service and the best impression to the client.

Reaching to the job site:
- Verify that your working site is clean and in order. (Do not forget that many clients would have their first impression of your job by its appearance, the tools and work equipment. Review if you have the adequate personal protection equipment. If you count with the materials and necessary equipment to attend emergencies, fires and/or spills, etc.)

Client attention:
- A good dealer guarantees a good treatment and service to the client. (You must remind that you contribute to the health protection, the environment and the economy of the client, sell only products with its original recipient and label, with guarantee seal, the re-packaging of these products is a prohibited activity, remind the client the importance of reading the label and follow the instructions).

Ordering of the store and warehouse:
- Separate the pesticides of other agricultural products (fertilisers, seeds, animal concentrates and food). Keep the herbicides in a separate place. Separate the solid formulations from the liquids.
- Avoid the presence of children inside the store and warehouse.

The dealers’ habits:
- Avoid eating, drinking or smoking inside the store and warehouse.
- The sellers should know how to read and be adults.

For the instructor: Explain to the participants that a more detailed knowledge over their obligations would be proportioned during the training.
UNIDAD # 3

PEST CONCEPT AND INTEGRATED PEST MANAGEMENT:

3.1 PEST ORGANISMS
3.2 INTEGRATED PEST MANAGEMENT
UNIT # 3

UNIT 3.1 – PEST ORGANISMS

CHAPTER REVIEW

Participating dealers must admit that in nature there is a variety of organisms and that these, in relation to human’s interests, may be classified as damaging, beneficial and indifferent organisms.

Then they will learn that damaging organisms are harmful and they are considered as pests when they cause economic damage. To manage any type of phytosanitary problem that affects their crops they should be able to identify and recognise the various pest organisms and also some beneficial organisms.

The titles of the main subjects are:
A. Biological diversity
B. Pest and beneficial organisms
C. Ways to identify and recognise pest organisms
D. Regional crops and their main pests

OBJECTIVES

At the end of the course the participant dealer will be able to:
- Identify and recognise the diversity of organisms that exist at his place of work
- Identify and recognise pest and beneficial organisms existing in his crops
- Relate some symptoms and damage found in his crops with a possible phytosanitary problem (harmful organism), and
- Mention the name of some pests found in their crops and, besides, indicate where they are located; how do they look like; what do they eat, etc.

TIME REQUIRED:

60 minutes

STEP No. 1 – PRESENTATION – BIOLOGICAL DIVERSITY

In nature there is a variety of organisms: insects (adults or immature); mites (adults or immature); fungus, bacterium, virus, nematodes, weeds, rodents, birds, etc. Some of them have economic interest to man because they are harmful; others are beneficial because they are predators, parasites and/or pathogens of them.

Note for the Trainer: Take to the classroom some samples of live organisms or some illustrations. Explain some of the differences and relations among them.
(1) Adult and egg of the boll weevil; (2) Nymph of the bean chickpea; (3) cutworm of the maize.

(4) Microphotograph of the potato “X” potex virus; (5) Harm provoked by the potato “X” potex virus; (6) Microphotograph of the cereals powdery mildew, *Erisiphe graminis*; (7) Harm provoked by powdery mildew.

(8) Adult and egg of the red mite, (9) Nematodes in coffee roots.

**BIOLOGICAL DIVERSITY**

**STEP No. 2 – PRESENTATION: PEST AND BENEFICIAL ORGANISMS**

Organisms that are harmful and cause economic damage to crops, domestic animals, health and other human’s interests are called pests. Those organisms that help in a natural and/or managed way to regulate the population of harmful organisms, are called beneficial organisms or natural enemies.

Message for the Trainer: Use the same samples and separate harmful organisms from beneficial organisms. Explain some differences. Some illustrations or other resources can also be used. Mention other examples for each case.
HARMFUL AND BENEFICIAL INSECTS

HARMFUL:
1. Cotton bollworm
2. Cotton borer
3. White Fly

BENEFICIAL:
1. Carabid (predator)
2. Lady bug (predator)
3. Trichogramma sp. (parasitoid)
HARMFUL AND BENEFICIAL PATHOGENS

HARMFUL:
1. Bacteriosis in tomato
2. Club root of crucifers
3. Potato X potex virus

BENEFICIAL:
4. White grub (Bacillus popilliae infectanas)
5. Berry borer (White muscardine fungus)
6. Trichoplusia (ni = ni moth)
STEP No. 3 - PRESENTATION: HOW TO IDENTIFY AND RECOGNISE THE VARIOUS PEST ORGANISMS

Harmful insects are one of the most common pests but they are not the only ones that damage crops. There are other organisms that can reach a pest condition. Among them we can find pests, bacterium, virus and nematodes; all of them are commonly called pathogens. They are also found in weeds, rodents and birds.

Notions about insects: In nature, insects are very abundant organisms. Their body is divided in head, thorax and abdomen. They have in the head a couple of antennas, a couple of eyes and the oral device. Some insects are characterised by a pair of wings in the thorax; and some do not have any; in that same region of the body three pairs of legs are located.

Note for the Trainer: Use insect illustrations where their morphology is indicated so participant dealers can observe them.

**MORPHOLOGY OF AN INSECT: LATERAL VIEW**
(A) HEAD: (A1) Antenna; (A2) Simple eyes; (A3) Compound eyes and (A4) Mouth.
(B) TORAX: (B1) Legs; (B2) Wings.
(C) Abdomen.
Notions about Mites: Most mites are very small organisms that are almost at the limit of human vision; they have been historically known by man since ancient times. However, it is until the last decades when their importance as disease vectors has been recognised and also as being responsible of the sanitary problems that affect man and domestic animals and, on the other hand, as farming pests of great importance. Due to their animal nature, mites have a great adaptation capacity that lets them live in the most varied habitats, that go from polar to the most tropical conditions in the whole planet; in deserts as well as in rivers, lakes, thermal fountains and marine depths.

As ectoparasites of vertebrates, mites are frequently found in bird feathers, mammals’ hair; on reptiles and often associated to insects. But they are not only seen as ectoparasites, it is also possible to see them as endoparasites, living in the respiratory channels; drilling under the skin and even in internal organs of various animals.

In the plants they can live in all aerial parts, where they can attack the leaves’ surface, live from the buds’ young tissues or form galls. They can also live from the plants’ underground parts and from stored products. On the other side, as free life animals they abound in rich organic matter; in trees, on the ground and in humid environments.

In spite of their great abundance and enormous distribution, mites are little known by man due to their small size. However, some of them, like ticks and plower of the scab, have been known for a long time due to their large size and the discomfort they cause to domestic animals and man.

Many mites seem to have only one segment in all the body; others look as if they have it divided in two parts and others seem to have the body widely segmented or with rings.

All mites are oviparous, even if in some cases the eggs can be incubated inside the mother’s body and furthermore, in extreme cases they can complete their development and get out to the exterior being adults.
**Notions about other arthropods:** Insects are classified in a larger group than invertebrates and they are nominated arthropods. There are some organisms that look like insects but they are not insects, among them are found the centipede, millipede, spiders, mites, woodlouse, and other crustacean (crabs, shrimps, lobster, etc.)

**Note for the trainer:** Use illustrations with these arthropods and show the different regions in which its body is divided and other specific morphological characteristics.

**MITES MORPHOLOGY AND METAMORPHOSIS:**
(A) EGG, (B), (C) AND (D) NYMPH STAGE, (E) ADULT
OTHER ANTHROPOIDS:
(A) CENTIPEDE, (B) WOOD LOUSE, (C) SPIDER, (D) TICK, (E) MILLIPEDE
**Notions about insect development and metamorphosis:** During the development and growth of insects, as well as frogs and toads, they suffer various changes. This development occurs within a rigid structure called exoskeleton; for that reason, every time they need to grow, they change skin (exoskeleton). That change is denominated moulting, and the number of changes until they reach the adult stage is called metamorphosis. There are two types of metamorphosis: Simple metamorphosis and complete metamorphosis. During the simple metamorphosis the insect go through the stages of egg, nymph and adult. During the complete metamorphosis, through the stages of egg, larva, pupa and adult.

**Note for the trainer:** Use insect illustrations with various types of metamorphosis; if possible, take with you some live samples. The attached illustrations may be used.

(A) SIMPLE METAMORPHOSIS : (A1) Egg; (A2) Nymphs y (A3) Adult.  
(B) COMPLETE METAMORPHOSIS: (B1) Egg; (B2) Larva; (B3) Pupa and (B4) Adult.
Notions about insect eating habits: Insects food is diverse. Some eat vegetable parts (roots, stems, leaves, flowers and fruit); others eat vegetable sap. Other insects nourish from man and domestic animals blood, transmitting diseases while they eat. There are also insects that damage man’s buildings and clothes; also, there are some insects that consume their own specie (predators and parasites). These varied types of food explains why insects have such a broad variety of oral devices, each one is special either for chewing, sucking, scraping, cutting, etc.

Note for the trainer: Use illustrations of insects nourishing from various sources. Also illustrate various types of oral devices. Have dealers participate; ask them to give some examples. Elaborate a list of them.

TYPES OF INSECT ORAL DEVICES
(A) SYPHON TYPE, (B) CHEWER, LICKER, (C) SUCKER, SCRAPER, (D) FLUFFY (E) CHEWER
HARMFUL INSECTS

1. Banded beetle
2. White fly
3. Aphid
4. Grass hopper
5. Banded beetle larva
6. Onion fly larva
7. Thrip nymphs
8. Rice weevil
9. Gusano medidor
10. Potato jumping flea
11. Rice sogata
12. Whitegrub
13. Wire worm
14. Leafhopper
MITES AND PROVOKED HARM

1. Adult red mite.
2. Eggs of the red mite.
3. Mite colony harming an apple flower bud.
4. Harm provoked by mites in legumes.
**Notions about pathogen organisms and plant diseases:** Phytopathogens are micro-organisms that affect the normal development of plants, causing them diseases. A disease is defined as the group of symptoms that affect the normal growth and development of plant. Plant diseases are divided in two groups:

A. Plant non-parasitic diseases. These diseases are not caused by live organisms. They are caused by excess, lack or deficiency of several factors necessary for the normal development of a plant. For example: Too high or too low temperature; nutritional deficiencies; phytotoxicity of some agrochemical products. Lack or excess of water.

B. Plant parasitic diseases. These diseases are caused by live micro-organisms called Pathogens that live in plants and feed themselves from them. These diseases are transmitted from one plant to the other. They occur when various factors are present: Presence of the pathogen agent; a guest plant sensible to it and environmental conditions appropriate for disease symptoms to develop.

In nature there are various micro-organisms that produce plant diseases. Next there are some of them:

**Notions about fungus:** Fungus are micro-organisms that do not produce their own food. Some absorb food from organic waste or dead organisms, while others are parasites that absorb food from their hosts live bodies. Although the species that provoke diseases and destroy crops and goods stored by man have given the fungus a bad reputation, the truth is that these organisms contribute in a significant way to nature ecological equilibrium. In conclusion, not all fungus are harmful: some are beneficial to man. Among the fungus that can provoke plant diseases are rusts, carbons, ashes, blights, etc.

**Notions about bacteria:** Bacteria are unicellular micro-organisms that cannot be observed at a glance, although some times they form colonies. Bacterium may cause plant diseases and can multiply very fast, causing damage. The rottenness they provoke is soft, sticky and foul-smelling.

**Notions about virus.** Virus are entities located in the threshold that separates what is alive and what is not. They are not cellular beings; they do not move by themselves and are not capable of developing their own life in an independent way. In a sense, it can be said that virus are alive only when they have infected another organism. Virus are pathogens that cannot be seen at a glance and are transmitted to healthy plants very easily. Sick plants remain small, with curly leaves and with mosaics.
**Notions about nematodes:** Nematodes or round worms are very small cylindrical worms that live agitating in the soil particles, constantly rolling and unrolling. Although some of them have a free life, others are important parasites of plants and animals. Some damage the roots and aerial part of the plants. They usually do not kill the plant but can reduce their yield. The roots of sick plants show galls, superficial necrosis of the roots, and malformation of the roots end, rottenness and other symptoms that can be taken for the ones caused by a virus.

Nematodes that nourish from the root do it from outside the root and they are denominated ectoparasites and the ones that penetrate the host tissues are denominated endoparasites and they nourish from internal cells. The latter divide into migratory endoparasites because they constantly change place inside the plants tissue and sedentary endoparasites because they stay in only one place. It must be clarified that there might be phases in an endoparasite life cycle in which the nematode nourishes in an ectoparasitic form and vice versa. Ground nematodes can be grouped as follows:

A. Saprophytes, that nourish from decomposed organic matter.
B. Predators, that nourish from small animals, including other nematodes.
C. Phytoparasites, that nourish from the plants.

**Xiphinema female**  **Pratylenchus female**

Frequently, various plant pathogens may cause similar damage; for this reason, it is difficult to recognise one disease from the other with the same symptoms. Chart No. 1 “Some symptoms found in plants and possible causes of phytosanitary problem”, can orient on this regard. However, it is always recommended to ask advice from a specialist to obtain a good diagnosis.
Note for the trainer: Aid yourself with illustrations and show the participants the symptoms related with the problem that provoke them. Take to the classroom samples of sick plants and identify related symptoms. Ask dealers to observe and examine the sick plants. Make all of them participate.
DISEASES CAUSED BY HARMFUL FUNGUS

1. Septoriosis
2. Moniliasis
3. Banana’s crown rottenness (various pathogens)
4. Cereals’ root disease
5. Botritis
6. Cercosporiosis in coffee
7. Rust spot in coffee
8. Powdery mildew in roses
9. Venturia, Apple spots
10. Sclerotinia, White mould in legumes
11. Cercosporiosis in peanuts
12. Piricularia or rice burn
DISEASES CAUSED BY HARMFUL BACTERIA

1. Agrobacterium tumafaciens
2. Pseudomonas solanacearum
3. Bacteria withering
   Clavibacter michiganensis
4. Necrobiosis of vascular tissue,
   Clavibacter michiganensis
DISEASES CAUSED BY HAMFUL VIRUS

1. Common mosaic in bean
2. Tomato virus
3. Golden mosaic in bean
4. Yellow dwarfing in barley
5. Virus of watermelon mosaic
6. Rolling of potato leaf
7. Virus “X” in potato
HARMFUL NEMATODES AND DAMAGE THEY CAUSE

1. Damage caused in potato by golden nematode
2. Roots damaged by nematodes
3. Beet nematodes
4. Meloidogyne nematodes in coffee roots
Notions about weeds: Weeds constitute another pest organism that can harm crops. Weeds are plants that do not belong where they grow. These plants cause problems because they absorb nutrients, compete for light, water and space, which are also needed by crops. Besides, they serve as hosts of harmful pathogens and insects and can reduce crops quality and yield. Weeds have life cycles that vary from one to several years. According to their life cycle, they are grouped in annual, biannual and perennial.

A. Annual. This type of weeds have a one-year life cycle; they can be grass or broad leaf.
B. Biannual. These weeds last two years and grow from a seed. Their roots are thick and have a mixed foliage.
C. Perennial. They last for several years, but lose their leaves at certain periods. There are various types and sizes of perennial weeds.

Note for the trainer: Take to the classroom three types of weeds or use some illustrations to show to the dealers. Ask them to mention the names by which they know them.

Notions about rodents and birds: Some superior organisms can become pests; rodents and birds can destroy and eat the crops. Many times they also eat and damage the plants already cultivated.

A. Rodents, such as mice and rats eat cultivated and stored grains. These animals constitute a danger to human health because they get food contaminated or dirty. Mice and rats are rodents with long tail and a body covered with hair. They are very skilful to climb and swim. Their favourite habitat is around drainage and water sewerage because they need to drink water every day. Rats and mice use their teeth to bite and chew. Signs left by rodents include feet and tail tracks; trails traced in the weed and ground; small and humid excrement with a brilliant black colour; marks of bites and an unpleasant smell that comes from the damaged grain. Rodents have become important field pests in some crops, such as sugar cane and rice, where they not only produce physical damage but also rottenness due to the injuries they cause.

B. Birds: Same as rodents, birds contaminate our food, reducing their amount and quality. Birds may cause severe damage to grain, fruit and vegetable crops. The signs of damage are pecks, feathers and excrement.

Note for the trainer: End the presentation making a resume. After the discussion, make a test over the subject. Motivate them and try to have everybody participate.
BIRDS

RODENTS

WEEDS

OTHER PEST ORGANISMS
UNIT # 3.2 INTEGRATED PEST MANAGEMENT

REVIEW

In this chapter the participant dealers would be informed of the attitude changes about the use of pesticides in the whole world: There existed a season in which the pesticides were considered as the solution for all pest problems, today, due to the growing restlessness with respect to the environment, the development of the resistant pests and the economic pressure that affects the farming, the pesticides are being considered as one control form inside a gamut of available measures and as well they should be use with care so they can be compatible with other control methods.

The titles of the main subjects are:
A. What is the integrated pest management?
B. Alternatives for pest management.

OBJECTIVES

At the end of the activity the dealers will be in capacity of:
- Defining the concept of integrated pest management and explain the reasons why this pest control method is acquiring more and more importance.
- Give examples of no chemical control measures that are use in the zone crops.

TIME REQUIRED:
15 minutes

STEP # 1 PRESENTATION: WHAT IS THE INTEGRATED PEST MANAGEMENT?

The integrated pest management priority is the plant protection with a minimum damage to the environment, it consists in the coordinated use of prevention and cure. As always, it is better to prevent than to cure. From the seedbed until the harvest, all farming practices should be oriented to avoid pest’s outbreak. The use of preventive practices can reduce the number of pesticide applications, saving money and reducing damage to the human health and contamination of the environment. However, even with the best use of preventive practices, from time to time, a pest would be so abundant, that would provoke economic loses in the crops. Therefore, besides prevention, the capacity to control a pest outbreak is needed. There exist some no chemicals practices that can be use to control a pest outbreak, for example: Massive liberations of pest natural enemies. Undoubtedly the integrated pest management includes the use of synthetic pesticides to reduce in a convenient moment a pest outbreak that has reached its economic threshold (critical level).
Economic threshold: The economic threshold is the density of the pest population, according to which the control methods should be started to stop the growth of the pest population allowing it to reach the economic damage level, that is to say, while it does not reach to this threshold, the pest control results uneconomical. The threshold would vary according to the actual control costs, the pest damaging capacity and the possible commercial value of the harvest. Once the economic threshold has been established for a specific pest/crop situation, the farmer or his adviser needs the means to calculate the pest population and thus decide what control method would be used.

Pest evaluation: The most common method to verify the pest levels is walking through the crop, observe the development of pests in a series of selected zones; this process is known as pest’s evaluation. For many crops, the investigation institutes have determined which could be the levels before starting the pesticide application.

For the instructor: Must insist that to carry to practice the integrated pest management, the pest population level that causes the economic lost should be known, how this can be calculated and what control methods are available. It should emphasise that dealers should know other pest control methods and how the farmers could combine them with the use of pesticides.

STEP # 2 PRESENTATION: ALTERNATIVES FOR PEST CONTROL

To accomplish a sustained pest management, is not simply to stop using pesticides. An active program of preventive practices has to be used. That is to say a farming practice has to be accomplished, starting for the variety selection in order to reduce the pest problems. The prevention strategy is a key in the integrated pest management. Unfortunately, the use of preventive practices would not guarantee that there in no economic damage caused by pests, therefore, even though preventive methods are being used, a pest evaluation and its critic levels should be frequently done a pest evaluation to be able to select the best control alternative or management.

Control Methods: There are many pests control methods at the farmer’s disposition, besides the pesticides.

A. Cultural Control – It refers to the modification of tillage techniques of a crop that the farmer achieves. For example: Crop rotation, change the planting date, selection of a resistant crop variety, elimination of crop residuals, irrigation control, etc.
B. Biological Control – It consists in stimulating or introducing pest natural enemies or to difficult the behaviour or the pest life cycle. For example: introduction of a parasite or predator, use of pathogens (fungus, bacteria and virus), preservation of natural enemies, to propagate infertile specimens, etc.
C. Physic Control – It is generally used for the control of birds and rodent and it consists in: The use of noise to scare them, the use of protector nets, the use of traps (of light, pheromones or mechanical).

For the instructor: He should make sure that the most important principles are understood and then relate them with local examples. Use sheets or transparencies that would permit you to illustrate other control alternatives.

