GUIDELINES ON

GOOD PRACTICE FOR GROUND AND AERIAL APPLICATION OF PESTICIDES

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
GUIDELINES ON GOOD PRACTICE FOR GROUND
AND AERIAL APPLICATION OF PESTICIDES

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1. **INTRODUCTION**

This Guideline has been prepared to assist pesticide regulatory officials to carry out post-registration activities described in the FAO Guidelines on Post-Registration Surveillance and Other Activities in the Field of Pesticides. It presents further detail for use in developing training sessions and information booklets or other aids to help assure the proper application of pesticides.

2. **CONTROL MEASURES**

There are a number of methods which can be used to control pests, diseases and weeds. These include:

2.1 **Natural Control** - Within nature there are a number of forms of control - e.g. climatic, natural enemies (parasites and predators), availability of food, space, naturally occurring resistance.

2.2 **Applied Control** - These include a range of practices, developed or modified by man, as may be necessary when natural control measures fail to control the pest. Some important methods are:

   2.2.1 Cultural Control - modifying cultivation practices, removal of host plants, crop rotation, modification of planting dates.

   2.2.2 Mechanical Control - hand weeding, light traps, hand hoeing.

   2.2.3 Physical Control - hot water treatment, grain drying.

   2.2.4 Biological Control - using natural enemies to control the pests, either releasing these into the environment or allowing natural dissemination.

   2.2.5 Chemical control - pesticides.

2.3 **Integrated Pest Control** - In many cases acceptable control calls for a combination of some or all of the above methods to keep pest populations down to an acceptable level. The utilisation of integrated pest management (IPM) makes use of all available means of control, as reflected in the definition in the FAO International Code Of Conduct on the Distribution and Use of Pesticides.

"Integrated Pest Management means a pest management system that, in the context of the associated environment and the population dynamics of the pest species, utilizes all suitable techniques and methods in as compatible a manner as possible and maintains the pest population at levels below those causing economically unacceptable damage or loss"
3. **WHAT TO USE**

In order to control pests and diseases the farmer must:

- identify the pest,
- know what control methods are available,
- evaluate the benefits/risks of each method or combination of
- choose the methods that are host effective yet cause the least harm to man and the environment,
- know how to use the selected control method(s) properly, know what regulations apply.

Pesticides are but one of the control measures which can be used to control pests and diseases. This Guideline develops some common sense practices, which when followed, will assist in ensuring that pesticide are safely and effectively applied.

4. **BEFORE APPLYING THE PESTICIDE**

4.1 Correctly identify the problem and estimate the extent of damage being done - if not sure, seek advice from a Government advisory officer, company adviser or neighbour.

4.2 Seek advice on alternative methods of control and use a pesticide only where necessary - remember there may be some cases where the side effects of a pesticide may make the problem worse.

4.3 Use only the pesticide recommended for the problem. If several materials are available, use the one which has the lowest hazard - not only to the applicator but to neighbours.

4.4 - **READ THE LABEL** - make sure the pesticide is:

- suitable for the intended use
- suitable for application to the particular crop at the time proposed
- able to be applied in time to leave the required withholding period between spraying and harvest or grazing
- the one that is least likely to cause drift problems, if it drifts off the target
- one which is least likely to cause problems to livestock, beneficial insects and the environment
4.5 Make sure the appropriate protective clothing, as recommended on the label, is available and is in a fit condition to wear - ensure that it has been washed since last using.

4.6 Make sure that all those individuals that are involved with the application are fully aware of the operation - take time out to fully brief all those involved in all aspects of the application.

4.7 Ensure that the right application machinery for the job is used and that it is in good order - it is good practice to always check the equipment before it is put away to see that it is in good repair.

4.8 Check to ensure that the equipment is clean and that any worn parts are replaced with correct new parts - keep a limited supply of spares on hand; e.g. washers, nozzles.

4.9 Ensure that the equipment is leakproof and correctly calibrated - obtain calibration charts from Government advisers, Company representatives or machinery suppliers. Faulty calibration can cost money, and render the operation unsafe.

4.10 Make sure there is enough pesticide on hand to complete the job - don't run out half way through, as by the time further supplies are available it may be too late as the pest may have already done the damage.

4.11 Warn neighbours of the intended application, especially if they are close to the area intended to be sprayed - good neighbourliness may save a lot of problems later.

5. WHILE MIXING THE PESTICIDE AND DURING APPLICATION

5.1 Wear the required protective clothing. If it becomes contaminated, remove it and replace with clean clothing - wet saturated clothing provides an ideal source for skin absorption.