USE OF HEALTHY SEED

HEALTHY AND STRONG PLANTS

TRAPS WITH WATER

STICKY TRAPS
TRAPS WITH PHEROMONES AND FOOD TO ATTRACT INSECTS

USE OF PARASITOIDS

USE OF PREDATORS

USE OF PARASITES

HOE CLEANING
USE OF CHEMICAL CONTROL

MANAGEMENT OF STUBBLE

BASIC COMPONENTS PROGRAM

IPM

OBSERVATION

Decision tools:
- Crop monitoring
- Support decision taking systems
- Area-wide management

PREVENTION

Indirect measures:
- Location
- Crop rotation
- Cropping pattern
- Phytogenetic
- Crop husbandry and hygiene
- Fertilisation
- Irrigation
- Habitat management
- Trap crops
- Inter-cropping
- Harvesting and storage

INTERVENTION

Direct measures:
- Mechanical and physical control
- Biological control
- Microbiological control
- Ecological control
- Selective chemical control
UNIT # 4

GENERALITIES ABOUT PLANT PROTECTION PRODUCTS

4.1 PLANT PROTECTION PRODUCTS: ADVANTAGES AND DISADVANTAGES

4.2 CLASSIFICATION OF PLANT PROTECTION PRODUCTS
UNIT # 4.1: PLANT PROTECTION PRODUCTS – ADVANTAGES AND DISADVANTAGES

REVIEW OF CHAPTER 4.1

Dealers will have the opportunity to know which products are developed by the plant protection industry for their sale and distribution. Likewise, they will learn the advantages and disadvantages derived from their use.

The titles of the main subjects are:
A. Plant protection products
B. Pesticide concept
C. Advantages and disadvantages

OBJECTIVES:

At the end of the activity the participant dealer will be able to:
- Identify plant protection products
- Mention the name of several products
- Know the pesticide concept
- Mention some advantages and disadvantages derived from their use

TIME REQUIRED

15 minutes

STEP No. 1 – PRESENTATION: PLANT PROTECTION PRODUCTS

The demands of a growing world population for food and fibre require world agriculture to produce higher yields from cultivated land. Feeding future populations with today’s crop yields is not viable; it would require a drastic expansion of planted acreage. In many parts of the world additional land is unavailable. In others, an expansion of cropped area would be environmentally and socially unacceptable. To increase yields from existing land requires a good plant protection technique against losses before and after harvesting. The challenge will be to do this without harming the environment and natural resources for future generations of farmers and consumers. IPM is a principle on which sustainable plant protection can be based. A contribution from the plant protection industry is to develop products compatible with IPM, investigating products, including a decrease in dose; developing mixtures, reducing the drift and the lixiviation to subterranean waters, developing safer and more efficient formulations, making tests of seed treatments, improving containers quality and elimination practices. Among developed and researched plant protection products we can find: Insecticides, fungicides, herbicides, rodenticides, etc.
MORE PEOPLE MEANS LESS LAND PER PERSON
FOR FOOD AND FIBRE PRODUCTION

Note for the trainer: Use pictures to illustrate this panorama. If possible bring samples of products in their original containers with a guarantee seal. Make a display. Request help from the industry.

STEP No. 2 – PRESENTATION: PESTICIDE CONCEPT

There are various ways to manage and control pests. Two of them are chemical and biological alternatives: using pesticides. A pesticide can be defined as any chemical or biological substance; biological agent or substance mixture destined to attack, destroy, control, prevent, diminish or repel the action of pest organisms that affect the health and well being of man, domestic animals and useful plants. The term includes substances destined to be used as plant growing regulators, defoliators, dehydrators, agents to reduce fruit density or agents to avoid fruits premature fall. Also substances applied to crops before or after harvest to protect the product against deterioration during the storage or transportation process.

STEP No. 3 – PRESENTATION: ADVANTAGES AND DISADVANTAGES DERIVED FROM THE USE OF PESTICIDES

In several regions of the world, most pests are responsible of transmitting diseases and of food loss and destruction. Losses of 20 – 30% of the harvests during production and over 20% during storage are not uncommon. Consequently, even though there are other
alternatives to manage and control pests, many times the responsible use of pesticides is necessary to obtain enough food that will provide us with an adequate and nutritious diet to keep healthy.

In farming, the use of pesticides presents various advantages:

- **Quick action**: Pesticides are useful when other control methods fail and an emergency arises. When a pest increases and exceeds the economic damage threshold, pesticides can act faster than other methods. Pesticides can solve the problem in a few hours or a few days.

- **Varied application**: Pesticides are found in several formulations. This means that they can be efficiently used in various situations. Their flexibility and adaptability constitute a great advantage.

- **Reduced cost**: As a general rule, pesticides are economic, particularly if their cost is compared with the cost of the crop that can be saved. But, it must be born in mind that application cost will be higher than the damage or harvest loss if pesticides are applied before reaching the economic damage threshold.

But the most important reason why this control alternative continuous being used is that in some cases pesticides constitute the only means to attack a pest and they also contribute to humans’ good health and well being, (preventing and curing diseases and providing abundant quality food).

However, it is convenient to remember that the use of pesticides can be dangerous for man and environment; therefore, it is necessary to know some disadvantages derived from their wrong management:

- **Pest resistance to pesticides**: By trying to find solutions to this problem, that is to find pesticides that can be used to control resistant pests, large amounts of pesticides have been introduced in world’s market, some of them highly toxic.

- **Human and animal toxicity**: With the introduction of more toxic pesticides, human intoxication by pesticides has become a health problem.

- **Persistence of certain pesticides**: The persistence of certain pesticides brings as a consequence food, water, land and air contamination.

- **Container elimination; old or due pesticide stock**: The wrong use of pesticide containers and the wrong disposal of due products at stores constitutes another personal safety and environmental contamination problem.

Note for the instructor: Use illustrations to explain the problem to the participants. Ask the dealers to expose some ideas, use the board to write them down. Enrich their points of view; clarify wrong ideas. End with a resume.

UNIT # 4.2: CLASSIFICATION OF PLANT PROTECTION PRODUCTS
REVIEW

Dealers will learn to classify plant protection products, according to their biological action, most common chemical groups in working site, mode of action, most common formulations, danger and legal aspects.

The main subjects are:

A. Classification of plant protection products, according to their biological action.
B. Classification of plant protection products, according to their chemical group.
C. Classification of plant protection products, according to their mode of action.
D. Classification of plant protection products, according to their action spectrum.
E. Classification of plant protection products, according to their formulation.
F. Classification of plant protection products, according to their danger.
G. Classification of plant protection products, according to legal aspects.

OBJECTIVES

At the end of the activity the participant will be able to classify the most commonly used plant protection products, according to the following criteria:

- Biological action
- Chemical group
- Mode of action
- Action spectrum
- Formulation
- Danger, and
- Legal aspects

TIME REQUIRED

45 minutes
STEP No. 1 – PRESENTATION:
CLASSIFICATION PER BIOLOGICAL ACTION

Depending on the organism subject to control, plant protection products are classified in: insecticides, acaricides, fungicides, bactericides, nematicides, rodenticides, ovicides, herbicides, etc. On the other hand there are insecticides that perform their biological action during certain insect developing stages, for example, eggs, (ovicides); larvae (larvicides); nymph (nymphicides) adults (adulticides).

RELATION OF PESTS AND PESTICIDES

In the left column there are the names of several pest organisms. Mark with an arrow the pesticide that relates with one of the objective organisms.

NEMATICIDE

ACARICIDE

INSECTICIDE

FUNGICIDE

HERBICIDE

RODENTICIDE

MOLUSQUICIDE

Note for the instructor: Use illustrations and relate pesticides with objectives to be controlled. Evaluate participating dealers. Use attached test.
STEP No. 2 – PRESENTATION AND DEMO STRATION:
PLANT PROTECTION PRODUCTS CHEMICAL GROUPS

There are various groups of chemical products. It is very important to know them from
the agricultural point of view, since some of them cannot be mixed because they are not
compatible with each other; besides, if they are known, a pesticide rotation programme
can be implemented to manage resistance problems. It is also very important to know
this for the worker’s safety, since depending on the chemical group to which the
pesticide belongs, in case of intoxication, the appropriate first aid measures can be
applied and the worker can be given the correct medical treatment. However, it is
convenient to clarify that in the same chemical group there might be products for which
it will be necessary to apply a very specific first aid and medical treatment; therefore, it
is absolutely necessary to read both their label and pamphlet.

Insecticide chemical groups are: organochlorines (practically discontinued)
organophosphates, carbamates, pyrethroids, chloronicotiniles, benzoilureas,
dibenzofuranes, acridiones, thiosulphones, thiodiazines, oximas carbamicas, tioureas,
ethialates, fenoxibenciles, benzamides, pyrediazinones, phenyl ether, pirroles,
organofluorines, hydracines, tritianes, formamidines, etc.

Acaricide chemical groups are: organophosphates, carbamates, norpyrethroids,
formamidines, organomethalics, imides, pyrethroids, benciles, tiodiazines, tetrazines,
quinoxalines, dinitrofenoles, pirazoles, tiazolidines, etc.

The most common fungicide chemical groups are: Copper salts, sulphur,
dithiocarbamates, ethylenbisditiocarbamates, nitrofeniles, triazoles, benzimidazoles,
pirimidines, acilanilines, sulfamides, morfolines, fitalimides, phosphoric acids,
conazoles, phosphates, difeniles, anilides, ureas, tiadizines, pyridazines, quinones,
pyridilsulfuros, benzamine, amitraquinones, oxazoles, gaunidines, tiodiazoles, pirroles,
piperidines, imidazoles, dithiolanos, pyranosides, isoatalaltos, oxazolidines, quinocines,
pyridines, methoxiacrilates, etc.

The most common herbicide chemical groups are: phenoxi acids, phosphonic acids,
bypriridiles, triazines, oxidiazoles, triazoles, ureas, dinitroanilines, benzoicos,
acetanilides, difenil ether, oximes, organophosphates, benzofuraniles,
benzotiodiazoles, pirazoles, benzitiazoles, phosphoniles, uraciles, carbamates,
sulpbonilureas, pyradizanones, pyridones, furanonas, imidazoles, falamates,
quinoxalines, etc.

Note for the instructor: Ask participating dealers to give you the names of the
products sold or distributed at his dealership. Write the names and classify them
by insecticides, fungicides, herbicides. Then, separate them according to their
chemical group. Try to make everybody participate and to give you the largest amount of information possible.

STEP No. 3 – PRESENTATION AND DEMONSTRATION: MODE AND SPECTRUM OF ACTION OF PLANT PROTECTION PRODUCTS

This classification is based on the form which plant protection product act on the pest’s organism. In general terms and in the case of insecticides, they are classified as:

Contact insecticides: These are products that exercise toxicity once they get in contact with the objective organism; it can be by direct or residual contact.

Ingestion or digestive. These are products that act after the product has been ingested by the objective organism.

Asphyxiating: Penetration is in gaseous state through the respiratory system of the objective organism.

Penetrant (translaminars): These can reach up to certain depth inside the treated part, but cannot translocate or store in other organs located further away in enough quantity to make it effective.

Systemic: These products are absorbed by the plant’s treated part and are transported through the tissues — specially vascular tissues — in enough quantity to be effective at the action points (leaves and sprouts). They are used to control chewing and soaking insect pests.

Polyvalent: These are products that can act in more forms than the ones mentioned before.
**Fungicides mode of action:**

Fungicides must prevent fungus from penetrating the plant in order to avoid an infection, or execute control on the plant’s present infections. They are classified in:

**Preventative fungicides, protective fungicides and contact fungicides:** The majority of the most known fungicides have traditionally been preventative; this means that they are applied to prevent that the fungus infect the plant. Protective or preventative fungicides act by causing a toxic effect on the fungus spores or on their germinating tubes, thus avoiding that the fungus penetrate the plant’s tissue and cause an infection. Due to their type of action, it is very important that these fungicides be distributed homogeneously in all the leaves’ surface but especially on the reverse, because it is in this place where the fungus germinating tubes penetrate through the stomas. When fungicides are applied, the whole foliar surface must be thoroughly covered.
**Penetrating fungicides:** These are the fungicides that penetrate the foliar lamina, although they are not able to redistribute inside the plant.

**Systemic or curative fungicides:** These fungicides are able to penetrate the leaf and to be translocated through the vascular system. This permits certain control of present infections. The plant absorbs systemic fungicides and in most cases they are translocated from the penetration point to other tissues inside the plant. Systemic fungicides move from one part of the leaf to other; they never cross its central vain, but can move from the leaf’s base toward the leaf’s tip. Its vascular movement is usually upwards and very rarely downwards, reason why foliar treatments do not have an effect on the roots.

**PLACES IN WHICH CONTACT AND SYSTEMIC FUNGICIDES ACT DURING A DISEASE CYCLE**
Note for the instructor: Use previous illustration and explain a disease cycle. Then indicate at what moment a contact or preventative fungicide acts as a systemic or curative fungicide.

In the case of herbicides, these can be:

**Foliar contact:** Contac herbicides act only on the plant’s exposed parts; therefore, spraying must be made thoroughly. When weeds growing among trees and bushes are sprayed, an impact nozzle must be used or apply low pressure to reduce the drift to a minimum. This is also important when the spraying is being done by a crew.

**Systemic of foliar translocation:** Herbicides of foliar translocation are absorbed through the leaves and translocated by the stem to the plant’s roots. They must be applied when weeds are vigorously growing. Due to their absorption and movement through the plant, their coverage must not be very complete as in the case of contact herbicides.

**Systemic, translocated by the root.** Most residual herbicides must be applied on a humid, finely cultivated soil. Some need to be incorporated to the soil by mechanical means, immediately after their application. Selectivity of residual herbicides depends on the crop’s tolerance regarding the herbicide, or that the crop has been sown deep enough to prevent any damage. When using a residual herbicide it must be taken in consideration whether crop rotation is being done. Some herbicides will remain active enough time to damage next crop. Atrazine should not be used in corn crops if next crop is sensible to atrazine, such as tobacco, vegetables, alfalfa or wheat.

Note for the instructor: He should explain each of the modes of action. Use illustrations. The following illustration can be used.
Regarding their action spectrum, pesticides are classified as:

- Polytoxic or with broad spectrum
- Oligotoxic or with reduced spectrum, and
- Monotoxic or specific
STEP No. 4 – PRESENTATION AND DEMONSTRATION:
FORMULATIONS OF PLANT PROTECTION PRODUCTS

Most of the ingredients in plant protection products are organic compounds that many times are hard to dissolve or water insoluble. They belong to the most unlike chemical matters, have different physical properties, can be solid or liquid and have a consistence similar to wax. The active ingredients can only develop their biological action if they definitely arrive to the point where they should act in the organism objective. And the purpose of the formulation is to make sure that this happens. Formulation is the form in which an active ingredient is prepared, accompanied by coadyuvant matters, such as solvents, bearers or vehicles, emulsifiers, moisturisers, surfactants and dispersants. Usually, plant protection products can be purchased in two formulations: Liquid and solid.

LIQUID FORMULATIONS:

Emulsion concentrate (EC). These are solid or liquid active matters and organic solvents. Adding the proper emulsion, such solvents can be mixed with water. The original transparent liquid turns into a whitish and milky emulsion, whose drops measure approximately one micro. Emulsion concentrates are easily produced and managed. The necessary dose for a treatment can be easily measured and dosed with a graduated glass. The emulsion’s homogeneity should be restored by shaking and pumping it. The empty container can be simply cleaned with a washing object. Some emulsion concentrates also have their disadvantages because their solvents may be phytotoxic, they are inflammable and due to the damage they cause to the environment.

Note for the instructor: Show the participants how an emulsion can be formed. Use water, oil and transparent liquid soap. Shake continuously. An emulsion is a colloidal suspension consisting on microdrops of a liquid solvent. Each small drop acts as a lens and disperses the light; for this reason the mixture is opaque.

Water soluble concentrate (SL). Formulations of this nature consist on concentrate solutions made of active matters or their salts, with water base or solvent mixable with water. Therefore, it is essential that the active matter be soluble in water. The containers of SL formulations can be cleaned very easily.

Note for the instructor: Show the participants how a solution is formed. Use a soda and water. Let it rest and, together with the participants, compare this case against the previous case. Reach a conclusion.

Concentrated suspension (CS). This type of formulation is also called flowable formulation. They are stable suspensions made of water soluble active matters. The essential advantage of the CS is that they do not drop powder and do not contain any solvent, and therefore, the user is not exposed to contamination when preparing the
spraying mixture. Besides, the concentrated suspensions can be easily measured and be well dosed. As an inconvenience, it can be pointed out that CS formulation can decompose during storage and it can be troublesome to empty completely the containers.

**Microencapsulate; capsule suspension (CS).** This type of suspensions represent a different type of formulation, with slow liberation, characterised by the fact that, when they are applied, the active matter is slowly liberated. The main objectives of this formulation are: To reduce acute toxicity and, therefore, less risk to the user (more personal safety). To prolong the action period, in order to decrease the number of treatments (less environmental contamination). To lower toxicity and avoid loss of active matter due to evaporation.

**SOLID PRODUCTS:**

**Wettable Powder (WP).**
These are solid active matters that are not soluble enough and, therefore, do not admit EC or SL formulations. They used to be launched in the market as wettable powder (WP). These formulations are manufactured by grinding the active matter, together with solid dispersing and moistening vehicles and reducing them to powder.

They are mixed with water for their application, mixing them in a container; this way a stable suspension is obtained. In view that the powder is so fine, the user may be exposed to contamination derived from powder emanations when the mixture is being prepared. Another inconvenient is that the powder has to be weighed if only part of it is taken out of the container.

- **Polvos solubles (SP):** Las formulaciones polvo soluble, son formulaciones secas que se disuelven en agua, no requieren mucha agitación y forman una verdadera solución. La cantidad de ingrediente activo por producto formulado es alta.

- **Granulados (GR):** La formulación granular se obtiene aplicando un ingrediente activo en estado líquido a los gránulos o partículas gruesas. Los gránulos pueden absorber o quedar cubiertos por el ingrediente activo líquido. En cualquiera de los casos, el gránulo se seca pero el ingrediente activo que esta dentro o sobre el mismo ejerce su acción tóxica.

**Water dispersible granules (WG)**
This is a safer formulation for the user; it was created specially to replace wettable powders. In comparison with these, water dispersible granules need a larger proportion of dispersible granules so that when they are mixed with water the active matter disperses spontaneously. Their main advantage is that no powder comes off when the mixture is being prepared. Water dispersible granules are flowable and their apparent density is constant, which makes it easy to measure them with a graduated glass. On the
other hand, the container can be emptied without leaving any residues inside. Their stability during storage is similar to EC and WP formulations.

Note for the instructor: Use powder, grains, etc., to simulate solid formulations. Show the participants each sample. Comment the results with them. Explain and clarify doubts. Make a resume.

STEP No. 5 – PRESENTATION: CLASSIFICATION OF PLANT PROTECTION PRODUCTS, ACCORDING TO THEIR RISK

Plant protection products are useful to manage and control pest organisms. However, they can also cause intoxication to persons who handle them. In order to determine whether they are harmful to humans, toxicological studies are being performed in other mammals, such as rats, mice, rabbits and dogs. The results of these tests help to predict their risk to humans, establish safety measures during handling and classify products according to their risk. In the following chart a classification of plant protection products is shown, according to their toxicity.

CLASSIFICATION OF PLANT PROTECTION PRODUCTS ACCORDING TO WHO (World Health Organisation).

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>PICTOGRAME WARNING</th>
<th>COLOR</th>
<th>DL 50 ACUTE ORALLY SOLID</th>
<th>ORALLY LIQUID</th>
<th>THROUGH SKIN SOLID</th>
<th>THROUGH SKIN LIQUID</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a/1 Extremely</td>
<td></td>
<td></td>
<td>&lt;20</td>
<td>&lt;10</td>
<td>&lt;40</td>
<td></td>
</tr>
<tr>
<td>Ib/2 Highly dangerous</td>
<td></td>
<td></td>
<td>-50</td>
<td>&gt;20 - 200</td>
<td>&gt;10 - 100</td>
<td>&gt;40 - 400</td>
</tr>
<tr>
<td>II/3 Moderately dangerous</td>
<td></td>
<td></td>
<td>-500</td>
<td>&gt;200 - 2000</td>
<td>&gt;100 - 1000</td>
<td>&gt;400 - 4000</td>
</tr>
<tr>
<td>III/4 Slightly dangerous</td>
<td></td>
<td></td>
<td>-2000</td>
<td>&gt;2000 - 3000</td>
<td>&gt;1000</td>
<td>&gt;4000</td>
</tr>
<tr>
<td>IV/5</td>
<td></td>
<td></td>
<td>Over 3000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note for the instructor: Use strips with the colours that represent the danger categories (toxicological categories). Ask the dealers what is their meaning. Make sure they associate the colours with the corresponding danger. That must be your main objective.
STEP No. 6 – PRESENTATION: LEGAL ASPECTS OF PLANT PROTECTION PRODUCTS

To be able to use a plant protection product in a determined country, this must have the approval from a government organism or organisms in charge of regulating its manufacture, commercialisation and use. Taking this in consideration, the products are classified in registered products, non-registered products, restricted products, and prohibited products. For export farming it is very important to know the norms and criteria established by local authorities from importing countries. For example:

- EPA (Environmental Protection Agency from U.S.A.)
- Codex Alimentarius from European Economic Community.

Note for the instructor: Prepare and take to the classroom a list of prohibited or severely limited products, according to local legislation. Also, prepare a list of plant protection products authorised by EPA and Codex Alimentarius. End the activity with a review of the chapter.

STEP No. 7 – PRESENTATION FAO INTERNATIONAL CODE OF CONDUCT

United Nations Food and Agriculture Organisation (FAO), with the collaboration of the agrochemicals industry and other international organisations, has prepared an International Code of Conduct for Distribution and Use of Pesticides. The Code has been adopted by FAO’s Conference (Directive organ) and the member nations have decided to support it. All parties, industry included, have a joint responsibility to ensure that the Code is applied.

It is important that the spirit as well as the letter of the Code be observed. The Directive has the clear responsibility to initiate appropriate actions in order to ensure that the Code is observed within each company.

The Code, as published by FAO, needed to be a long and detailed document, in order to be able to cover the responsibilities of all involved in pesticide management. The pamphlet “FAO, International Code of Conduct for the distribution and use of pesticides – An application guide for the agrochemicals industry”, prepared by CropLife International, is a summary of the measures recommended in the Code and the consequences for the industry and it can be found in the annex.

The Code has 12 articles, which are resumed in the pamphlet, outstanding the most important responsibilities and actions of the industry. We ask those taking part in the
Production, Formulation and Packing of agrochemical products to pay attention to articles 4, 5 and 6. Those interested in Marketing, Distribution and Sales, should pay attention to articles 5, 8 and 11. Whilst people in charge of Registration, Product Development and Technical Service should address their attention to articles 4, 5, 8 and 10.

Note for the instructor: The pamphlet previously mentioned is a good consultation material. Try to obtain a few of them so the participating dealers can analyse them and apply the information in their work.
UNIT # 5

LABEL AND PAMPHLET OF PLANT PROTECTION PRODUCTS
UNIT # 5: LABEL AND PAMPHLET OF PLANT PROTECTION PRODUCTS

REVIEW OF THE UNIT

The participant dealer should understand the importance that the label and pamphlet as legal documents have, and to solve all doubts that they have of how to use and manage in a safe and responsible manner the plant protection products. That is the reason of the need of reading both documents before buying a product, applying it, to storage and transport, when the empty containers should be eliminated and what to do in case of an accident.

As follows they be able to identify different kinds of labels and pamphlets, recognize the different parts of a label and pamphlet, and know about the information that both have.

The titles of the main subjects are:

A. Definitions: What is a label?, What is a pamphlet?
B. The importance of the label and pamphlet
C. Kinds of labels
D. Main parts of a label and pamphlet
E. Use of the label and pamphlet

OBJECTIVES

At the end of the unit the farmer will be capable of:

- Distinguish between a label and a pamphlet;
- Recognize how the label and pamphlet complement each other, giving all the necessary information of the safe and responsible management of a plant protection product;
- Identify in the label and pamphlet where to find the needed information;
- Identify the toxicity of a plant protection product according to the colour of the label and the advising phrases;
- Make a correct use of the label and pamphlet.

TIME REQUIRED

45 minutes
STEP No. 1 – PRESENTATION AND DEMONSTRATION

What is a label? and What is a pamphlet?

The label from plant protection products is defined as any written, printed, or engraved material, adhered to the container, package or exterior wrapping for retail sale or distribution.

The pamphlet is an additional informative sheet that must be included with the product when the purchase takes place. That document contains very important agricultural information to manage and use the product in a safe and responsible way.

For the Instructor: He should supply himself with several label and pamphlet samples of plant protection products being sold or distributed in the geographical area in which the dealers being trained are working. He should expose the material, comment and clarify any doubts.

STEP No. 2 – PRESENTATION OF THE IMPORTANCE OF LABEL AND PAMPHLET

The label and pamphlet are the legal documents that should be handed to the buyer in most countries. It is required that these documents be written in the country’s official language and, in addition, they should show all the information and instructions for the safe and responsible management of plant protection products; therefore, the information must be written in a language that can be understood by the user.

Following is some of the information that should appear on the label: Name of the formulator, commercial name of the product, concentration, formulation type, biological action, name of active ingredient, use precautions and warnings (with their respective pictogram’s), intoxication signs and symptoms, first aid, antidotes, some environmental issues (also with pictogram’s) and the colour band that identifies its danger, with the corresponding warning phrases.

The pamphlet, besides containing most of the information that appears on the label, it should mention agricultural aspects, such as, action mode, application equipment, how to prepare the mixture, recommendations of use against pest organisms, recommended dose, application intervals, waiting time between last application and crop, waiting period to return to treated area, phytotoxicity, compatibility, etc.

For the Instructor: Using the board, group the information that appears on the label and compare it with the information on the pamphlet. Have the participants discuss the subject and come to their own conclusions.
STEP No. 3 – DEMONSTRATION:
TYPES OF LABELS AND PAMPHLETS; THEIR PARTS

There are three types of labels: With one body (one face); with two bodies (two faces) and three bodies (three faces). These are used for obligatory labelling of products formulated for agricultural use, according to their size. One-body labels are used on small containers and the three-body labels in larger containers. Pamphlets constitute an informative document that must be handed to the buyer when he buys the product, regardless of size. All pamphlets contain the same information.

For the Instructor: Organise some working groups and give them labels and pamphlets so the participants can find out the differences between the two. Ask them to study carefully the labels and pamphlets and answer the questions that you have prepared on a sheet of paper. Some examples of questions can be the following: What is that product for? What products control pest “X”. Which is the most dangerous product? Which is the least dangerous? Use your creativity to make other questions. Correct errors and clarify doubts.

STEP No. 4 – SUMMARY: USE OF LABEL AND PAMPHLET

The best way to use labels and pamphlets is to read them to solve any doubts about the correct and safe manner to use a plant protection product. It is important to recognise that there are at least five situations on which it is necessary to read the label and pamphlet. These are:
- Before buying the product. Selecting the product is easier if the label and pamphlet are read thoroughly before purchasing. Both documents help to identify the appropriate product to treat the problem that the crop presents. Before buying or using a product, the user should recognize the risks or problems that could emerge.
- Before preparing the dosage and the mixture or applying a product. The label and pamphlet have the instructions and warnings about the use of the product; for that reason, it is always necessary to read both documents before preparing the dosage and the mixture or applying a product. This will give assurance that the product is being used correctly.
- Before storing and transporting the product. The label as well as the pamphlet indicate the proper procedures for storage and transportation.
- Before eliminating empty containers. These documents contain the procedures for a correct elimination of empty containers, including triple rinse.
- At the time of an accident or an emergency caused by the incorrect use of a product.

Always remember how important and useful it is to read both the label and the pamphlet!

The instructor should end the unit making a recapitulation. He should evaluate the level of learning of the participants and clarify their doubts.
ONE-BODY LABELS

LABELS IN ENGLISH SHOULD BE INSERTED ON THIS PAGE
TWO-BODY LABELS

LABELS IN ENGLISH SHOULD BE INSERTED ON
THREE-BODY LABELS

LABELS IN ENGLISH SHOULD BE INSERTED ON THIS PAGE
PICTOGRAMMES
CUIDADO
ANTIDOTO: SULFATO DE ATROPINA
SOLVENTE: VASELINA LIQUIDA

ESTE PRODUCTO PUEDE SER MORTAL. SI SE INGERE Y/O INHALA PUEDE CAUSAR DAÑOS A LOS OJOS Y A LA PIEL POR EXPOSICION

“NO ALMACENAR EN CASAS DE HABITACION”
ANTIDOTES ALGUNOS DE LOS NOS, PERSONAS VITALMENTE INCAPACES, ANIMALES DOMESTICOS, ALIMENTOS Y MEDICAMENTOS

SO AGRONOMICO:
ODO DE ACCION: aracolex 5,95 RB, actúa por contacto e gestión.
QUIPO DE APLICACION: aracolex 5,95 RB, viene listo para ser aplicado. La aplicación se hace mediante aplicadores manuales, directamente sobre los surcos del cultivo. Aplíquese uniformemente sobre el terreno, al voleo o en pequeños monoliticos separados 60 cm. entre sí. Se recomienda aplicarlo de preferencia la mañana y no antes de una lluvia fuerte o riego pues sería lavado y/o disminuido el efecto.

FITOTOXICIDAD: Caracolex 5,95 RB no es fitotóxico a las dosis recomendadas.
COMPATIBILIDAD: Caracolex 5,95 RB, se aplica solo.

PRECAUCIONES Y ADVERTENCIAS DE USO: no almacenar el producto y transporte: Conserve y transporte el Caracolex 5,95 RB en su empaque original, etiquetado y cerrado herméticamente. No transportarlo ni almacenarlo junto a alimentos, herbicidas, forrajes y medicamentos. Almacenarlo en un lugar fresco y seco. Manejese con cuidado para evitar derrames. Si ello ocurre, recójalo con una paña y aplíquelo en el cultivo según las recomendaciones del producto.

NO ALMACENAR ESTE PRODUCTO EN CASAS DE HABITACION
MANTENGASE FUERA DEL ALCANCE DE LOS NIÑOS

NO COMER, Fumar O BEBER DURANTE EL MANEJO Y APLICACION DE ESTE PRODUCTO
BAÑESE DESPUES DE TRABAJAR Y PONGASE ROPA LIMPIA

SINTOMAS DE INTOXICACION:
Dolor de cabeza, mareos, temblores musculares, cólicos, vómitos, diarreas, sudoración, tos con flema, en casos severos puede ocurrir edema pulmonar y convulsiones.

PRIMEROS AUXILIOS:
POR INGESTION: Provocar el vómito, estimulando la parte posterior de la garganta con la punta del dedo índice. Repita el estímulo hasta que el vómito fluya claro.

DO A LOS PERIODOS DE CARENCE Y LIMITES DE TOLERANCIA EN LOS CULTIVOS DE EXPORTACION RECOMENDADOS EN ESTE PANFLETO Y CON APEGO A LAS NORMAS LEGALES DEL PAIS PRODUCTOR Y DEL PAIS IMPORTADOR, ES RESPONSABLE EXCLUSIVA DEL USUARIO EN CASO DE DUDA, CONSULAR LAS PUBLICACIONES RESPECTIVAS O AL TECNICOS EN LA MATERIA.

FORMULADO Y DISTRIBUIDO POR:
Bayer S.A., Km. 29.5 Ruta al Pacífico 633-0496, 633-0451, 633-0452 Guatemala, Guatemala

IMPORTADO Y DISTRIBUIDO POR:
• Bayer S.A. Blvd. Bajamar Marbella, Avenida Postal 494 San Salvador, El Salvador 502-278-3000
• RAISA, Km. 65 Carretera Norte, Bodega Bayer, Marqueta, Maracay 522-248-2190

PAIS NUMERO FECHA DE REGISTRO DE REGISTRO

CENTROS DE INFORMACION TECNOLOGICA
PAIS INSTITUCION TELEFONOS
GUATEMALA: Centro de Investigación Técnica 331-2828
3a. Calle 8-77 Zona 1, Estados Unidos, Ciudad
EL SALVADOR: Unidad de Educación 221-3994
Ministerio de Salud Pública y Asistencia Social 221-5151
Calle 10a, No. 307, San Salvador

FRONT BODY

INTERVALO DE APLICACION
De 8 a 15 días.
INTERVALO ENTRE LA ULTIMA APLICACION Y LA COSECHA
10 días.
INTERVALO DE REINGRESO AL AREA TRATADA
Sin restricción.

REAR BODY

ENGLISH LABELS SHOULD BE INSERTED ON THIS PAGE

CropLife • International • Representing The Plant Science Industry
“ALTO LEA EL PANFLETO ANTES DE USAR EL PRODUCTO Y CONSULTE AL PROFESIONAL EN CIENCIAS AGRÍCOLAS

CUIDADO
ANTIOXITO: NO TIENE
SOLVENTE: Dimetil benceno
DENSIDAD: 1.02 g/ml a 25°C

ESTE PRODUCTO PUEDE SER MORTAL SI SE INGIERE Y/O SE INHALA PUEDE CAUSAR DAÑOS A LOS OJOS Y A LA PIEL POR EXPOSICIÓN.

"NO ALMACENAR EN CASAS DE HABITACIÓN" MANTÉNGASE ALEJADO DE LOS NIÑOS, PERSONAS MENTALMENTE INCAPACES, ANIMALES DOMESTICOS, ALIMENTOS Y MEDICAMENTOS"

USO AGRONÓMICO
MODO DE ACCIÓN: PROWl® 50 EC, herbicida selectivo absorbido por raíces y foliáceo translúcida via xilema y fémene. Inhibe tanto la división como la elongación celular en meristemos del tallo y la raíz de las malezas susceptibles.

EQUIPO DE APLICACIÓN: PROWl® 50 EC, puede ser aplicado con equipo manual, terrestre o aéreo. Calibre el equipo antes de aplicar el producto. En aplicaciones aéreas el volumen de cálculo no debe ser menor de 50 litros por hectárea, en aplicaciones terrestres use un mínimo de 200 litros por hectárea. Lave el equipo después de cada jornada de trabajo. Usteo boquillas de abastecimiento.

FORMA DE PREPARACIÓN DE LA MEZCLA:
Llene el tanque hasta la mitad con agua, vierta la cantidad recomendada de PROWl® 50 EC, termine de llenar el tanque mientras agita. Si se va a utilizar una suspensión líquida de otro producto haga una premezcla de proporción 1 a 1 con agua y agregue esta premezcla al tanque con agua (90% de 9 partes) y agite hasta obtener una dispersión total, agregue PROWl® 50 EC al tanque mientras agita y termine de llenar el tanque. Si la mezcla va a ser con un polvo mejore, prepare una premezcla 1 a 2 con agua, añada esta al tanque de agua (80% de 8 partes) y agite para lograr una buena suspensión, agregue PROWl® 50 EC y agite mientras termina de llenar el tanque. Se recomienda que PROWl® 50 EC sea el último compuesto que se agrega al tanque.

RECOMENDACIONES DE USO:
PROWl® 50 EC es un herbicida que combate las siguientes malezas:

| GRAMÍNEAS: | 
|----------|---------------------------------|
| Cenchrus echinatus | Abierto |
| Cenchrus purpureus | Gramo |
| Digitaria horizontalis | Solano |
| Digitaria sagittata | Alondro |
| Echinochloa crus-galli | Barro de indio, Moco de pacote |
| Echinochloa colona | Pola moñuda, verquilla, cruzada de agua |
| Eleusine indica | Pita de galos |
| Digitaria sanguinalis | Jenguá |
| Digitaria sanguinalis | Mazamiquita, Zacate manchado |
| Digitaria verticillata | Zacate dulce, Zacate hondureño |
| Digitaria lasiocarpa | Pejillo, plumilla, Coba de Bueno |
| Digitaria verticillata | Pisto guineo |
| Digitaria sanguinalis | Coba de zorra |
| Digitaria sanguinalis | Zacate johannes |

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ALGODON: Aplique en presiembra incorporado, con doble pase cruzado de rastra de 6 a 8 cm. de profundidad o preemergente inmediatamente después de la siembra, máximo 24 horas después, si el suelo está húmedo o se esperan lluvias. No realizar aplicaciones postemergentes ya que pueden ser muy fitotóxicas al cultivo.

MAIZ: Aplique preemergente, solo o mezcla con atrazina (1 kg/a), en presiembra total al cultivo antes de que envergen las raíces de arroz. El maíz debe ser sembrado a una profundidad de 4 cm.

ARROZ: Preemergente, aplique inmediatamente después de siembra. Dado el modo de acción del producto es indispensible tapar la semilla antes de la aplicación. Nunca se aplique antes de la siembra. El suelo debe estar bien preparado y drenado sin charcos o depósitos de agua. Aplique cuando se esperan lluvias o se va a irgar dentro de los 7 días siguientes a la aplicación. En arroz de riego es recomendable esperar un periodo no menor de 48 horas entre la aplicación y el establecimiento del siguiente riego. En postemergencia temprana PROWL® 90 EC, se puede mezclar con dosis de propanil de 2.5 a 3.8 kg/a, cuando las malezas tengan de 2 a 3 hojas. Es conveniente el uso del ojo compactador de suelo antes de la aplicación, a fin de uniformizar la superficie del mismo y la germinación de la maleza. Para el control de arroces indeseables en arroz de riego, prepare y nivele el suelo, realice un riego de germinación (3 días), drene y aplique 4 litros de PROWL® 50 EC, establece una lámina de agua permanente durante 12 días. Drene el campo y continúe con mojos (mantégalos así de 7 a 14 días). Aplique glicerolato (3 kg/a). Siembre el arroz comercial 2 a 3 días después de aplicar glicerolato. Use semilla pregerminada, tan pronto como el desarrollo del eje lo permita, establece la lámina de agua permanente. En este tratamiento se debe esperar un periodo de 24 días después de la aplicación para poder sembrar.

SOYA Y FRIJOL: Como preemergente aplique inmediatamente después de la siembra (máximo 24 horas después) si el suelo está húmedo o se esperan lluvias. En presiembra incorporada aplique antes o el mismo día de la siembra, a una profundidad de 8 a 8 cm mediante doble pase cruzado de rastra o bien otro implemento que mezcla bien el terbiuado con el suelo.

SARGO: Aplique en mezcla con atrazina (600 -1000 g/a), cuando el grego ha nacido y tiene de 3 a 4 hojas. Aquellas antes de la emergencia del sorgo o cuando este ya está emergiendo, son fitotóxicas, por tanto no deben hacerse. Mejor control de malezas será obtenido cuando las malezas tengan 2 hojas o menos al momento de la aplicación.

CARA DE AZUCAR: En preemergencia absoluta a dosis de 2 a 3 litros por hectárea. En postemergencia se puede usar en mezcla con Terbutrina, Ametrina, Diuron o 2-4-D. En caña saca, el suelo debe estar libre de residuos para que el herbicida pueda llegar al suelo. Si hay interferencia se recomienda una labor de cultivo mecánico para exponer el suelo al tratamiento con herbicidas.

TABAJO: PROWL® 50 EC puede ser aplicado en forma incorporada antes de realizar el transplante.

AJA: Aplique preemergente después de la siembra y antes de la emergencia de las malezas. Para todos los cultivos es necesario una buena preparación del terreno.
INTERVALO ENTRELA ULTIMA APLICACIÓN Y LA COSECHA: PROWL® 50 EC se aplica en el momento de la semilla, por lo cual siempre media un mínimo de 60 días.

INTERVALO DE RIEGOS AL ÁREA TRATADA: Cuando la aplicación sobre la superficie tratada haya sido.

FITOTOXICIDAD: PROWL® 50 EC, puede provocar fitotoxicidad en cultivos como algodón, frijol, soya y maíz, si se aplican cerca o después de su emergencia, y en sorgo si este tiene menos de 7 hojas verdaderas.

COMPATIBILIDAD: PROWL® 50 EC es compatible en mezcla de tanque con Propanil, 2,4-D, Atrazine, Duron, Fluometuron, Graminóides hormonales y sulfonilureas. PROWL 50 EC puede ser mezclado con insecticidas pirétricos, organofosforados y carbamatos. No es compatible con productos alcalinos.

PRECAUCIONES Y ADVERTENCIAS DE USO: ALMACENAMIENTO Y TRANSPORTE: No almacene ni transporte con alimentos, ropa, medicinas ni animales. Manténgase en su envase original lejos de la luz directa del sol. Almacene el producto bajo llave, en un lugar seco y fresco, alejado del calor o del fuego. No es corrosivo. Es inflamable.

NO ALMACENAR ESTE PRODUCTO EN CASAS DE HABITACIÓN: MANTÉNGASE FUERA DEL ALCANCE DE LOS NIÑOS.

NO COMER, FUMAR O BEBER DURANTE EL MANEJO Y APLICACIÓN DE ESTE PRODUCTO: BAÑENSE DESPUÉS DE TRABAJAR Y PONGASE ROPA LIMPIA.

SÍNTOMAS DE INTOXICACIÓN: cansancio, sudor excesivo, sed e insomnio. En casos severos hay un aumento de ansiedad, inquietud y aumento en el ritmo respiratorio y latidos del corazón.

PRIMEROS AUXILIOS: POR INGESTIÓN: No provoque el vómito porque puede causar neumátasis química o edema pulmonar al aspirarse. Lleve el paciente al médico. POR INHALACIÓN: Retire a la persona del área contaminada y llévela a un lugar limpio y ventilado. POR CONTACTO CON LOS OJOS: Si cae en los ojos, lave con suficiente agua durante 15 minutos. POR CONTACTO CON LA PIELE: Si cae en la piel quita la ropa contaminada y dé un baño con suficiente agua y jabón, poniendo especial atención en el pecho, orejas, el ombligo, las uñas y la ingle. Lave con una esponja suave.