5.2 DO NOT work in wet contaminated clothing

5.3 Try not to work alone when using the more hazardous materials - this is very important when spraying in an isolated area. If adversely affected, the operator may not be able to obtain help.

5.4 Never allow children or unauthorized people near the mixing area - dregs can kill - a number of children have died because of obtaining access to dregs in the bottom of an apparently empty container.
5.5 Recheck the instructions on the label - don't rely on memory - use rates are many and varied.

5.6 Avoid spilling the pesticide on the skin particularly the concentrate - pour liquid formulations carefully to avoid splashing. Be careful to avoid powder formulations dusting up into the face. If the pesticide is spilt on the skin, wash it off immediately.

5.7 Never eat, drink or smoke while mixing or applying pesticides- avoid practice which may increase the risk of absorption.

5.8 Have clean water on hand for washing - very important before eating, smoking or going home after the job.

5.9 Never blow out clogged nozzles with the mouth.

5.10 Do not spray crops in flower or when weeds which may be attractive to bees are flowering - spray highly hazardous materials in the evening when the bees are not foraging -remember bees are working for you.

5.11 Spray in such a way so as to reduce drift by:

- not spraying in a strong wind. The safest condition is when there is a steady breeze of less than 5 km/h blowing away from a sensitive area.

- keeping the nozzles at an appropriate distance from the nozzle.

- use appropriate pump pressure. High pressures produce more fine droplets which drift further off the target area than bigger droplets. For boom spraying it is seldom necessary to exceed pressures of 300 kPa, and for gun spraying pressures in excess of 2000 kPa are seldom necessary.

- DO NOT SPRAY if wind conditions are not suitable.

<table>
<thead>
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<th>Description</th>
<th>Approx Air Speed</th>
<th>Visible Signs</th>
<th>Spraying</th>
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<tr>
<td>Calm</td>
<td>&lt; 2 km/h</td>
<td>Smoke rises vertically</td>
<td>Avoid</td>
</tr>
<tr>
<td>Light Air</td>
<td>2-3 km/h</td>
<td>Direction shown by smoke drift</td>
<td>Avoid</td>
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</table>
Light Breeze 3-7 km/h Leaves rustle, Ideal
wind felt on face

Gentle Breeze 7-10 km/h Leaves and twigs Avoid
using in constant motion herbicides

Moderate not 10-15 km/h Small branches move. Application
not Raises dust and moves loose paper. advised

5.12 Never leave containers of concentrate unattended in the field -- not only children but also stock can gain access, often with disastrous results.

5.13 Provide proper supervision to all those handling or applying the pesticide - make sure everyone involved knows what is going on.

6. **AFTER APPLICATION**

6.1 Return any unused pesticide to the store or secure area.

6.2 Dispose of empty containers. (See FAO Guidelines for the Disposal of Waste Pesticide and Pesticide Containers on the Farm)

6.3 Safely dispose of any residual pesticides left in the spray tank. (As per above FAO Guidelines)

6.4 Clean protective clothing and wash hands or any other part of body which may be contaminated.

6.5 Clean the sprayer and decontaminate if necessary before changing from one type of pesticide to another.

6.6 Complete spraying records including amount of pesticide used, date of application, stage of growth of the crop, weather conditions at the time of spraying and any other appropriate details.

6.7 Do not allow other persons to enter the treated area for the required period if re-entry restrictions apply to the pesticide used.

7. **AERIAL APPLICATION**
While many of the points in paras 4, 5 and 6 apply to aerial applications, because of the size of the operation and the number of personnel involved, the following additional points should be noted.

7.1 The Pilot

7.1.1 The pilot should hold the appropriate licence/permit/ authority to apply the particular pesticide and be able to demonstrate his competence in the use of the pesticide chosen with respect to:
   (a) suitability for that particular operation.
   (b) application rates.
   (c) effects on the target area.
   (d) hazards to man, and effects they may have on non-target vegetation and animals, and special precautions to be taken because of this; and
   (e) first aid measures

7.1.2 The pilot should only apply pesticides after he has taken steps to ensure that:
   (a) persons not involved in the application are outside the area to be treated and are sufficiently distant to avoid contact from any drift;
   (b) non-target crops, livestock (including fish and bees) or other property, including any body of water, which may be damaged or contaminated by the pesticide are not within the area to be treated, nor so nearby that there is a reasonable possibility of damage by drift; and
   (c) the pesticide will be substantially confined to the area to be treated.