NUNCA DE A BEBER NI INDIUZCA EL VOMITO A PERSONAS EN ESTADO DE INCONSCIENCIA.

ANTIDOTO Y TRATAMIENTO MEDICO: No hay antidoto. Dar tratamiento sintomático, siempre que sea necesario, según el cuadro clínico del paciente.

CENTROS NACIONALES DE INTOXICACION:

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<tr>
<td>GUATEMALA</td>
<td>Centro de informacion y Asistencia Técnicostológica</td>
<td>2513550 - 2320735</td>
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<td>BELICE</td>
<td>Centro de Intoxicaciones Karl Husner Memorial Hospital</td>
<td>231548 y 236939</td>
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<tr>
<td>EL SALVADOR</td>
<td>Ministerio de Salud Pública</td>
<td>221-0966 ext. 140</td>
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<tr>
<td>HONDURAS</td>
<td>Secretaria de Recursos Naturales</td>
<td>311006</td>
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<tr>
<td>NICARAGUA</td>
<td>Centro Nacional de Toxicología</td>
<td>289-4514</td>
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<td>COSTA RICA</td>
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REAR BODY

LABELS IN ENGLISH SHOULD BE INSERTED ON THIS PAGE

CropLife • International • Representing The Plant Science Industry
PLANT PROTECTION PRODUCTS: RISKS TO HUMAN AND ENVIRONMENT

6.1 RISKS FOR HUMAN

6.2 RISKS FOR ENVIRONMENT
UNIT # 6.1 RISKS FOR HUMANS

UNIT REVIEW

The participants should understand that when one is constantly working with plant protection products, it is necessary not to forget and to follow the warning and precaution measures that appear in the label and the pamphlet; on the contrary, accidents may occur.

For this reason, it is essential to know, the danger that involves the use and management of plant protection products; the way how these can enter to the human body, the different absorption grades in the skin; the signs and symptoms of an intoxication associated with the main chemical groups someone works with; the types of intoxication that may occur (acute, retarded and chronic), and the First Aid that can be given in the case an intoxication occurs. This knowledge would allow preventing and avoiding accidents that could have fatal consequences.

The main titles of the subjects in this workshop:
A. Risks or associated dangers to plant protection products.
B. The media lethal dosage (LD50).
C. Ways through which the plant protection products enter to the human body and absorption grades in the skin.
D. Signs and symptoms of intoxication by the more common chemical groups.
E. Types of intoxication: Acute, retarded and chronic.
F. First Aid in case of intoxication.

OBJECTIVES

At the end of the activity, the participants would be capable to:
- Recognize the dangerous categories that identify the different plant protection products.
- Identify and recognize the risks to which they are exposed when they use plant protection products;
- Recognize the routes through which the plant protection products enter to human body;
- Understand the different absorption grades of the skin when this is exposed to plant protection products.
- Recognize the different signs and symptoms of an intoxication provoked by plant protection products;
- How to provide First Aid when an intoxication with plant protection products occurs.

REQUIRED TIME
STEP # 1 PRESENTATION AND DISCUSSION: HUMAN RISKS ASSOCIATED TO PLANT PROTECTION PRODUCTS.

The plant protection products are useful for the control of pest organisms, but used in an inappropriate way causes accidental and occupational intoxications, besides of the intoxications and death for intentional ingestion with suicide purpose.

The previous situation proves that the plant protection products used in an irresponsible manner may be dangerous, the way to identify the toxicity of the plant protection products, consist in identifying the colour band in the labels, thus the red band means extremely or highly dangerous; the yellow, moderately dangerous; the blue, lightly dangerous and the green of very but very low danger. Also the pictogram’s and warning phrases in the labels and the pamphlets.

For the instructor: Organize a discussion about intoxication experiences with plant protection products. Ask any of the participants if any of them has been intoxicated with these products, or if they know someone that has suffered this type of experience. Motivate them to talk and discuss their experiences. During the discussion, determine if the people involved knew that it was an intoxication, or if they recognized the signs and symptoms and did not know how to act.

STEP # 2 PRESENTATION: LD50

All plant protection products represent a risk or danger of intoxication or death, but some of them are more dangerous than others, to determine the endanger (toxicity) of these products, scientists achieve experiments with animals such as: rats, mice, rabbits, guinea pigs, dogs and hens. In these experiments the scientists determine the quantity of product that is necessary to kill half (50%) of the treated animals. This quantity is called the media lethal dosage and is used to assign the danger band to the plant protection products. It is important to know, that when less the dosage is, the product endanger is higher.

For the instructor: accomplish a summary getting as a result, the following conclusions:

- Incorrectly use of plant protection products may cause intoxications and possibly death.

- The LD50, permits to classify the plant protection products from high to low danger.
WAYS TO DETERMINE THE LD50

Oral

Dermal

Inhaled
STEP # 3 PRESENTATION AND DEMOSTRUCTION: ROUTES THROUGH WHICH THE PLANT PROTECTION PRODUCTS ENTER TO OUR BODY ABSORPTION GRADES BY THE SKIN.

There are four ways for a plant protection product enter to the human body: By the mouth (orally); by the nose and the mouth (inhalation); and through the skin (dermal) and by the eyes. The entrance by the mouth, is the less probable route, but it can be particularly dangerous; nevertheless, the precautions to avoid it are simple:

Neither eat, nor drink, do not smoke with the hands contaminated by these products.

Do not store plant protection products in bottles of drinkable products or food containers.

Do not transport or store the products together with the food, to avoid contamination.

Keep away the rodenticide baits and the treated seeds from the food, to avoid accidental consumption.

The inhalation could be dangerous, when very volatile products are used in closed environments or because the application method produces liquid or solid particles, quite fine can be inhaled. The use of respiratory masks and to accomplish the applications in appropriate hours are precautions that must be considered.

The most probable contamination is through the exposed skin. It can occur not only by the effect of a spilled or splash of a concentrate or a mixture, but also using contaminated clothing, the use of defective equipment or by continuous exposition to the pulverization. These products pass rapidly from the clothing to the skin and can enter the organism inclusive, through healthy skin and without wounds. The eyes, mouth, tongue and the genital region are zones particularly vulnerable. During hot weather, special measures should be taken due that the sweat increases the absorption capacity by the skin.

For the instructor: Use illustrated sheets where the penetration routes of plant protection products are signed, and the different absorption grades by the skin. Help yourself with the enclosed sheets.
BODY ABSORPTION ROUTES

- Eyes
- Nose
- Mouth

SKIN
SKIN ABSORPTION GRADES

35% Skull
40% Forehead
50% Ear conduit
20% Abdomen
8% Forearm
10% Palm
99% Scrotum
15% Foot
STEP # 4 PRESENTATION: SIGNS AND SYMPTOMS OF INTOXICATION.

When an intoxication occurs, there are many indications that allow recognizing it, those indications, are known as symptoms and signs. The symptoms are sensations that only the intoxicated person can feel, for example: headache, anxiety, blurry vision, etcetera. The signs are manifestations that occurs in the patient but can be observed by a second or more persons, as for example: sweating, corporal tremors, vomits, etc. The symptoms and signs of a light intoxication include: headache, fatigue, dizziness, blurry vision, sweating, nausea, vomits, abdominal cramps, salivate and contractions (dwarf) of the pupils. A moderately serious intoxication, besides the previous symptoms, can produce indisposition and chest pressure, the pupil’s contraction, low cardiac rhythm, muscular tremors, confusion, lack of muscular coordination, difficulty to speak and Psychosis (strange and maniac behaviour). The mortal intoxication can have many manifestations that includes faecal and urinary incontinence, heart irregularities and deteriorated respiratory function.

For the instructor: present a story about an intoxication experience that allows distinguishing symptoms of signs. Ask the participants to distinguish these signs and symptoms. Clear doubts. Present the enclosed material.

An 18 year old worker asked for medical attention to the health by nausea, dizziness, salivation, blurry vision, respiratory difficulty, weakness and uneasiness for two hours of duration. He informed that he started the plant protection products application at six O’clock in the morning, at seven drank water from a water bottle, he ate a pair of tortillas with beans. An hour later he began with discomfort, reason why he decided to suspend the application and consult a health.
SLIGHT SIGNS AND SYMPTOMS

tired
headache
dizziness
sweaty

blurry vision
vomiting
cramps
stomachache

MODERATE SIGNS AND SYMPTOMS
DANGEROUS SIGNS AND SYMPTOMS

difficulty to breathe

unconscious
dripping nose and slobbering
STEP # 5 PRESENTATION: TYPES OF INTOXICATION.

The provoked intoxications by plant protection products are of three types: acute, retarded and chronic. The acute intoxications, are of short term. A person can intoxicate entering in contact once or many times in less than 24 hours with the plant protection products. The symptoms and signs of intoxication develop rapidly. The retarded occur by frequent expositions, repeated to the plant protection products during periods of many days or weeks. The symptoms and signs appear in a light intermittent manner or after months of expositions. The chronic intoxications that show in a long term due to the plant protection products accumulation in certain tissues and body organs, until long time later, inclusive years the intoxication symptoms appear. All persons that use plant protection products must recognize which are the symptoms and signs of intoxication by chemical groups with which they work, reason why here are described:

Intoxications with organochloride: The first symptoms and signs are: General pain, headache, irritability, dizzy, nausea, vomiting. Later the intoxicated person might present involuntary muscle contractions, tremors, respiratory difficulty, convulsions and enter in a state of comma.

Intoxications with organophosphorus and carbamates. At the beginning the following effects are observed: headache, dizzy, fatigue or tiredness, blurry vision, excessive sweating, abundant saliva, tearing, stomach ache, diarrhoea, nausea and vomiting. The subsequent steps are characterized because the patient presents weakness, incapacity to walk, chest pain, contractions and muscle spasms, contracted pupils that do not react to the light. The final step comprehends the following characteristics: Loss of reflections, unconsciousness, breathing difficulty, involuntary urinate and defecate and death comes if medical treatment is not administered.

Intoxications with pyretrines and pyrethroids. The first symptoms that the intoxicated person show are: tingling in the eyelids and the lips, conjunctive and mucous irritation, sneezing. Afterwards he presents intense itching, skin stains secretion and nasal obstruction, excitation and convulsions.

Intoxications with bypiridiles. In the intoxicated person it might produce skin irritation, irritation of the conjunctives, general discomfort, weakness, sores and burns in the mouth, abdominal pain, respiratory failing, thirst, bleeding nose, lung, kidneys and liver damage.

Intoxications with herbicides of the phenoxi group. The acute intoxications with herbicides of the phenoxi group at the beginning provoke loss of appetite, irritation of the exposed skin, dizziness and intestinal tract irritation. Later, the intoxicated presents exhaustion, vomiting, thoracic and abdominal pain, muscle tremors, mental confusion, convulsions and comma.

For the instructor: Use the illustrated sheets that appear in this presentation, they will help you in the teaching process.
Signs and Symptoms of Organochloride Intoxication

General discomfort
Headache
Dizziness
Vomiting
Nauseas
Tremors
Convulsions
Comma
Lack of breathing
Signs and Symptoms of Organophosphorus and Carbamates Intoxication

- Headache
- Dizziness
- Blurry vision
- Vomiting
- Nauseas
- Stomach Cramps
- Contracted pupils
- Abundant saliva
- Breathing difficulty
- Transpiration
- Tremors
- Diarrhoea
- Weakness
- Convulsions
- Comma
Signs and Symptoms of intoxication by Pyretrines and Pyrethroids

Tingling:
- in eyelids
- in lips

 Conjunctive and mucous irritation

Sneezing

Intense itching

Spots in skin

Secretion and nasal obstruction

Excitation

Convulsions and comma

Lack of breathing
Signs and Symptoms of intoxication with Bypiridiles

- Skin irritation
- Conjunctive irritation
- General discomfort
- Weakness
- Sore spots and burns in the mouth
- Abdominal pain
- Respiratory failure
- Thirst
- Bleeding nose
- Lungs, kidneys and liver damage
Signs and Symptoms of intoxication with Herbicide of the Phenoxi Group

Appetite loss
Skin irritation
Dizziness
Intestinal tract irritation
Exhaustion
Nauseas y vomiting
Thoracic and abdominal pain
Muscular tremors
Mental confusion
Convulsions and comma
Lack of breathing
STEP # 6 PRESENTATION AND SIMULATION: FIRST AID IN CASE OF AN INTOXICATION WITH PLANT PROTECTION PRODUCTS.

The First Aid consist in the help that a person that is not a doctor could give to an intoxicated person with plant protection products, with the purpose of:

- to preserve his life
- to prevent health deterioration, and
- to promote the recuperation

It is convenient to remind that First Aid are useful to help and relieve the intoxicated person until he or she reaches medical assistance. First Aid cannot replace medical support.

The procedures of specific First Aid, according to the entrance route of the plant protection product to the organism, is described as follows:

**Intoxication by dermal via:**

- Act with quickly avoiding the auto contamination during the procedure.
- Remove the intoxicated person of the area where the accident occurred (stop the exposition).
- Take off the contaminated clothing.
- Shower the intoxicated or wash the skin completely with water and soap.
- Ask for medical help and must carry the label and the pamphlet.
Intoxication by respiratory via:
- Act quickly avoiding to auto contaminate
- Remove the intoxicated person of the contaminated area
- Loosen the clothing of the intoxicated or take it off if it is contaminated, the skin must be washed with water and soap.
- Help the intoxicated person with artificial respiration or with oxygen by nasal via, if it is necessary.
- Ask for medical help and carry the label or the pamphlet.

Intoxication by oral via:
- Act quickly, stop the exposition, take off the contaminated clothing and shower the intoxicated person,
- Induce to vomit if there is no contraindication in the label or the pamphlet;
- Give a drink of activated coal suspension (3 pills of activated coal in half glass of water)
- Ask for medical help and carry the label and the pamphlet.
**Intoxication by ocular via:**
- Wash quickly any splash that occurs in the eyes during 15 minutes; with plenty of clean water, every ten seconds, must turn over the eyelids. Avoid contaminating the other eye.
- Cover and immobilize the eye using a clean and dry cloth.
- Ask for medical help, carry the label and the pamphlet.

In all cases of intoxication it is necessary to determine the causes that occasioned the accident, to execute the pertinent corrections.

**For the instructor: Consult the document: First Aid: Procedures” that appears in annex 02, so that better options could be proposed. Organize work groups and assign them an intoxication by plant protection products case so they achieve a First Aid simulation.**
UNIT 6.2 RISKS TO THE ENVIRONMENT

UNIT REVIEW

In this unit, the housewives would have the opportunity to know the environmental dynamic of plant protection products when they are applied over their crops. They would recognise that when a plant protection product is applied, many things may occur. At times, the products reach to the area that is going to be treated and keeps in it for a long time, producing residuals over the treated vegetables contaminating the food. Nevertheless, in other occasions, the product disappear rapidly after its application because it introduces in the environmental dynamic, whether it is evaporated, towards the atmosphere, leached, towards the subway waters; drained towards the superficial waters; absorbed or adhered to the soil particles; photolysed by the solar light action, etc; provoking air, soil and water contamination. In other occasions, the product does not even reach the designed treated area, on the contrary, it suffers dragging by the air currents and deposits in not desired areas, contaminating other environments. Besides they would know that the incorrect use of plant protection products might increase the resistance problem of the pest’s organisms and the population destruction of benefice organisms. To complement the process of teaching-learning would know some measures and actions that may be followed to diminish the undesirable effects or the plant protection products in the environment.

The titles of the main subjects are:
A. Environmental dynamic of plant protection products (Forms of how the products degrade)
B. Plants, water, soil, and air contamination;
C. Problem of resistance and destruction of the benefice organisms;
D. Measures to diminish the environmental impact.

OBJECTIVES

At the end of the activity, the participant housewives would be in capacity of:
- Identify and recognise the processes that implicate the environmental dynamic of plant protection products when being applied;
- Recognise the manners how the plant, water, soil and air contamination occur;
- Identify and recognise the processes by which, plant protection products can be degraded in the environment.
- Recognise the problem of the resistance and destruction of the benefice organisms;
- Take measures and actions to diminish the undesirable effects derived of the use of plant protection products
STEP #1 PRESENTATION: ENVIRONMENTAL DYNAMIC OF THE PLANT PROTECTION PRODUCTS.

When plant protection products are applied, the objective is to contact these substances with the organisms that have reached its pest condition in most of the cases. A minor percentage of 5% enters in contact with the pest and a 95% remains in the environment. These products that remain in the environment start to be degraded by the action of diverse biotic and abiotic processes, for example: can be putrid by the action of the light, water, air and by diverse organisms, also can be adhered, vaporised, leached, drained and have a different destiny as planned initially, provoking contamination of other environments. Everything mentioned before constitutes the environmental dynamic for the plant protection products. To understand this dynamic, is very useful to know and predict the environmental risks that implicates the use of those products, likewise to adopt the measures and actions that permit to reduce or minimize them.

For the instructor: use the pictures that show the different stages and processes involved in the environmental dynamic of the plant protection products that appear in the next pages.

STEP #2 PRESENTATION: PLANTS, WATER AND SOIL CONTAMINATION; AND SOME ACTIONS TO MINIMIZE IT.

Many times the plant protection products have a different destiny that the one initially planned, that way provoke water, soil and air contamination. Likewise provoke contamination in our crops when we spray them with the purpose of protecting them from the pest organisms.

**Plant contamination:** The plant protection products can reach to the plant surface through some of the following actions, whether if it is in an individual or combined way: direct application, drag or drift effect, residual precipitations that are in the atmosphere and the irrigation with contaminated waters with rests of these products, once they reach the plants surface are metabolised and transformed, to activate or deactivate, increase or diminish the capacity of producing toxic effects for the same plant or for other organisms and contaminate the vegetables that we consume, making them no apt for its consumption, because they contain residual levels that surpass the maximum limits of residuals permitted and established by Comité Conjunto del Codees Alimentarius FAO/OMS. Some actions that can reduce this risks are: Use plant protection products that are authorized by the competent organism that watches for the harmless food; respect the lacking periods; avoid the crossed recontamination of other agricultural fields; application in adequate hours, to avoid drift and drag of contaminants; use good quality water, etcetera.

**Water contamination:** The contamination of superficial and underground waters with plant protection products can be provoked by various actions and/or processes, for example: direct applications, drift or drag during the application; deposit of soil.
particles with remains of adhered products; drag of superficial layers of contaminated soils, wash dawn by rainwater; wash of application and protection equipment in superficial water fountains (rivers, lakes, ponds, etc) leaching of product residues localized in the application surface, etcetera. The establishment of mitigation areas is very important to avoid the contamination of water fountains, channels and irrigation ditches; the methods of soil management and conservation, also reduces the risks by this type of contamination to occur. To minimize these risks, must be followed the precaution measures and management that are offered in the label and pamphlet of the plant protection products.

Soil contamination: Soil is the final receptacle of residuals of plant protection products as water contamination, the actions and processes that take part in its contamination are the same.

Air contamination: The dynamic of plant protection products leftovers in the atmosphere is influenced by the product concentration in the air, the temperature, the wind, the product volatility, and other physicist-chemical characteristics. Processes as the evaporation, eolic erosion and the drift, are responsible for contamination. Some useful actions to reduce these risks are: to make the application in the freshest hours and without much wind, select products of lower volatility, select application technologies that reduce the drift and drag, etcetera.

For the instructor: use pictures that allow illustrating these types of contamination. Ask the dealers about actions that can be done to minimize the environmental contamination. If it is possible make them all give new ideas.

STEP # 3 PRESENTATION: RESISTANCE PROBLEM AND DESTRUCTION OF BENEVOLENT ORGANISMS

Other of the environmental problems derived of the misuse of plant protection products, and that has repercussions over the control possibilities of pest organisms, are the resistance and the destruction of benevolent organisms. The application of plant protection products in a repeated manner, the dosage increment, the decrease of intervals between one application and other, the product mixture, the dependence of a unique control alternative, propitious the selection of pest organisms that can tolerate or resist higher dosage than the required to kill the majority of the population, at the same time destroys and/or reduces the benevolent organisms population. To manage the problem of resistance and destruction of population of benevolent organisms, the IPM adoption, the selective use of plant protection products and the guidance recommendations that appear in the label and the pamphlet would be some of the actions to follow.

For the instructor: make reference of experiences in which resistance is being reported, ask the dealers for this kind of experiences, make conclusions. Finish the activity with a summary.
The environmental destination of a chemical compound:

- photodegradation in soil surface
- washed by rainwater
- microbial degradation
- leaching
- plant absorption and transposition
- soil adsorption and desorption
- chemical degradation
- volatilisation
UNIT # 7

RISKS, RESPONSIBILITIES, HYGIENE, HEALTH AND SAFETY OF THE DEALERS OF PLANT PROTECTION PRODUCTS.
UNIT # 7 RISKS, RESPONSIBILITIES, HYGIENE, HEALTH AND SAFETY OF DEALERS OF PLANT PROTECTION PRODUCTS.

UNIT REVIEW:

The dealers are a group of workers that with frequency are selling, transporting, eliminating and storing plant protection products. In these activities, they often get in direct contact with the products, reason why they are exposed to suffer any intoxication type, for these reasons in this unit the dealers would learn to take in mind the necessary precaution measures to reduce the risks of suffering an intoxication, they would know the clothes and the necessary equipment to protect themselves in the execution of these activities and the personal hygiene measures that should be practiced before, during and after having used plant protection products. Thus they would know the protection equipments that could be recommended to their clients.

The titles of the main subjects are:

A. Risks that may face during the process of manipulation and management of plant protection products.
B. Responsibilities that should be assumed during the manipulation and management of plant protection products.
C. Hygiene, health and security of persons in charge of stores and/or dealerships.
D. Wash and maintenance of the clothes and protector equipment.
E. Clothes and protector equipment that could be recommended to clients.

OBJECTIVES

At the end of this activity the dealer would be in capacity of:
- Identifying the risks to which he is exposed when managing and manipulating plant protection products.
- Knowing and using precaution measures, security and personal hygiene necessary to manage in a responsible form the product to avoid intoxications;
- Knowing the parts of the clothes and the personal protection equipment that can be used and/or recommend to their clients;
- Using the clothes and the personal protection equipment in the correct form;
- Manufacturing some parts of the personal protection equipment (Screen, back protector);
- Washing in a safe way and give maintenance to the clothes and personal protection equipment.

TIME REQUIRED

60 minutes
STEP # 1 PRESENTATION AND DISCUSSION: RISKS

The manipulation of many plant protection products could be potentially dangerous, especially if the equipments has been poorly designed, or if the maintenance is deficient, or if the operative procedures do not satisfy the minimum requisites.

The principal dangers are: intoxications, fire and environmental contamination for spills.

**Intoxication:** The intoxication can be caused by absorption of plant protection products through the skin, by vapour or inhalation of powder of these products, or less by ingestion of the same. The contact of the product with the skin is the most common cause of poison. It is more common than it should be, partly because people frequently do not notice that have been in contact with pesticide (perhaps through torn dresses or internally dirty) that’s why they don’t give remedy, and partly because, even though they know about the contact, they think they only run the risk when they have the skin injured or wounded. In effect, many plant protection products whether they are liquid or in powder, they penetrate easily to the blood system, through the skin perfectly healthy. The eyes and around the genital organs are particularly vulnerable.

The inhalation is one of the most rapid ways of intoxication. This is due that the vapours and powders passing rapidly from the lungs to the blood system. The ingestion is the less common cause of accidental intoxication and, when it happens, is because people have carried foods and drinks to the working area, or have been smoking with contaminated hands.

**Fire:** The same as many chemical products, some plant protection products or its ingredients constitute a risk of fire. Other could be flammable when rotten. Due to the big quantities of these products in many stores, the fire consequences can be serious.

**Environmental Contamination:** The most probable risk of environmental contamination comes from the accidental spills or leakage of these products. There exist a particular danger as a consequence of a fire, when contaminated water is used to extinguish a fire and is poured in the drainage and to the pluvial vials with detrimental consequences.

For the instructor: Prepare the enclosed illustrations to accomplish this presentation.
THE SKIN IS NOT A BARRIER FOR PESTICIDES

IT IS NOT ALLOWED TO EAT, DRINK OR SMOKE IN THE WORKING AREAS

WATER OUTLETS TO EXTINGUISH A FIRE CAN PROVOKE ENVIRONMENTAL CONTAMINATION

SPILLS CAN CONTAMINATE THE ENVIRONMENT
STEP # 2 PRESENTATION: RESPONSIBILITIES, THE DATA FORM OF PRODUCTS PROPERTY AND/OR ITS LABEL.

Responsibilities: The store and/or dealership manager should become aware that he is responsible of the following:
- The occupational health of all permanent and temporal employees.
- The industrial hygiene and the store security.
- The environmental protection.

The responsibility of the different phases of an operation could be delegated to the subordinates well trained and considered, but they must perfectly know which their responsibilities are.
The data form of the products and/or labels: Due to each plant protection product formulated and each of its ingredients have specific properties, the supplier should supply a product data form, of each product or ingredient or its label.

The product data form should have at least: Physical and chemical characteristics, security information and instructions, instructions about the product managing, recommendations with respect to the protection equipment, cleanliness instructions, residuals decontamination and elimination, first aids measures, information for doctors, information for the firemen and other information sources. Most of this information comes in the label.

During the managing of these products, the instructions of the data form or the label should be followed.
STEP # 3 PRESENTATION: THE HYGIENE, HEALTH, AND SECURITY OF THE PERSON IN CHARGE OF DEALERSHIP AND/OR WAREHOUSE.

**Occupational health and first aid:** Clinical tests to new employees, are recommended for all permanent and temporal personnel working with plant protection products. When plant protection products of the chemical group’s organophosphorus and carbamates are managed, the original levels should be determined from the blood cholinesterase of all employees, before the exposition. These levels should be periodically examined and should be done by a qualified hospital or laboratory.

The level of the cholinesterase activity should be interpreted by a physician, but the following guide can help:

- In a decrease of more than the 20% of the initial value of the cholinesterase activity the cause should be investigated.
- A cholinesterase decrease of more than the 40% of the initial value indicates that the respective worker should move away from the area to avoid further phosphorus and/or carbamates expositions.

The employees should not be exposed again to inhibitor products of the cholinesterase, until the new analysis show that the cholinesterase activity in the blood is of the 20% of the initial value that they had before the first contact with the cholinesterase inhibitors. There must be an agreement with a local hospital or with a physician to attend any emergency in case of an accident.
Protective and emergency equipment:
Clothes and personal protection equipment; for routine works, the following protection
elements should be available.

Undoubtedly, the installation type and the work type to be done, are determinant to
decide which of the articles illustrated above should be used.

Emergency equipment; for emergency situations the following equipment is
recommended:

- Emergency shower and a device to wash the eyes
- Clothes and personal protection equipment
- Equipment against fire and spills
- First-aid kit and signposting
Showers and dressing rooms: the places to change clothes and wash the hands should be provided by separate wardrobe for normal dresses and work dresses. It should not be allowed the worker to go home with the working clothes. A separate and clean environment should be available for the worker, where they can eat, drink or smoke. To eat, drink or smoke should not be permitted in working areas. The working clothes should be washed with frequency.

Equipment against fire and spills: should have equipment against fire and spills, which should include: extinguishers, a water fountain, sand, land, which should be located strategically.
Signs: Signs indicating smoking prohibitions, restricted accesses, location of emergency equipment and evacuation routes, should be placed in visible places and in a prominent form.

Every equipment related with security and emergencies should be reviewed and maintained in a regular and frequent manner, to be sure it is in good functioning shape. The personal protection equipment should be decontaminated and cleaned after its use. A control record and maintenance done to this equipment should be kept.

STEP # 4 PRESENTATION: CLOTHES WASH AND MAINTENANCE AND PROTECTION EQUIPMENT

The clothes and personal protection equipment should be kept in good conditions, so it does not have holes or worn out parts from where the product can contaminate the skin. The boots should be inspected frequently to check they are not damaged or need to be repaired or replaced according to the case. The clothes and the other parts of the equipment should be washed at the end of each working day with water and soap with preference at the work site or in a contracted laundry.
STEP # 5 PRESENTATION AND DEMONSTRATION: TYPES OF CLOTHES AND PROTECTION EQUIPMENT THAT FARMERS CAN USE.

It is important that the person in charge of the store and/or dealership knows the clothes and personal protection equipment that could recommend to farmers, reason why some of them are presented:

For the instructor: End the unit and make a recapitulation. Make questions to the participants. Clear up doubts if there are some
SPECIFICATIONS FOR THE PROTECTIVE SUIT

OBJECTIVE
Protect the worker when pouring, mixing, loading and applying plant protection products; when advisable take precautions in hot climate conditions.

BASIC REQUIREMENTS
Protection to an ample gamut of plant protection product formulations. Long lasting, comfortable, light and cheap.

DESIGN
The two-piece protective suit (shirt and pants) provides enough ventilation at the same time keeps its protective properties. It permits the maximum flexibility to the user, so that one piece or both can be used separately, depending on the type of work and the application method.
The upper part of the suit can be opened or closed by the sides by tying the waist and elastic wrists. The pants should be of a simple cut and with the classical waist. The picture shows the suit dimensions, and these can vary according to the average height of the country people where it is used.

MATERIAL
100% cotton of 110 to 150 grams/square meter of weight. The fitting material is cotton since the field evaluations have shown its protection, being the most comfortable material and long lasting compared with other light and synthetic protection materials. It can be obtained for accessible prices.

ALTERNATIVES
Appropriate alternative materials include those combinations of polyester, cotton and not woven polypropylene that are as comfortable as cotton. It is not as lasting as cotton therefore, they should be replaced with more frequently according to the type of work accomplished.
An alternative could be the PVC or polyethylene one-piece suit (with or without sleeves) with side openings. This suit has the advantage that provides additional protection in case that a backpack sprinkler is damaged. They can be used in sporadic cases, as a temporal and economic measure, bags or clean empty plastic sheets. If the one-piece suit specifications are executed, even though variations may exist.

ADDITIONAL INFORMATION
The suits that is shown in the pictures, are not normally at the disposition of the manufacturers, so any person can make it according to the specifications.
TWO PIECE PROTECTIVE SUIT

(All dimensions in centimeters)
ONE PIECE SUIT
PROTECTIVE MASK

(All dimensions in centimeters)

FOAM BAND
28 cms long (in the back)

SUBJECTION STRIPE (VELCRO TYPE)
28 cms long (in front)

FLEXIBLE ACETATE
(FRONT)

ROUNDING EXTREME

*SPONGE

HEIGHT LATERAL

2.5

28

47

2.5
UNIT # 8

PURCHASE, TRANSPORTATION, STORAGE AND ELIMINATION OF EMPTY CONTAINERS OF PLANT PROTECTION
UNIT # 8 PURCHASE, TRANSPORT, STORAGE AND ELIMINATION OF EMPTY CONTAINERS FOR PLANT PROTECTION PRODUCTS.

UNIT REVIEW

In this unit, would remember the dealers the importance of identifying the pest’s organisms that exist in the cultivated fields; before the selection of the most adequate plant protection product. Then they would learn and recognise, that at the moment of the purchase, must assure that the products are in good conditions and are originals. They would also learn the rules to accomplish safe transportation and storage of plant protection products, thus the correct elimination of residuals.

The titles of the main subjects are:
A. Purchase of the adequate product
B. Rules for the correct transportation
C. Rules for the correct storage
D. Rules for the correct elimination of residuals

OBJECTIVES

At the end of the activity, the participant dealers would be in capacity of:
- To remind her husband and other members of the family, the importance of selecting and acquiring the most adequate plant protection product to the phytosanitary problem in their crops.
- During the purchase be able to examine the condition of the containers of plant protection products (label, guarantee seal, etc.)
- Transport the plant protection products in a correct and safe way;
- Store the plant protection products in a correct and safe way, and
- Eliminate the correct way the empty containers, residue and remainders of plant protection products.

TIME REQUIRED

45 minutes.
STEP # 1 PRESENTATION: PURCHASE OF THE ADEQUATE PRODUCT

Before buying a plant protection product, it is important to identify the phytosanitary problems that exist in the crop. To be sure that the selected product is the correct one, it is convenient to ask specialists in this matter for advice. Before using the product the label and the pamphlet instructions should be read carefully.

At the moment of the purchase, examine that the products is original, that the container is correctly label and is not in bad condition (poured and/or dented), and besides make sure it has a guarantee seal.

Do not accept damaged containers (broken or poured) or that are not the manufacturer’s originals, or that are inadequately tagged; since this may provoke problems during the transportation, use and storage. Remember that the repacking of plant protection products is an illegal activity.

For the instructor: Use illustrated sheets or photographs, where the correct and incorrect is presented. Ask questions to the dealers and analyse their answers. Motivate their participation. You can help yourself with the enclosed visual material.
STEP # 2 PRESENTATION: RULES FOR THE CORRECT TRANSPORTATION

In order that the transport operation is as safe as possible and to be able to react efficiently in case of an accident; in the dealings and places where the farmers or other members of the family buy plant protection products, the following norms must be followed, paying special attention and assure that no persons or their belongings and food products are in risk for leaks or contaminated containers.

Separation between passengers, cattle and merchandise. Whenever it is possible, plant protection products should not be loaded in vehicles that transport passengers, animals, foods and other substances for human or animal consumption. If this is not possible, then separate the plant protection products as much as possible, from the passengers and of the rest of the luggage.

Safe load. Load and unload plant protection products containers carefully. Never put over them heavy merchandise that might flatten the containers, nor throw them from the height. Surpassed nails, metallic stripes and splinters of wood that might exist in the vehicles, can perforate the containers and produce spilling; all these obstacles should be eliminated before loading. After the unloading, the vehicle should always be cleaned.

For the instructor: Follow the indicated procedure in the previous step.
STEP # 3 PRESENTACION: NORMS FOR SAFE STORAGE

The plant protection products are expensive merchandise that could be damage and remain useless, inclusive they can be dangerous if they are not stored in the adequate conditions. Read the label and the pamphlet and follow the storing instructions, avoid especially extreme temperatures, it is safe to do so. It is necessary to plan the purchases with care, to reduce the storing time and avoid residuals. The storing places should be safe, out of the reach of the children and no authorised persons, animals, foods and water fountains. The food and drinks containers should never be used to keep these products.

Construction of dealerships and warehouses

If it is possible, the warehouses for plant protection products should be located in a high piece of land, to avoid floods and with water proof roofs. The floor should be impermeable and without cracks and easy to clean, they should be designed to hold back and contaminated water used to stop fire, for example with a 15 centimetres. If it has drainage, these should not be directly connected to the public collectors, but to an individual deposit. The warehouses should be well ventilated, to avoid high temperatures and humidity that could damage the plant protection products. With this measures is also avoiding the vapour accumulation.

The rats can destroy bags and boxes, that’s the reason way the warehouses should be protected from them, for example sealing all the holes with a metallic cloth or metallic bars.
At the arriving time all merchandise should be carefully checked, its identification, quantity and condition. When a merchandise is not in good condition, or for any reason it could be dangerous, the appropriate safety measures should be taken.

The stock of this products should be methodically ordered and marked clearly so that they can be identified or inspected easily, the containers should be vertically stored and the pile height should be limited to avoid damaging the containers by crushing them. The containers should be stored over platforms, not directly over the ground, and away from the walls to allow ventilation. An adequate space between the walls and piles should be left, also between the pile rows to allow an adequate air flow, give access when inspections are done and handling emergency cases. Special careful should be taken avoiding the mixture of products that could increase the danger. The contamination of insecticides or fungicides by herbicides or growth regulators, can cause sever damage to crops. Solid formulations should be stored separately from the liquid ones; physical separation of flammable liquids, oxidative materials and potentiality unstable ones is also needed.

As a general rule, the older product should be used before the new ones, to avoid its unnecessary storage in the dealership. The storage of the merchandise in a dealership, according to manufacturing and purchase dates, and the use of a permanent inventory book, will help to make this a usual practice.

All the stock should be inspected regularly to detect signs of damage or loss. Things to have in mind:

- Intense smell, often indicate loss or decomposition of the product.
- In large cans, oxidation or cracks.
- Cans or plastic bottles, deformation or loss.
- Boxes, cardboard, paper or plastic bags, faded or humid, holes or signs of loss.
- Glass bottles, broken or crushed.
- Lack of caps or labels.

When deterioration or loss is observed all the damaged packages should be moved and isolated. The packages that were near the damaged ones should be carefully checked, in case they are contaminated and move them apart for cleaning.
STORE THE PRODUCTS OVER PLATFORMS AND AWAY FROM THE WALLS.

AVOID CRUSHING DAMAGE

THE STOCK SHOULD BE CHECKED REGULARLY TO DETECT DETERIORATION OR LOSS
The plant protection products in the shelves of a dealership should be separated the solid from the liquid products, as shown on the photographs. The low danger products should be placed in the higher levels and the ones of high toxicity in the lower level.

Another option could be place the solid products in the superior level and in the lower levels the liquid products. The high toxicity products should be placed in the lower level.
The herbicides should be placed separately from the rest of plant protection products to avoid contamination.

It is incorrect to place plant protection products with different biological action in the same shelf, because the risk of contamination of the products increases and they can be damaged. The refill or can changing of the plant protection products is illegal, it should be avoided.
THE MINIMUM EMERGENCY EQUIPMENT THAT A DEALERSHIP SHOULD HAVE:

01. Containers with sawdust, sand and water.
02. Brooms, shovels and waste bags.
03. Fire extinguisher
04. Protective clothing and equipment.
05. First Aid Kit.
Emergency measures in the dealership and warehouse

Wherever plant protection products are kept or stored, does not matter the quantity, precaution to prevent accidents and damage should be taken, in the same way the trouble the residue and its elimination give. In case they occur, quick an effective measures should be taken against: fire, spills, loss and people contamination.

Fire

The plant protection products especially those formulated as liquids that can be flammable, show more risk of fire and can make inflammable vapours flow at normal temperatures. Therefore, a good ventilation is necessary (in the roof level as in the floor level); the containers should not be left open. The leakages and spills should be corrected immediately. In the dealerships and warehouse should be forbidden to smoke and start fires. The electric and heat installations and equipment, should be constructed, installed and kept, according to the safe norms against explosion and fire, established in the national legislation.

In the outside of the warehouses and the dealerships of this products posters should be placed in visible spots in the inside and outside indicating “Danger Pesticides: authorised personnel only”, posters and signs indicating “No smoking: fire starting forbidden”, should be placed. It is really important to fulfil these rules.

In all warehouses water, sand and soil should be available, with the purpose of extinguishing small fires or to absorb spills or leakages. In the large warehouses, there should be extinguishers, these should be periodically checked to make sure that are correctly filled. For small dealerships it is recommended to have at least one fire extinguisher. The fire extinguishers should be placed in easy reaching places in case of emergency, for example near a door. At the entrance of the dealership or warehouse, in an easy reaching place, there should always be gas masks, gloves and boots for at least two people. This equipment also should be regularly checked. From the local firemen advice should be asked, to know which is the best equipment and about the norms of water use.

Spills and leakages

The spill and leakages often happen when in the warehouses or dealerships the incorrectly closed containers are moved or when a breaking occurs. If a spill or leakage occurs, the next step describes the immediate way of acting.
Personal contamination

If the containers of plant protection products are kept in good conditions and are managed carefully by the personnel, which wear the protective clothing recommended in the product’s label, there is no reason for a personal contamination to happen. But if they are not using the correct protective suit, should proceed to decontaminate the injured person and give first aid.

For the instructor: Give the participant a copy of the inspection list bellow. The first homework would be to check all the list in their working places, and if there is something that is needed to be corrected in the way of managing the plant protection products, should be done later.

SMOKING AND STARTING FIRE SHOULD BE FORBBIDEN IN THE WAREHOUSES AND DEALERSHIPS

FIRE EXTINGUISHERS, WATER AND SAND SHOULD BE AVAILABLE IN THE WAREHOUSES AND DEALERSHIPS
CHECK LIST TO INSPECTION A DEALERSHIP OR A WAREHOUSE

01. Construction and equipment

Place of storage far away from people and animals ..................... Yes  No
Located in a flooding place .................................................. Yes  No
Place of storage where delivery trucks can approach easily .......... Yes  No
Spilling or leakages of pesticides can be stopped easily ............... Yes  No
The roof is water proof but well ventilated ................................. Yes  No
The floor impermeable, even and free of cracks ......................... Yes  No
Are the drainage connected to the public collectors ................. Yes  No
The walls and windows are secured and well ventilated .............. Yes  No
Enough illumination to read labels ...................................... Yes  No
Good quality electric installation ............................................ Yes  No
First Aid kit available ......................................................... Yes  No
Buckets with sand in case of spilling ..................................... Yes  No
Is there a fire extinguisher .................................................. Yes  No
Verify that the fire extinguisher works .................................. Yes  No
Place where the employees can wash themselves ..................... Yes  No
Visible “No Smoking” posters .............................................. Yes  No
“Danger: Pesticides” posters in all outside doors ..................... Yes  No
Protective clothes, gloves, caps and masks for employees .......... Yes  No
Is there a powder extractor ................................................ Yes  No

02. Distribution

Pesticides stored far away from foods ................................. Yes  No
The herbicides stored separately from the rest of the pesticides .. Yes  No
No container or plastic bag broken or leaking ......................... Yes  No
All the containers correctly labelled .................................. Yes  No
The older products in the front and the new ones in the back of the shelves .................................................. Yes  No
Correct way to pile pesticides .............................................. Yes  No
Corridors between shelves ................................................ Yes  No
Is there space between the walls and the pesticides ................ Yes  No
Use of small shovels ........................................................ Yes  No
Non visible product due .................................................... Yes  No
Non spill or leakage visible ............................................... Yes  No
STEP # 4 PRESENTATION: NORMS FOR THE CORRECT ELIMINATION OF RESIDUALS

The following are considered residuals of plant protection products: subdued products, residuals and/or pouring, diluted products, empty containers, contaminated clothes and materials used for cleaning spills and application equipment.