7.1.3 The pilot should halt operations immediately if:
   (a) any person not involved in the operation is likely to be exposed to a hazardous pesticide,
   (b) a clear and immediate health hazard from drift occurs, or is likely to occur; and
   (c) vegetation, animals or property outside the target area have been or are likely to be exposed to a pesticide by drift.

7.1.4 The pilot must take precautions against becoming contaminated. To do this he must:
(a) avoid all physical contact with the pesticides, contaminated application equipment, and contaminated surfaces,

(b) wear appropriate protective clothing, which is changed every day or more often if it becomes contaminated,

(c) shower and change as soon as possible after the flying is finished (or if contaminated by pesticides) and put used clothing out for washing,

(d) not act as loader or mixer, clear or adjust spray nozzles, clean the aircraft of pesticides, fly with leaky application equipment, or fly through own spray cloud,

(e) wash face, forearms and hands before eating, drinking or smoking and eat well away from the loading area,

(f) ensure that all pesticide pressure lines except those leading to pressure gauges are mounted outside the cockpit so as to avoid exposure in the event of accidental leaking,

(g) have taken steps to have appropriate tests to monitor exposure before the beginning of the season and during the season at regular intervals.
7.1.5 If the aircraft is likely to pass over a marker or other person, the pilot should ensure that the application equipment is switched off.

7.2 **Loaders**

Surveys have shown that of the spraying team, loaders are the most frequently contaminated by pesticides.

7.2.1 Loaders should be familiar with:

(a) the common and/or the chemical names and trade names of the pesticides that they are handling,

(b) hazards to humans and safety precautions to be followed because of this; and

(c) first-aid measures.

7.2.2 Loaders should be competent in:

(a) the correct method of measuring, preparing, mixing and loading of the pesticide,

(b) the correct method of storing and handling the product,

(c) the accepted method of cleaning up spills, and disposal of unwanted pesticide, prepared spray and containers,

(d) the actions, effects and hazards of the pesticides being used including the ways in which they are absorbed,

(e) first aid; and,

(f) the availability of medical attention.

7.2.3 Loaders must wear the specified protective clothing and properly maintain it.

7.3 **Markers**

The use of human markers should be avoided wherever possible. Markers are in a potentially hazardous situation and special care to avoid exposure to pesticides, especially by way of skin absorption, should be taken.

7.3.1 Markers should have instruction in:
(a) safety procedures they should take to avoid exposure to pesticides,
(b) the names, hazards and routes of absorption of the pesticides being used,
(c) decontamination and first aid procedures; and
(d) safety procedures in agricultural flying.

7.3.2 Markers should:

(a) wear protective clothing (a coverall, boots or shoes, and a washable wide brimmed hat) which must be changed for clean clothing daily,
(b) shower and change as soon as the spraying is finished for the day or more frequently if clothing becomes wet,
(c) when marking:
   (i) always work into wind,
   (ii) never stand where exposure to pesticides or drift is most obvious,
   (iii) where possible stand at least 50 metres beyond the edge of the target area so that the aircraft is not spraying when it passes,
   (iv) do not touch or walk through freshly sprayed crops,
   (v) move away upwind from mark when the aircraft is approaching and 300 metres away on a spray run. If unable to get clear of aircraft, lie face down with hands beneath the body,
   (vi) at the turning end, move upwind when the aircraft is completing its turn and before the wings are level.

8. CONTROLLED DROPLET APPLICATION

Controlled droplet application (CDA), utilises the correct droplet size to obtain maximum control of the target organism as well as maintaining a uniformity of droplet size. Different size droplets are used for herbicide, fungicide and insecticide application. Application is simple, with a spinning disc being driven by a battery and the pesticide falling by gravity when the bottle is inverted, onto the spinning disc. Either drift or placement spraying may be used.

8.1 Drift Spraying

8.1.1 Note wind direction and walk progressively upward across the field through the untreated crop - smoke can be used to assess wind.
8.1.2 Check speed of disc and the batteries before starting to spray.
8.1.3 Hold disc about 1 metre above the crop and if there is a second sprayer operating ensure there is no drift towards him.

8.1.4 When the end of the row is reached, invert the sprayer to stop the flow.

8.1.5 Do not spray in extreme conditions, i.e. dead calm or in strong gusty wind.

8.2 Placement Spraying

8.2.1 Hold disc a few centimetres above the weeds to be sprayed.

8.2.2 Hold the machine in such a way so that you need not walk through the sprayed area.

8.2.3 When the end of the row is reached, invert the sprayer to stop the flow.

8.2.4 Do not spray in extreme conditions, i.e. dead calm or in gusty/ windy conditions.