To avoid the trouble that means the elimination of residuals, the responsible management of plant protection products from the moment of its purchase until the application, is important, since this can reduce the complications.

Undoubtedly residuals are always produced, which should be eliminated through safe methods. For those who practice safe elimination methods, clean the areas and contaminated objects to reduce the environmental contamination.

The general principles that should be fulfilled are:

- Always obey the local legal rules according to the theme.
- Always eliminate residuals when they happen; avoid the accumulation of big quantities.
- Read the label and pamphlet of the product to know the specific instructions.
- Ask for the advice of an expert when doubts may come.
- Eliminate residuals in a way to avoid the risk of people, domestic cattle, fauna and wild flora, crops, stored foods or water fountains.

Procedure when a spill occurs:

- In the case of a spill, proceed as follows:
  - Use the clothes and personal protection equipment.
  - Keep away people and animals.
  - Do not smoke, or use illumination with free flames close to the spilling.
  - Damaged containers should be removed far away from the housing and water fountains and where the soil can absorb the spill.
  - Stop the spill using ground or sawdust, sweep carefully the contaminated material, pick it up and bury it, where there is no possibility to contaminate the spring and water sources.
  - Wash carefully all contaminated areas with water and soap.

If someone gets contaminated:

- Take off and wash the contaminated clothes.
- Wash repeatedly the skin affected, with water and soap, if it is necessary ask for medical help.

If any foods has been contaminated:

- Burn or bury deeply in the ground. The contaminated foods should never been eaten or given to animals. This might be fatal.

Procedure to eliminated empty containers: Triple-wash.
After using plant protection products the containers remain empty, with residuals of the used product, and that need to be discarded in a correct and safe way, to avoid the contamination of human beings, domestic animals and the environment (air, soil and water). It should be remind that the containers of plant protection products should never be used for human or animal consumption water or food.

It has been proven, for example, that empty containers of liquid formulations can keep in its interior certain product quantity, thus a container of 20 litters can retain 60 millilitres of the original concentrate. Therefore, before its elimination and final deposition should be subject of triple wash to obtain economy, health and ecology, for that the procedure that appears in the illustration of page 100 should be followed. The containers triple washed should be perforated to make them useless and then taken to the closest collect centre for its destruction.

For the instructor: Besides the presentations, make demonstrations of the safe and correct way to stop and clean up a spill and the safe way to manage and eliminate the empty containers.
MINICENTRE OF CROP PROTECTION PRODUCTS
EMPTY CONTAINERS RECOLLECTION TRIPLE WASHED AND USELESS
COLLECT CENTRES OF PLANT PROTECTION PRODUCTS EMPTY CONTAINERS
UNIT # 9

MANAGEMENT AND MAINTENANCE OF THE APPLICATION EQUIPMENT
UNIT # 9 MANAGEMENT AND MAINTENANCE OF THE APPLICATION EQUIPMENT

UNIT DESCRIPTION

In this unit the dealers would know the construction of the types of aspersion equipment (knapsack sprayer) of common use in the local job. They would also learn the way to use it, repair it and give maintenance.

The titles of the main subjects are:

A. Types of sprinkler and knapsack sprayer.
B. Construction of the knapsack sprayer.
C. Maintenance and reparation of the knapsack sprayer.
D. Use of the knapsack sprayer.

OBJECTIVES

At the end of this activity the participant dealers would be in capacity of:

- Identify the most common types of sprinklers or knapsacks sprayers at work;
- Describe the construction and function of these equipment;
- Dismantle and assemble again a knapsack sprayer;
- Identify and name the nozzles (tip) of use in the zone;
- Indicate what plant protection products can be applied with them;
- Demonstrate to be able to verify the good functioning of the application equipment;
- Put a knapsack sprayer on the shoulders without help;
- Maintain constant pressure in the aspersion or pulverisation equipment; and
- Demonstrate the effect that the type or status of the nozzle, the pressure, the passing and the height of the nozzle with respect to the treated objective, has in the application dosage and the cover.

TIME REQUIRED

60 Minutes
STEP # 1 PRESENTATION:
TYPES OF SPRINKLERS OR SPRAYER EQUIPMENT

In most countries in development, the application of plant protection products is done using manual sprinklers or small hydraulic sprayers. According to the crop practices and the economic development of an area, fog machines, motorised sprinklers mounted in tractors or airplanes, rotating disc sprinklers and fumigators. Besides that, there exist special equipments or adapted to apply formulations in powder or granules.

The most common types of sprinklers or sprayer are the following:
- Pre-pressure backpack or knapsack sprinklers;
- Knapsack sprinklers operated manually (piston type and diaphragm type)
- Motorised knapsack sprinklers
- Handy type sprinklers for herbicides;
- Manual sprinklers with rotating disc (applicators for herbicides or insecticides)

For the instructor: For this presentation help yourself with the enclosed audiovisual material, besides supply yourself with several of the mentioned equipment for its demonstration.

PRE-PRESSURE BACKPACK SPRINKLER AND ITS PARTS
SPRINKLER OF CONSTANT PRESSURE
CONSTRAINT PRESSURE SPRINKLER
(A) INTERNAL PISTON  (B) EXTERNAL PISTON
MOTORIZED KNAPSACK SPRINKLERS AND THEIR PARTS
HANDY TYPE SPRINKLERS FOR HERBICIDES AND ITS PARTS

Interchangeable nozzle.
Spraying turbine with electric engine and revolving disc 2200 r.p.m.

Mixture conduit
Air way
Stabilizer plate with a 0.5 mm mesh filter

5 liter Can containing the liquid herbicide works as a tank
ULVA APPLICATOR (FOR INSECTICIDES) AND ITS PARTS
STEP # 2 PRESENTATION AND DEMOOSTRATION: CONSTRUCTION OF THE SPRINKLER OR THE KNAPSACK SPRAYER.

Every knapsack sprayer is formed by the following components:

1. The cap of the tank. This has a vent that should be cleared up in every moment to permit the air entrance.
2. Tank filter. Under the cap and on the tank entrance, there is a filter that does not allow the entrance of sweepings and other dirt. Every time the sprinkler is full, the filter should be in its place.
3. The tank. The function of the tank is to contain the mixing that is going to be applied, its capacity can change according to the equipment size, there are of 10 or 20 litters and of different materials.
4. The pump and the compressor deposit. Generally the pump is of diaphragm or piston. The compressor deposit maintains the liquid pressure when the pump is functioning, and it could have an incorporated variable pressure valve, which would produce the pressure that the operator has selected.
5. The pump rod. Is generally at the right or left side, according to the manual ability of the operator.
6. The hose. Allows the connection of the pump towards the sprayer valve and the spray gun.
7. The pulverization valve and spray gun. The sprayer valve normally contains one filter, which should be checked regularly, the same as the system gasket.
8. Nozzles, peak-axe or tips. Is at the end of the spray gun and could be of two types: fan nozzles and cone nozzles (fixed or variable). Use the enclosed audio-visual material for its better description and provide guidance of nozzles selection.

For the instructor: For this presentation use protector clothes and part of the personal protection equipment. In this presentation and demonstration it should refer to the type or types of sprayer and nozzles of the most common use in the zone and should limit to the knowledge and techniques that would help their clients. Make a brief demonstration over the construction and the equipment components. A logic way of accomplish this, is following the liquid motion through the equipment, as these advances from the cap to the nozzle, dismantle, describing and explaining the function of each component. Use real sprayer, to save time, before the presentation loosen the screws and/or dismantle the sprayer partially. Also use the enclosed educational materials.
1. Resistant! and easy to assembly handle.
2. Wide filter in the spray guns handle with an incorporated closing system and quay.
3. Fixative in passing handle.
5. Filling filter with content indication.
6. Mechanical agitator with device to assemble the closing valve.
7. External level indicator in liters and gallons USA.
10. Record for accessory assemble indicated in this catalog.
11. Fastening spots for the belt. (accessory).
12. Regulating conical nozzle.
13. Replaceable nozzle for herbicides. (only Mod. Super Agro 16).
14. Pump hose with nuts, without brackets.
15. Exit record in strait angle incorporated in the camera.
16. Fixative of crowbar, spray gun and arm to make easier the transportation and storing.
17. Operating crowbar with ergonomic handle.
18. Guide nut with closing and lubricating washer.
19. Transportation handle.
20. Resistant and adjustable straps.
21. Pressure camera, eccentric and monopiece of high capacity and resistance.
22. Rubber retainer.
23. Reversible model. (See instructions).
24. Inox. balls in valve and shirt.
25. Antischock and anticorrosive complete base.

PARTS OF A SPRAYING PUMP
CONE SHAPED NOZZLE COMPONENTS WITH CHANGEABLE DISCS

FLAT FAN SHAPED NOZZLE COMPONENTS
NOZZLE TYPES

- **DG TeeJet**
  - Even Flat Spray Tip

- **TeeJet**
  - Even Flat Spray Tip

- **TwinJet**
  - Twin Even Flat Spray Tip

- **ConeJet**
  - Hollow Cone Spray Tip

- **TG Full Cone**
  - Spray Tip

- **Disc-Core**
  - Spray Tip

- **TeeJet UB**
  - Spray Tip
# NOZZLE SELECTION GUIDE

<table>
<thead>
<tr>
<th>Herbicides</th>
<th>Fungicides</th>
<th>Insecticides</th>
<th>Liquid Fertilizers</th>
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<tbody>
<tr>
<td></td>
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<tr>
<td><strong>Turbo Tejet</strong></td>
<td>BEST</td>
<td>BEST</td>
<td>GOOD</td>
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<tr>
<td><strong>AI Tejet</strong></td>
<td>BEST</td>
<td>BEST</td>
<td>GOOD</td>
</tr>
<tr>
<td><strong>XR Tejet</strong></td>
<td>BEST</td>
<td>BEST</td>
<td>(In low pressures)</td>
</tr>
<tr>
<td><strong>DG Tejet</strong></td>
<td>BEST</td>
<td>BEST</td>
<td>GOOD</td>
</tr>
<tr>
<td><strong>Tejet</strong></td>
<td>GOOD</td>
<td>GOOD</td>
<td>GOOD</td>
</tr>
<tr>
<td><strong>Twinjet</strong></td>
<td>BEST</td>
<td>BEST</td>
<td>GOOD</td>
</tr>
<tr>
<td><strong>Turbo Floodjet</strong></td>
<td>BEST</td>
<td>BEST</td>
<td>BEST</td>
</tr>
<tr>
<td><strong>Turbo Turfjet</strong></td>
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<tr>
<td><strong>Fulljet</strong></td>
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<tr>
<td><strong>AIUB Tejet</strong></td>
<td>GOOD</td>
<td>BEST</td>
<td>BEST</td>
</tr>
<tr>
<td><strong>Disc-Core</strong></td>
<td>BEST</td>
<td>BEST</td>
<td>GOOD</td>
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<tr>
<td><strong>Conjet</strong></td>
<td>BEST</td>
<td>BEST</td>
<td>GOOD</td>
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<tr>
<td><strong>Tejet UB</strong></td>
<td>BEST</td>
<td>BEST</td>
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<tr>
<td><strong>OC Tejet</strong></td>
<td>GOOD</td>
<td>GOOD</td>
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<tr>
<td><strong>TO Tejet</strong></td>
<td>GOOD</td>
<td>GOOD</td>
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<tr>
<td><strong>TG Full Cone</strong></td>
<td>GOOD</td>
<td>GOOD</td>
<td>GOOD</td>
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<tr>
<td><strong>Quick Tejet</strong></td>
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<td></td>
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<tr>
<td><strong>Streamjet</strong></td>
<td>BEST</td>
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</tbody>
</table>

**NOTICE:** Read the label of the chemical product for the specific recommendations of dosage and applying volumes.
SEQUENCE TO BE FOLLOWED IN THE MAINTENANCE OF A SPRINKLER
SEQUENCE TO BE FOLLOWED IN THE MAINTENANCE OF A SPRINKLER

(FOR THE PUMP ASSEMBLE CONTINUE IN THE OPPOSITE DIRECTION)
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ANNEX # 1

SOME SYMPTOMS FOUND IN THE PLANTS AND THE POSSIBLE CAUSES OF THE PHYTOSANITARY PROBLEM
## ANNEX # 1

### SOME SYMPTOMS FOUND IN THE PLANTS AND THE POSSIBLE CAUSES OF THE PHYTOSANITARY PROBLEMS.

<table>
<thead>
<tr>
<th>SYMPTOMS</th>
<th>POSSIBLE CAUSES</th>
</tr>
</thead>
</table>
| Galls                          | Insects and mites  
                                 | Fungus and bacteria  
                                 | Nematodes                                                            |
| Chlorosis                      | Deficiency or excess of nutrients  
                                 | Chlorophyll inhibiting herbicides  
                                 | Virus and mycoplasm  
                                 | Pathogens + toxins  
                                 | Root rottenness  
                                 | Root Nematodes  
                                 | Lack of air on soil (compact soil)  
                                 | Stony ground (fruit trees)  
                                 | Low content of organic matter  
                                 | Bad drainage                                                            |
| Development of diverse leaf pigmentation | Weather conditions  
                                 | Soil conditions  
                                 | Insects  
                                 | Fungus and bacteria  
                                 | Virus and mycoplasm  
                                 | Nutrient excess or deficiency  
                                 | Mechanical or toxic damage                                                            |
| Dwarf plants                   | Virus and/or nematodes  
                                 | Inconstant humidity availability  
<pre><code>                             | Bad drainage                                                            |
</code></pre>
<table>
<thead>
<tr>
<th>Plant Disease/Issue</th>
<th>Potential Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Witches broom disease</td>
<td>Mites, Virus and mycoplasma, Fungus</td>
</tr>
<tr>
<td>Aborted flowers</td>
<td>Deficient pollination, Fertilisation: deficient or unbalanced, Temperature (high and/or low), Growth regulators, Insects, Excessive rain or strong winds, Phytotoxicity</td>
</tr>
<tr>
<td>Gummosis</td>
<td>Mechanical damage, Insect damage, Fungus and bacteria</td>
</tr>
<tr>
<td>Leaves with holes</td>
<td>Insects, Fungus</td>
</tr>
<tr>
<td>Leaves with spots</td>
<td>Mites and insects, Virus, Fungus</td>
</tr>
<tr>
<td>Leaves with stains</td>
<td>Fungus, Bacteria, Toxic matter</td>
</tr>
<tr>
<td>Cut leaves</td>
<td>Insects</td>
</tr>
<tr>
<td>Frog leg (branch proliferation)</td>
<td>Virus, Herbicides</td>
</tr>
</tbody>
</table>
Withering
- Dry land
- Excessive soluble salts
- Root rottenness
- Nematodes
- Vascular fungus
- Vascular bacteria
- Excessive water
- Insects

Rottenness
- Bacteria and fungus

Adventitious roots
- Interference with translocation at ground level or deeper
- Water stress
- Radical rottenness
- Nematodes

Damping-off. Descendent death
- Ground fungus
- Insects
- Soluble salts
- Water saturated soil (bad drainage)
- Space problems for roots to grow

Blight
- Fungus
- Icy weather
ANNEX # 2

FIRST AID IN CASE OF INTAXICATION WITH PESTICIDES
FIRST AID IN CASE OF INTOXICATION WITH PESTICIDES.
Shoes, C. & Collier, C. Adapted C. Palacios.

SYNTHESIS.
The first aid are the initial effort to assist a patient while the medical help is on its way. If these procedures are administered immediately when intoxication with pesticides is suspected, can constitute the difference between to save or loose a patient.

PREPARATIONS:
Before describing the management procedures of first aid in connection with the use of modern pesticides, it is important to emphasise that wherever the pesticides are stored, managed or employed, the following elements for first aid should be on hand.

1. Water supply
2. A soft soap and cloth to wash the skin, and
3. Domestic remedies and antidotes that could be employed before transporting the patient to a medical installation.

Of the various antidotes that have been recommended for treatment of first aid in an intoxication, one of the most useful is the charcoal. Charcoal is essential for the treatment of intoxications by pesticides first aid due to ingestion and should be available for its immediate use. When it is administered in an adequate dosage, this absorbent inhibits the gastrointestinal absorption of an ample spectrum of chemical compounds.

The activated charcoal, a fine black powder, odourless, insipid, is the destroyer of distillation residuals of different organic materials, for example: wood pulp, treated adequately to increase its absorption power. (Hayes, 1970)

There is a pharmochemical quality of activated charcoal that usually can be bought in any drugstore. Nevertheless, when there is no drugstore available, at home you can obtain an acceptable quality of common charcoal that can be employed to treat intoxication cases. A common practice is to burn breadcrumbs heating them in a semi-closed container until it is completely carbonized. A good quality, perhaps better, of common charcoal can be done by heating wood splinters in a closed container to exclude air in the burnt process.

The wood should be brushed or cut in small splinters and heat them until they carbonize completely. A particle can be proven breaking it sporadically to determine if it has blackened complete. The heating should continue, excluding the larger quantity of air as possible, until there is no domestic charcoal smoke. This can then be sprinkle with powder or destroyed in pieces with the hands and stored in a bottle for use in case of intoxication (Freed, 1981)

The activated charcoal is only superior to the universal antidote (2 parts of activated charcoal, 1 part of oxide of magnesium and 1 part of tannic acid) or the domestic equivalent (2 parts of burnt toast, 1 part of magnesium milk and 1 part of tea) and should always be employed.

Another preparation that should be on hand is the ipecac syrup, to induce the vomit in case of ingesting a toxic substance. The dosage is of 2 spoons for adults and 1 teaspoon for children. NOTE: Ipecac syrup, NO fluidextract.
PROCEDURES IN CASE OF INTOXICATION WITH PESTICIDES.
The first step in an intoxication emergency, except if you are alone with the patient, is to call a doctor and/or the ambulance or any vehicle that can transport him or her to the closest clinic. If you are alone with the patient, watch that the breathing is regular, the pulse adequate and that it does not occur any additional exposition.
While you wait for the doctor or vehicle, or even while the patient is been transported to the hospital, these first aid procedures should be followed:

INGESTED PESTICIDES
Procedure:
1. If the pesticide is unknown, administer any of the following adsorbent agents through the mouth.
2. Activated charcoal: preferred for all toxic substances except cyanide and bypiridiles. Dosage – 30 grams in 100 millilitres of water (3 tablespoons in half glass of water) as a thick suspension, or if the activated charcoal is not obtained, administer beaten egg whites. Dosage – 8 egg whites for adults; 4 egg whites for children.
   In the case of paraquat, an adsorbent clay as the Füller land is preferable to the activated charcoal. If clay is not obtained, then no contaminated land should be administered, then take the patient to the hospital.
3. If the pesticide is known, induce to vomit if it is recommended in the pesticides label and there are no contraindications. After vomiting, administer the activated charcoal in 100 millilitres of water (3 tablespoons in half glass of water) or beaten egg white, if there is no charcoal. Take the patient to the hospital.

VOMIT INDUCTION
If the identity of the pesticide is known, induce to vomit if it is recommended in the label. The ipecac syrup or the vomit by mechanic stimulus are two methods employed to induce vomiting. The ipecac syrup, administered through the mouth can eliminate the 90% to the 100% of the stomach content. The dosage is 2 tablespoons for adults and 1 teaspoon for children. Note ipecac syrup, NO fluidextract.

Figure # 1 VOMIT BY MECHANIC STIMULUS
Vomit by mechanic stimulus: Mechanic stimulation of the throat is where the index finger is used to induce the vomit. It is advised to use the first two fingers of the other hand to push the patient’s cheek between the teeth to assure that he does not bite the index finger. See figure # 1. This procedure can extract a 50% of the stomach content and can be done immediately. As soon as the vomit occurs within a few minutes, provide the patient activated charcoal.

Procedures to avoid in cases of pesticide ingestion

1. Contraindications to the vomit induction. **Do not induce the vomit if the patient:**
   - is sleepy, unconscious or with convulsions, the patient could choke and die if the vomit is induced.
   - has swallowed a corrosive poison, because the product will burn the throat severely going back as it did when was ingested. Examples are the strong acids and alkalis as phenols and alkaline salts. The patient would complain of severe pain and would have signs and symptoms of mouth and throat burns.
   - has ingested a pesticide on petroleum base. Most pesticides that come with liquid formulations are dissolved in petroleum derived products (xylene, kerosene, etcetera.)
   - The words emulsifiable concentrate or EC in the labels are signs of not inducing vomit, if the patient has ingested a concentrate. If the patient has swallowed a diluted form of these products, nevertheless should force to vomit immediately.
   - If the patient is in the last three last months of pregnancy

2. The use of salt (NaCl) to induce vomit should be avoided because a severe intoxication may occur with salt in fruitless attempts to induce vomiting (Gleason etc. Al.,1976)

3. More than two dosages of ipecac syrup should not be administered because this drug is harmful to the heart. The ipecac fluidextract should never be used to induce vomit because is fourteen times more concentrated than the syrup. (Arena, 1978).

4. Do not administer baking powder, sodium bicarbonate and other carbonates in case of ingesting acid pesticides, because this can induce to the intestines perforation through the sudden emission of carbon dioxide.

Inhaled pesticides

Procedure:
1. If the patient is in a closed space, do not go for him or her without a breather mask.
2. Carry the patient (do not let the patient walk) to take fresh air immediately.
3. Open all doors and windows
4. Loosen adjusted cloth.

**Pesticide in the skin**

*The more rapid the pesticide is washed from the victim, the smaller the lesion would result.*

**Procedure:**
1. Take off contaminated clothes
2. Submerge the skin in water (shower, hose, faucet, pool, irrigation channel, etc.)
3. Clean the skin, hair and nails slowly with pure soap and water. The detergents and commercial cleaners can increase the absorption of the pesticide (Maramba, 1980)
4. If water and soap are not immediately obtained, employ a clean and dry cloth to take off as many pesticide as possible from the skin and wash as soon as possible.
5. For chemical burns, cover immediately, without tighten, with a clean and soft cloth after washing with large quantities of current water.
6. Avoid the uses of ointments, greases, oils, powders and other drugs in the treatment of first aid of burns.

**Pesticides in the eye**

**Procedure:**
1. Maintain the eyelids open and wash the eye with a soft spout of current water immediately. Do not press.
2. Be careful not to contaminate the other eye, if only one eye is affected.
3. Continue the washing during 15 minutes.
4. Do not employ chemical products or drugs in the washing water because this may increase the grade of ocular lesion.
5. Turn down first to the upper eyelid and then the inferior and clean them with a wet cotton to extract any strange body.
6. Irrigate the eye once again.
7. Do not exceed more than one hour washing the eyes because dryness may provoked or inhibit the production of tears.
8. Cover the eye with a little piece of clean cloth and send the victim to the doctor, preferable an ophthalmologist.

**Other first aid procedures:**
1. Cleaning of the respiratory via and posture – is always imperative to assure a clean respiratory via extracting any strange body, as teeth, foods and secretions of the mouth and the nose, put the patient in recovery position with the head extended and 15 to 30 degrees lower than the trunk level.
This position:

1. Prevent obstruction of the respiratory tract due to the relaxation of the tongue and other soft tissues. If the tongue has already slipped to the throat, it should be thrown outside.

   - Prevent the aspiration of the vomited material in the respiratory tract.
   - Increase the drainage by gravity of the secretions of the respiratory tract.
   - Prevent the additional transit of the stomach content in the thin intestine.

2. Bring the patient to the clinic or hospital. DO NOT WASTE TIME, MAKE IT QUICKLY.
3. Breathing maintenance – if the respiratory movements are inadequate or non-existent, apply artificial respiration employing a bag "ambu" or respiration mouth to mouth. See figure # 3.
4. Circulation maintenance – when the pulse disappears all of a sudden and there are no detectable heart bits, apply external massage. See figure # 4.
5. Unconsciousness – never administer anything by the mouth and assure that the tongue is suspended towards in front when inserting a small blunt and hard object as a spoon or a tongue depressor, between the tongue and the palate.

6. Convulsions – insert a quilted gag between the jaws to prevent that the patient bites his tongue. Prevent additional injury by placing a pillow or a cushion under the head and not letting it fall. See figure # 5.
7. Prophylaxis and antidote medication of first aid – the atropine sulphate and the oxymns should not be ingested by the pesticide users as a prophylactic measure because they do not prevent the intoxication. Indeed, they can create a false security sense and retard the first aid administration procedures and definitely medical treatment. The sulphate of atropine pills can disguise or retard the first intoxication symptoms and that can be prejudicial at least in two manners. The workers can go back to their work and receive more exposition or, the worker is carried to a doctor, to whom he doesn’t inform that he has already taken atropine, the intoxication diagnosis can lose or retard. In an emergency of acute intoxication, if the victim is stunned or vomiting, do not employ oral atropine as first aid measure because the dosage is too small and the victim cannot swallow. (Anón, 1974)

8. Pesticide identification – If it is possible, take the pesticide container, label or pamphlet with the doctor, in a safe way. If it is impossible, make sure he knows what type of pesticide the patient has been using. See figure # 6
ANNEX # 3

FAO INTERNATIONAL CODE OF CONDUCT ON THE DISTRIBUTION AND USE OF PESTICIDES
PREFACE

The action taken by FAO to develop, in consultation with appropriate United Nations agencies and other organisations, an International Code of Conduct on the Distribution and Use of Pesticides follows and accompanies many other events, some going back 25 years. All these events were designed to benefit the international community and to serve to increase international confidence in the availability, regulation, marketing and use of pesticides for the improvement of agriculture, public health and personal comfort.

On the basic functions of the Code, which is voluntary in nature, is to serve as a point of reference, particularly until such time as countries have established adequate regulatory infrastructures for pesticides.

The Director-General of FAO suggested in 1981 that such a Code could help to overcome a number of difficulties associated with pesticides. The FAO Panel of Experts on Pesticide Specifications, Registration Requirements and Application Standards, at its meeting in 1982, agreed that activities involving the export and import of pesticides, and thereby their safe use, might be best dealt with through the adoption of a Code of Conduct. To that end, a working document was prepared for the FAO Second Government Consultation on International Harmonisation of Pesticide Registration Requirements, Rome, 1-5 October 1982. The formal decision to develop the Code was taken at that Consultation, which recommended that FAO, in consultation with the appropriate United Nations organisations and bodies and international organisations outside the United Nations system, should draft a project of that document.

The Code itself was adopted by the FAO Conference at its Twenty-third Session in 1985 by way of Resolution 10/85, which appears as an Annex to the present publication.

A number of governments and organisations have expressed concern about the propriety of supplying pesticides to countries which do not have infrastructures to register pesticides and thereby to ensure their safe and effective use. It should be noted that the development of national regulatory programmes is the first priority of FAO’s activities in this field. There has also been concern over the possibility that residues of certain pesticides, not needed or not permitted in particular countries, are present in imported agricultural commodities produced in other countries where the use of such pesticides is not restricted. While recognising that it is impossible to eliminate all such occurrences, because of diverging pest control needs, it is nonetheless essential that every effort be made to apply pesticides only in accordance with good and recognised practices. It is,
at the same time, important for industrially developed countries to recognise, in their regulatory activities concerning residues, the pest control needs of developing countries, particularly the needs of countries in tropical regions.

In the absence of an effective pesticide registration process and a governmental infrastructure to control the availability of pesticides, some countries importing pesticides must rely greatly on the pesticide industry to promote the safe and proper distribution and use of pesticides. Under these circumstances, foreign manufacturers, exporters and importers, as well as local formulators, distributor’s repackers, advisers and users, must accept a share of the responsibility for safety and efficiency in distribution and use.

The role of the exporting country needs to be considered. Much emphasis has been given recently to the desirability of regulating the export of pesticides from producing countries. It is generally accepted that no company should trade in pesticides without a proper and thorough evaluation of the pesticide, including any risks. However, the fact that a product is not used or registered in a particular exporting country is not necessarily a valid reason for prohibiting the export of that pesticide. Developing countries are mostly situated in tropical and semitropical regions. Their climatic, ecological, agronomic, social, economic and environmental conditions and, therefore, their pest problems, are usually quite different from those prevailing in countries in which pesticides are manufactured and exported. The government of the exporting country, therefore, is in no position to judge the suitability, efficacy, safety or fate of the pesticide under the conditions in the country where it may ultimately be used. Such a judgement must, therefore, be made by the responsible authority in the importing country, in consultation with industry and other government authorities, in the light of the scientific evaluation that has been made and a detailed knowledge of the conditions prevailing in the country of proposed use.

The export to developing countries of pesticides that have been banned in one or more countries or whose use has been severely restricted in some industrialised countries has been a subject of public concern, which has led to intensive discussions. In addressing this issue, the FAO Conference, at its Twenty-fifth Session in 1989, agreed to introduce provision for Prior Informed Consent (PIC) procedures. These procedures are described in the revised Article 9 on Information Exchange and Prior Informed Consent.

While the Code of Conduct may not solve all problems, nevertheless, it should go a long way toward defining and clarifying the responsibilities of the various parties involved in the development, distribution and use of pesticides, and it should be of particular value in countries which do not have yet control procedures. When there is a pesticide regulatory process in a country, obviously, there will be less need for a Code of Conduct than in a country where there is no such process.
The Code of Conduct is not a short or simple document, mainly because the nature, properties, uses and effects of pesticides are diverse and, therefore, require comprehensive consideration. Furthermore, the strong public pressure for banning or restricting the use of some effective and much needed pesticides often stems from a lack of understanding of the many important issues involved. This document is designed, therefore, also to provide the general public with some basic guidance on these issues.

Edouard Saouma

Director General
TEXT OF THE CODE

Article 1. Objectives of the Code

1.1.1 The objectives of this Code are to set forth responsibilities and establish voluntary standards of conduct for all public and private entities, engaged in or affecting the distribution and use of pesticides, particularly where there is no national law to regulate pesticides or the existing one is inadequate.

1.2 The Code describes the share responsibility of many segments of society, including governments, individually or in regional groupings, industry, trade and international institutions, to work together so that the benefits to be derived from the necessary and acceptable use of pesticides are achieved without significant adverse effects on people or the environment. To this end, all references in this Code to a government or governments shall be deemed to apply equally to regional groupings of governments for matters falling within their areas of competence.

1.3 The Code addresses the need for cooperation between governments from exporting and importing countries to promote practices which ensure efficient and safe use, while minimising health and environmental concerns due to improper handling or use.

1.4 The entities which are addressed by this Code include international organisations; industry, including manufacturers, trade associations, formulators and distributors; users and public sector organisations, such as environmental groups, consumer groups and trade unions.

1.5 The standards of conduct set forth by this Code:

1.5.1 To encourage responsible and generally accepted trade practices;

1.5.2 To assist countries which have not yet established controls designed to regulate the quality and suitability of pesticide products needed in that country and to address the safe handling and use of such products;

1.5.3 To promote practices which encourage the safe and efficient use of pesticides, including minimising adverse effects on humans and the environment and preventing accidental poisoning from improper handling;

1.5.4 To ensure that pesticides are used effectively for the improvement of agricultural production and of human, animal and plant health.

1.6 The Code is designed to be used, within the context of national law, as a basis whereby government authorities, pesticide manufacturers, those engaged in trade and any citizens concerned may judge whether their proposed actions and the actions of others constitute acceptable practices.
Article 2. Definitions

For the purpose of this Code, it is understood by:

Active ingredient is the biologically active part of the pesticide present in a formulation.

Advertising means the promotion of the sale and use of pesticides by print and electronic media, signs, displays, gifts, demonstration or word of mouth.

Banned means a pesticide for which all registered uses have been prohibited by final government regulatory action, or for which all requests for registration or equivalent action for all uses have, for health or environmental reasons, not been granted.

Common name is the name assigned to a pesticide active ingredient by the International Standards Organisation or adopted by national standards authorities to be used as a generic or non proprietary name for that particular active ingredient only.

Distinguishing name is the name under which the pesticide is labelled, registered and promoted by the manufacturer and which, if protected under national legislation, can be used exclusively by the manufacturer to distinguish the product from other pesticides containing the same active ingredient.

Distribution means the process by which pesticides are supplied through trade channels on local or international markets.

Environment means surroundings, including water, air, soil and their interrelationship as well as all relationships between them and any living organisms.

Extension service means those entities in the country concerned responsible for the transfer of information and advice to farmers, regarding the improvement of agricultural practices, including production, handling, storage and marketing.

Formulation means the combination of various ingredients designed to render the product useful and effective for the purpose claimed; the form of the pesticide as purchased by users.

Hazard means the likelihood that a pesticide will cause an adverse effect under the conditions in which it is used.

Integrated Pest Management (IPM) means a pest management system that, in the context of the associated environment and the population dynamics of the pest species, utilises all suitable techniques and methods in as compatible a manner as possible and maintains the pest populations at levels below those causing economically unacceptable damage or loss.
**Label** is the written, printed or graphic matter on, or attached to the pesticide; or the immediate container thereof and the outside container or wrapper of the retail package of the pesticide.

**Manufacturer** means a corporation or other entity in the public or private sector or any individual engaged in the business or function (whether directly or through an agent or through an entity controlled by or under contract with it) of manufacturing a pesticide active ingredient or preparing its formulation or product.

**Marketing** means the overall process of product promotion, including advertising, product public relations and information service, as well as distribution and selling on local or international markets.

**Maximum residue limit (MRL)** is the maximum concentration of a residue that is legally permitted or recognised as acceptable in or on a food, agricultural commodity or animal feedstuff.

**Packaging** means the container, together with the protective wrapping used to carry pesticide products via wholesale or retain distribution to users.

**Pesticide** is any substance or mixture of substances intended for preventing, destroying or controlling any pest, including vectors of human or 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 feedstuffs, or which may be administered to animals for the control of insects, arachnids or other pests in or on their bodies. The term includes substances intended for use as a plant growth regulator, defoliant, desiccant, or agent for thinning fruit or preventing the premature fall of fruit, and substances applied to crops either before or after harvest to protect the commodity from deterioration during storage and transport.

Pesticide industry means all those organisations and individuals engaged in manufacturing, formulating or marketing pesticides and pesticide products.

Pesticide legislation means any laws or regulations introduced to regulate the manufacture, marketing, storage, labelling, packaging and use of pesticides in their qualitative, quantitative and environmental aspects.

Poison means a substance that can cause disturbance of structure or function, leading to injury or death when absorbed in relatively small amounts by human beings, plants or animals.

Poisoning means occurrence of damage or disturbance caused by a poison, and includes intoxication.
Prior Informed Consent (PIC) - Refers to the principle that international shipment of a pesticide that is banned or severely restricted in order to protect human health or the environment should not proceed without the agreement, where such an agreement exists, or contrary to the decision of the designated national authority in the participating importing country.

Prior Informed Consent Procedure (PIC procedure) means the procedure for formally obtaining and disseminating the decisions of importing countries as to whether they wish to receive future shipments of pesticides that have been banned or severely restricted. A specific procedure established for selecting pesticides for initial implementation of PIC procedures. These include pesticides that have been previously banned or severely restricted, as well as certain pesticide formulations that are acutely toxic. This procedure is described in the Guidelines on the Operation of Prior Informed Consent (15).

Product means the pesticide in the form in which it is packaged and sold; it usually contains an active ingredient plus coadjutors and may require dilution prior to use.

Protective clothing means (but is not limited to) scientific associations; farmer groups; citizens’ organisations; environmental, consumer and health organisations; and labour unions.

Registration means the process whereby the responsible national government authority approves the sale and use of a pesticide, following the evaluation of comprehensive scientific data, demonstrating that the product is effective for the purposes intended and not unduly hazardous to human or animal health or the environment.

Repackaging means the transfer of pesticide from any commercial package into any other container, usually smaller, for subsequent sale.

Residue means any specified substances in food, agricultural commodities, or animal feed, resulting from the use of a pesticide. The term includes any derivatives of a pesticide, such as conversion products, metabolites, reaction products, and impurities considered to be of toxicological significance. The term “pesticide residue” includes residues from unknown or unavoidable sources (e.g. environmental) as well as known uses of the chemical.

Responsible authority means the government agency or agencies responsible for regulating the manufacture, distribution or use of pesticides and more generally for implementing pesticide legislation.

Risk means the expected frequency of undesirable effects of exposure to the pesticide.

Severely restricted (a limited ban) means a pesticide for which virtually all registered uses have been prohibited by final government regulatory action but certain specific registered use or uses remain authorised.
Toxicity means a physiological or biological property which determines the capacity of a chemical substance to do harm or produce injury to a living organism by other than mechanical means.

Trader means anyone engaged in trade, including export, import, formulation and domestic distribution.

Use pattern embodies the combination of all factors involved in the use of a pesticide, including the concentration of an active ingredient in the preparation being applied, rate of application, time of treatment, number of treatments, use of coadjuvants and methods and sites of application, which determine the quantity applied, timing of treatment and interval before harvest, etc.

**Article 3 – Pesticide management**

3.1 Governments have the overall responsibility and should take the specific powers to regulate the distribution and use of pesticides in their countries.

3.2 The pesticide industry should adhere to the provisions of this Code as a standard for the manufacture, distribution and advertising of pesticides, particularly in countries lacking appropriate legislation and advisory service.

3.3 Governments of exporting countries should help to the extent possible, directly or through their pesticide industries, to:

3.3.1 Provide technical assistance to other countries, especially those with shortages of technical expertise, in the assessment of the relevant data on pesticides, including those provided by industry (see also Article 4);

3.3.2 Ensure that good trading practices are followed in the export of pesticides, especially to those countries with no or limited regulatory schemes (see also Articles 8 and 9)

3.4 Manufacturers and traders should observe the following practices in pesticide management, especially in countries without legislation or means of implementing regulations:

3.4.1 Supply only pesticides of adequate quality, packaged and labelled as appropriate for each specific market;
3.4.2 pay special attention to formulation, presentation, packaging and labelling in order to reduce hazard to users, to the maximum extent possible, consistent with the effective functioning of the pesticide in the particular circumstances in which it is to be used;

3.4.3 provide, with each package of pesticide, information and instructions in a form and language adequate to ensure safe and effective use;

3.4.4 retain an active interest in following their products to the ultimate consumer, keeping track of major uses and the occurrence of any problems arising in the actual use of their products as a basis for determining the need for changes in labelling, directions for use, packaging, formulation or product availability.

3.5 Pesticides which handling and application require the use of uncomfortable and expensive protective clothing and equipment should be avoided, especially in the case of small scale users in tropical climates.

3.6 National and international organisations, governments, and pesticide industries should take action in coordinated efforts to disseminate educational materials of all types to pesticide users, farmers, farmers’ organisations, agricultural workers, unions and other interested parties. Likewise, affected parties should seek and understand educational materials before using pesticides and should follow proper procedures.

3.7 Governments should allocate high priority and adequate resources to the task of effectively managing the availability, distribution and use of pesticides in their countries.

3.8 Concerted efforts should be made by governments and pesticide industries to develop and promote integrated pest management systems and the use of safe, efficient, cost-effective application methods. Public sector groups and international organisations should actively support such activities.

3.9 International organisations should provide information on specific pesticides and give guidance on methods of analysis through the provision of criteria documents, fact sheets, training sessions, etc.

3.10 It is recognised that the development of resistance of pests to pesticides can be a major problem. Therefore, governments, industry, national institutions, international organisations and public sector groups should collaborate in developing strategies which will prolong the useful life of valuable pesticides and reduce the adverse effects of the development of resistant species.
Article 4. Testing of pesticides

4.1 Pesticide manufacturers are expected to:

4.1.1 Ensure that each pesticide is adequately and effectively tested by well recognised scientific procedures and test methods, so as to fully evaluate its safety, effectiveness (2) and fate (3), with regards to the various anticipated conditions in regions or countries of use;

4.1.2 Ensure that such tests are conducted in accordance with sound scientific procedures and good lab practice (4) – the data produced by such tests, when evaluated by competent experts, should show whether the product can be handled and used safely, without unacceptable hazard to human health, plants, animals, wildlife and the environment (3);

4.1.3 Supply copies or summaries of the original reports of such tests for assessment by responsible government authorities in all countries where the pesticide is to be offered for sale. Evaluation of the data should be referred to qualified experts;

4.1.4 Make sure that the proposed use pattern, label claims and instructions, packages, technical literature and advertising truly reflect the outcome of these scientific tests and assessments;

4.1.5 If requested by a country, provide advice on analysis methods of any active ingredient or formulation that they manufacture, as well as the necessary analytical standards.

4.1.6 Provide advice and assistance to train technical staff in relevant analytical work. Formulators should actively support this effort.

4.1.7 Conduct residue trials prior to marketing, in accordance with FAO guidelines on good analytical practice (5) and on crop residue data (6, 7) in order to provide a basis to establish appropriate maximum residue limits (MRL’s).

4.2 Each country should possess or have access to facilities to verify and exercise control over the quality of pesticides offered for sale, to establish the quantity of the active ingredient or ingredients and the suitability of their formulation (8).

4.3 International organisations and other interested bodies should, within available resources, consider assisting in the establishment of analytical laboratories in pesticide importing countries, either on a country or on a multilateral regional basis. These laboratories should be capable of carrying out product and residue analysis and should have adequate supplies of analytical standards, solvents and re-agents.
4.4 Exporting governments and international organisations must play an active role in assisting developing countries to train personnel in the interpretation and evaluation of test data.

4.5 Industry and governments should collaborate in conducting post-registration surveillance or monitoring studies to determine the fate and environmental effect of pesticides under field conditions.

**Article 5. Reducing health hazards**

5.1 Governments which have not already done so, should:

5.1.1 Implement a pesticide registration and control scheme, along the lines set out in Article 6;

5.1.2 Decide, and from time to time review, the pesticides to be marketed in their country, their acceptable uses and their availability to each segment of the public;

5.1.3 Provide guidance and instructions for the treatment of suspected pesticide poisoning for their basic health workers, physicians and hospital staff;

5.1.4 Establish national or regional toxicological information and control centres at strategic locations to provide immediate guidance on first aid and medical treatment, accessible at all times by telephone or radio. Governments should collect reliable information about health aspects of pesticides. Suitably trained people, with adequate resources must be made available to ensure that accurate information is collected.

5.1.5 Keep an extension and advisory service, as well as farmers’ organisations, adequately informed about the range of pesticide products available for use in each area;

5.1.6 Ensure, with the cooperation of industry, that where pesticides are available through outlets which also deal in food, medicines, other products for internal consumption, for topical application or clothing, they should be physically separated from other merchandise, so as to avoid any possibility of contamination or of mistaken identity. Where appropriate, they should be clearly marked as hazardous materials. Every effort should be made to publicise the dangers of storing foodstuffs and pesticides together.
5.2 Even where a control scheme is in operation, industry should:

5.2.1 Cooperate in the periodic reassessment of the marketed pesticides and in providing health centres and medical staff in charge of toxicological centres with information about existing hazards.

5.2.2 Make every reasonable effort to reduce hazards by:

5.2.2.1 Making less toxic formulations available;

5.2.2.2 Introducing products in ready-to-use packages and otherwise developing safer and more efficient application methods;

5.2.2.3 Using containers that are not attractive for subsequent reuse and promoting Programmes to discourage their reuse;

5.2.2.4 Using containers that are safe (e.g. not attractive to or easily opened by children), particularly for the more toxic home use products;

5.2.2.5 Using clear and concise labelling;

5.2.3 Halt sale and recall products, when safe use does not seem feasible under any use instructions or limitations.

5.3 Government and industry should further reduce hazards by making provision for safe storage and disposal of pesticides and containers at both warehouse and farm level; determining the sites where waste from formulating plants should be eliminated and controlling elimination operations.

5.4 To avoid unjustified confusion and alarm among the general public, public sector groups should consider all available facts and try to distinguish major differences in risk levels of the various pesticides and their uses.

5.5 In establishing production facilities in developing countries, manufacturers and governments should cooperate to:

5.5.1 Adopt technical standards and follow safe operating practices, appropriate to the nature of manufacturing operations and hazards involved;

5.5.2 Take all necessary precautions to protect the health and safety of workers, bystanders and the environment;

5.5.3 Maintain quality assurance procedures to ensure that products manufactured comply with relevant purity, performance, stability and safety standards.
Article 6 – Regulatory and Technical Requirements

6.1 Governments should:

6.1.1. Take action to introduce the necessary legislation for the regulation, including registration of pesticides and make provisions for its effective enforcement, including the establishment of appropriate educational, advisory, extension and health-care service; the FAO guidelines for the registration and control of pesticides (9) should followed, as far as possible, taking full account of local needs, social and economic conditions, levels of literacy, climatic conditions and availability of pesticide application equipment;

6.1.2 Strive to establish pesticide registration schemes and infrastructures under which products can be registered prior to domestic use and, accordingly, ensure that each pesticide product is registered under the laws or regulations of the country of use before it can be made available there;

6.1.3 Protect the proprietary rights to use of data;

6.1.4 Collect and record data on the actual import, formulation and use of pesticides in each country, in order to assess the extent of any possible effects on human health or the environment, and to follow trends in use levels for economic and other purposes.

6.2 The pesticides industry should:

6.2.1 Provide and objective appraisal, together with the necessary supporting data on each product.

6.2.2 Ensure that the active ingredient and other ingredients of pesticide preparations marketed correspond in identity, quality, purity and composition to the substances tested, evaluated and cleared for toxicological and environmental acceptability;

6.2.3 Ensure that active ingredients and formulated products for pesticides for which international specifications have been developed conform with the specifications of FAO (8), where intended for use in agriculture; and with WHO pesticide specifications (10), where intended for use in public health;

6.2.4 Verify the quality and purity of the pesticides offered for sale;

6.2.5 When problems occur, voluntarily take corrective action, and when requested by governments, help find solutions to difficulties.
Article 7 – Availability and use

7.1 Responsible authorities should give special attention to drafting rules and regulations on the availability of pesticides. These should be compatible with existing levels of training and expertise in handling pesticides on the part of the intended users. The parameters on which such decisions are based vary widely and must be left to the discretion of each government, bearing in mind the situation prevailing in the country.

7.2 In addition, governments should take note of and, where appropriate, follow WHO’s classifications of pesticides by hazard (11) and associate the hazard class with well-recognised hazard symbols, as the basis for their own regulatory measures. In any event, the type of formulation and method of application should be taken into account in determining the risk and degree of restriction appropriate to the product.

7.3 Two methods of restricting availability can be exercised by the responsible authority: not registering a product or, as a condition of registration, restricting the availability to certain groups of users, in accordance with national assessments of hazards involved in the use of the product in the particular country.

7.4 All pesticides made available to the general public should be packaged and labelled in a manner which is consistent with FAO’s guidelines on packaging (12) and labelling (13) and with appropriate national regulations.

7.5 Prohibition of the importation, sale and purchase of an extremely toxic product may be desirable, if control measures or good marketing practices are insufficient to ensure that the product can be used safely. However, this is a matter for decision in the light of national circumstances.

Article 8 – Distribution and Trade

8.1 Industry should:

8.1.1 Test all pesticide products to evaluate safety with regards to human health and the environment prior to marketing, as provided for in Article 4, and ensure that all pesticide products are likewise adequately tested for efficacy and stability and crop tolerance, under procedures that will predict performance under the conditions prevailing in the region where the product is to be used, before they are offered there for sale.

8.1.2 Submit the results of all tests to the local responsible authority for independent evaluation and approval, before the products enter trade channels in that country.

8.1.3 Take all necessary steps to ensure that pesticides entering international trade conform to relevant FAO (8), WHO (10) or equivalent specifications for composition and quality (where such specifications have been developed) and to the principles embodied in pertinent FAO guidelines, and in rules and regulations on classification and packaging,
marketing, labelling and documentation laid down by international organisations concerned with modes of transport (ICAO, IMO, RID and IATA in particular).

8.1.4 Make a commitment to see that pesticides manufactured for export are subject to the same quality requirements and standards as those applied by the manufacturer to similar domestic products.

8.1.5 Ensure that pesticides manufactured or formulated by a subsidiary company meet appropriate quality requirements and standards, which should be consistent with the requirements of the host country and parent company.

8.1.6 Encourage importing agencies, national or regional formulators and their respective trade organisations to cooperate in order to achieve fair practices and safe marketing and distribution practices and to collaborate with authorities in stamping out any malpractice within the industry.

8.1.7 Recognise that the recall of a pesticide by a manufacturer and distributor may be desirable when faced with a pesticide that represents an unacceptable hazard to human and animal health and the environment, when used as recommended and cooperate accordingly.

8.1.8 Endeavour to ensure that pesticides are traded by and purchased from reputable traders, who should preferably be members of a recognised trade organisation.

8.1.9 See that persons involved in the sale of any pesticides are trained adequately to ensure that they are capable of providing the buyer with advice on safe and efficient use.

8.1.10 Provide a range of pack sizes and types, which are appropriate for the needs of small-scale farmers and other local users to avoid handling hazards and the risk that resellers will repackage products into unlabelled or inappropriate containers.

8.2 Governments and responsible authorities should take the necessary regulatory measures to prohibit the repackaging, decanting or dispensing of any pesticide in food or beverage containers and should rigidly enforce punitive measures that effectively stop such practices.

8.3 Governments of countries importing food and agricultural commodities should recognise good agricultural practices in countries with which they trade and, in accordance with recommendations from the Codex Alimentarius Commission, should establish a legal basis for the acceptance of pesticide residues, resulting from such good agricultural practices.

ICAO: International Civil Aviation Organisation
IMO: International Maritime Organisation
RID: International regulations concerning the carriage of dangerous goods by rail
IATA: International Air Transport Association
Article 9 – Information Exchange and Prior Informed Consent

9.1 The government of any country that takes action to ban or severely restrict the use of handling of a pesticide, in order to protect health or the environment, should notify FAO as soon as possible of the action taken. FAO will notify the designated national authorities in other countries of the action of the notifying government (15).

9.2 The purpose of the notification regarding control action is to give competent authorities in other countries the opportunity to assess the risks associated with the pesticides, and to make timely and informed decisions as to the importation and use of the pesticides concerned, after taking into account local, public health, economic, environmental and administrative conditions. The minimum information to be provided for this purpose should be:

9.2.1 The identity (common name, distinguishing name and chemical name);

9.2.2 A summary of the control action taken and of the reasons for it. If the control action bans or restricts certain uses but allows other uses, such information should be included.

9.2.3 An indication of the additional information that is available, and the name and address of the contact point in the country to which a request for further information should be addressed.

Information exchange among countries

9.3 If export of a pesticide banned or severely restricted in the country of export occurs, the country of export should ensure that necessary steps are taken to provide the designated national authority of the country of import with relevant information.

9.4 The purpose of information regarding exports is to remind the country of import of the original notification regarding control action and to alert it to the fact that an export is expected or is about to occur. The minimum information to be provided for this purpose should be:

9.4.1 A copy of or reference to the information provided at the time of the notification of control action.

9.4.2 Indication that an export of the chemical concerned is expected or is about to occur.

9.5 Provision of information regarding exports should take place at the time of the first export following the control action, and should recur in the case of any significant development of new information or conditions surrounding the control action. It is the intention that the information should be provided prior to export.

9.6 The provision to individual countries of any additional information on the reasons for control actions taken by any country must take into account the protection of any proprietary data from unauthorised use.

Prior Informed Consent (PIC)
9.7 Pesticides that are banned or severely restricted for reasons of health or the environment are subject to the Prior Informed Consent Procedure. No pesticide in these categories should be exported to an importing country participating in the PIC procedure, contrary to that country’s decision made in accordance with FAO operational procedures for PIC.

9.8 FAO will:

9.8.1 Review notifications of control actions to ensure conformity with definitions in Article 2 of the Code, and will develop the relevant guidance documents;

9.8.2 In collaboration with UNEP, develop and maintain a data base of control actions and decisions taken by all Member Governments:

9.8.3 Inform all designated national authorities and relevant international organisations about notifications received under Article 9.1 and decisions that have been taken regarding the use and importation of a pesticide that has been included in the PIC procedure and publicise it in an appropriate way.

9.8.4 FAO will seek advice at regular intervals and review the criteria for inclusion of pesticides in the Prior Informed Consent procedure and the operation of the Prior Informed Consent scheme and will report to Member Governments on its findings.

9.9 Governments of importing countries should establish internal procedures and designate the appropriate authority for the receipt and handling of information.

9.10 Governments of importing countries participating in the PIC procedure, when advised by FAO of control action within this procedure, should:

9.10.1 Decide on future acceptability of that pesticide in their country and advise FAO as soon as that decision has been made;

9.10.2 Ensure that governmental measures or actions taken regarding an imported pesticide for which information has been received are not more restrictive than those applied to the same pesticide produced domestically or imported from a country, other than the one that supplied the information;

9.10.3 Ensure that such a decision is not used inconsistently with the provisions of the General Agreement on Tariffs and Trade (GATT).

9.11 Governments from pesticide exporting countries should:

9.11.1 Advise their pesticide exporters and industry of the decisions of participating importing countries;

9.11.2 Take appropriate measures within their authority and legislative competence, designed to ensure that exports do not occur contrary to the decision of participating importing countries.
Article 10 – Labelling, packaging, storage and disposal

10.1 All pesticide containers should be clearly labelled, in accordance with applicable international guidelines, such as the FAO guidelines on good labelling practice (13).

10.2 Industry should use labels that:

10.2.1 Include recommendations consistent with those of the recognised research and advisory agencies in the country of sale;

10.2.2 Include appropriate symbols and pictograms whenever possible, in addition to written instructions, warnings and precautions;

10.2.3 In international trade, clearly show appropriate WHO hazard classification of the contents (11) or, if this is inappropriate or inconsistent with national regulations, use the relevant classification;

10.2.4 Include, in the appropriate language or languages, a warning against the reuse of containers, and instructions for the safe disposal or decontamination of empty containers;

10.2.5 Identify each lot or batch of the product in numbers or letters that can be read, transcribed and communicated by anyone without the need for codes or other means of deciphering;

10.2.6 They are marked with the date (month and year) of formulation of the lot or batch and with relevant information on the storage stability of the product.

10.3 Industry should ensure that:

10.3.1 Packaging, storage and disposal of pesticides conform in principles to FAO guidelines for packaging and storage (12), FAO guidelines for the disposal of waste pesticides and containers (16), and WHO specifications for pesticides used in public health (10);

10.3.2 In cooperation with governments, packaging or repackaging is carried out only on licensed premises where the responsible authority is convinced that the staff is adequately protected against toxic hazards, that the resulting product will be properly packaged and labelled, and that the content will conform to the relevant quality standards.

10.4 Governments should take the necessary regulatory measures to prohibit the repacking, decanting or dispensing of any pesticide into food or beverage containers in trade channels and rigidly enforce punitive measures that effectively deter such practices.
**Article 11 – Advertising**

11.1 Industry should ensure that:

11.1.1 All statements used in advertising are capable of technical substantiation.

11.1.2 Advertisements do not contain any statement or visual presentation which, directly or by implication, omission, ambiguity or exaggerated claim, is likely to mislead the buyer, in particular with regard to the safety of the product, its nature, composition, or suitability for use, or official recognition or approval;

11.1.3 Pesticides which are legally restricted to use by trained or registered operators are not publicly advertised through journals other than those catering for such operations, unless the restricted availability is clearly and prominently shown;

11.1.4 No firm or individual in any country simultaneously markets different pesticide active ingredients or combinations of ingredients under a single distinguishing name;

11.1.5 Advertising does not encourage uses other than those specified on the approved label;

11.1.6 Promotional material does not include use recommendations different from the ones of the recognised research and advisory agencies;

11.1.7 Advertisements do not misuse research results or quotations from technical and scientific literature; and scientific jargon and irrelevances are not used to make claims appear to have a scientific basis they do not possess;

11.1.8 Claims as to safety, including statements such as “safe”, “non-poisonous”, “harmless”, “non-toxic”, are not made, with or without a qualifying phrase such as “when used as directed”;

11.1.9 Statements comparing the safety of different products are not made;

11.1.10 Misleading statements are not made concerning the effectiveness of the product;

11.1.11 No guarantees or implied guarantees – e.g. “more profits with…”, “guarantees high yields” – are given unless definite evidence to substantiate such claims is available;

11.1.12 Advertisements do not contain any visual representation of potentially dangerous practices, such as mixing or application without sufficient protective clothing, use near food, or use by or near children;

11.1.13 Advertising or promotional material draws attention to the appropriate warning phrases and symbols as laid down in the labelling guidelines (13);
11.1.14 Technical literature provides adequate information on correct practices, including the observance of recommended rates, frequency of applications, and safe pre-harvest intervals;

11.1.15 False or misleading comparisons with other pesticides are not made;

11.1.16 All staff involved in sales promotion are adequately trained and possess sufficient technical knowledge to present complete, accurate and valid information on the product sold;

11.1.17 Advertisements encourage purchasers and users to read the label carefully, or have the label read to them if they cannot read.

11.2 International organisations and public-sector groups should call attention to departures from this article.

11.3 Governments are encouraged to work with manufacturers to take advantage of their marketing skills and infrastructure, in order to provide public-service advertising regarding the safe and effective use of pesticides. This advertising could focus on such factors as proper maintenance and use of equipment, special precautions for children and pregnant women, the danger of reusing containers, and the importance of following label directions.

Article 12 – Monitoring the observance of the Code

12.1 The Code should be published and should be observed through collaborative action on the part of governments, individually or in regional groupings, appropriate organisations and bodies of the United Nations system, international governmental organisations and the pesticide industry.

12.2 The Code should be brought to the attention of all concerned in the manufacture, marketing and use of pesticides and in the control of such activities, so that governments, individually or in regional groupings, industry and international institutions understand their shared responsibilities in working together to ensure that the objectives of the Code are achieved.

12.3 All parties addressed by this Code should observe it and promote the principles and ethics expressed by the Code, regardless of other parties’ ability to observe the code. The pesticide industry should cooperate fully in the observance of the Code and promote the principles and ethics expressed thereby, irrespective of a government’s ability to observe the Code.

12.4 Independently of any measures taken with respect to the observance of this Code, all relevant legal rules should be strictly applied, whether legislative, administrative,
judicial, or customary, dealing with liability, consumer protection, conservation, pollution control and other related subjects.

12.5 FAO and other competent international organisations should give full support to the observance of the Code, as adopted.

12.6 Governments should monitor the observance of the Code and report on progress made to the Director-General of FAO.

12.7 Governing Bodies should periodically review the relevance and effectiveness of the Code. The Code should be considered a dynamic text which must be brought up to date as required, taking into account technical, economic and social progress.
FAO Conference Resolution 10/85
International Code of Conduct
on the Distribution and Use of Pesticides

THE CONFERENCE

Recognising that increased food production is a high priority need in many parts of the world and that this need cannot be met without the use of indispensable agricultural inputs, such as pesticides.

Noting that FAO’s study entitled Agriculture: toward 2000 foresees a steady increase in the worldwide use of pesticides.

Convinced that such growth in pesticide use is likely to take place in spite of necessary intensive parallel efforts, to introduce biological and integrated pest control systems.

Acknowledging that pesticides can be hazardous to humans and the environment and that immediate action must be taken by all concerned, including governments, manufacturers, traders and users, to eliminate, as much as possible and within the scope of their responsibility, unreasonable risks, not only in the country of origin but also in the countries to which pesticides may be exported.

Being aware that the requirements for the safe and proper use of pesticides in some developed countries have led to the adoption of complex systems of regulations and of enforcement mechanisms, but that many other countries have neither such mechanisms nor the necessary legislation, regulations or infrastructures to control the import, availability, sale or use of pesticides.

Convinced that additional efforts are needed to enable such countries to control pesticides more effectively and to assess the hazards which could result from their use or misuse.

Recognising that a voluntary Code of Conduct, based on internationally agreed technical guidelines, would provide a practical framework for the control of pesticides, especially in countries that do not have adequate pesticide registration and control schemes.

Noting that such a draft Code was reviewed by the Committee on Agriculture at its Eight Session, and endorsed by the Council at its Eighty-eight Session.

Having further noted the conclusions and recommendations of these bodies,
1. Hereby adopts a voluntary International Code of Conduct on the Distribution and Use of Pesticides, as given in the annex to this Resolution;

2. Recommends that all FAO Member Nations promote the use of this Code in the interests of safer and more efficient use of pesticides and of increased food production;

3. Requests governments to monitor the observance of the Code in collaboration with the Director-General who will report periodically to the committee on Agriculture;

4. Invites other United Nations agencies and other international organisations to collaborate in this endeavour within their respective spheres of competence.

(Adopted 28 November 1985)
References


ADDITIONAL TECHNICAL GUIDELINES ADOPTED AFTER THE FAO CONFERENCE OF 1985 AND PUBLISHED UP TO MAY 1999

- Pictograms for pesticide labels, Rome, FAO.


- Addenda to the guidelines for the registration and control of pesticides. FAO.


- Guidelines for retail distribution of pesticides, with particular reference to storage and handling at the point of supply to users in developing countries. FAO. Rome, 1988.
