



IPM PACKAGE NO. 59



INTEGRATED PEST MANAGEMENT PACKAGE

FOR
AMLA



Government of India
Ministry of Agriculture
Department of Agriculture & Cooperation
Directorate of Plant Protection, Quarantine & Storage
N. H. IV, Faridabad - 121 001.

IPM PACKAGE FOR AMLA

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Grams : 'PROTECTION'



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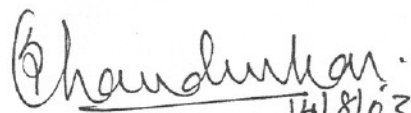
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FOREWARD

Integrated Pest Management (IPM) approach has been globally accepted for achieving sustainability in agriculture. It has become more relevant due to a number of advantages like safety to environment, pesticide-free food commodities, low input cost based Crop Production Programme etc. Though IPM approach has been taken up since 1981, its impact has not been felt until 1994. Human Resource Development has helped to sensitise extension functionaries and farmers about the usefulness of IPM.

For successful implementation of IPM, the scattered information on various components of this eco-friendly approach forms basic necessity. In this direction, initial attempts were made in 1992 to harmonise the IPM Package of Practices of various crops. Subsequently, concerted efforts were made in 1998, 2001, 2002 and 2003 to update and develop IPM Package of Practices for agricultural and horticultural crops. Presently, IPM Package of Practices for 77 crops have been finalized to help the extension workers and farmers to manage the pests and diseases and to minimize the over use/misuse of chemical pesticides. Efforts have been made to incorporate the relevant available technical input provided by the scientists of ICAR Institutes/ SAUs and State Departments of Agriculture/Horticulture. However, suggestions for further improvement in future publication/ revision will be of immense help. Hopefully, these IPM Package of Practices will be useful for the Researchers, Plant Protection Workers and Farmers alike.


(P. S. CHANDURKAR)
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P R E F A C E

In order to minimize the indiscriminate and injudicious use of chemical pesticides, INTEGRATED PEST MANAGEMENT (IPM) has been enshrined as cardinal principle of Plant Protection in the overall Crop Protection Programme under the National Agricultural Policy of the Govt. of India. IPM is an eco-friendly approach for managing pest and disease problems encompassing available methods and techniques of pest control such as cultural, mechanical, biological and chemical in a compatible and scientific manner. The greater emphasis has been given on biological control including use of biopesticides.

With a view to provide technical knowledge to the extension functionaries and farmers in the States, first National Workshop on IPM for harmonization of Package of Practices was organized at National Plant Protection Training Institute (NPPTI), Hyderabad during June 29-30, 1992. Subsequently workshops were organized on April 15-17, 1998 and Nov. 5-6, 1998 at the Directorate of Plant Protection, Quarantine & Storage, Faridabad and IPM Package of Practices for 20 crops were finalized on rice, cotton, vegetables, pulses and oilseeds. In this series, two National Workshops on IPM have been conducted at NPPTI, Hyderabad and Dte. of PPQ&S, Faridabad during 14-17, 2001 and Feb. 20-22, 2002 respectively to update 20 available IPM Packages and develop 31 new IPM Packages especially for horticultural crops. Sixth and Seventh National Workshop held at Central Insecticides Laboratory, Faridabad on 4th-5th July, 2002 and 9th-10th January, 2003 respectively for 18 IPM Packages and Eighth National Workshop was held at NPPTI, Hyderabad on 28th-29th May, 2003 for 8 IPM Packages. In these Workshops, 77 IPM Package of Practices for cereal crops (Rice, Wheat, Maize, Sorghum, Millets), commercial crops (Cotton, Sugarcane, Tobacco, Tea, Betelvine, Saffron), pulse crops (Pigeonpea, Gram, Black gram/Green gram, Pea, Rajma), oilseeds (Groundnut, Soybean, Rapeseed/Mustard, Sesame, Olive, Safflower, Castor, Sunflower, Oilpalm), vegetables (Potato, Onion, Tomato, Brinjal, Okra, Chillies, Cruciferous vegetables, Leguminous vegetables, Cucurbitaceous vegetables, Broccoli, Spinach, Lablab bean, Garlic), fruits (Citrus, Banana, Apple, Mango, Guava, Grapes, Jackfruit, Pineapple, Sapota, Pomegranate, Litchi, Papaya, Apricot, Peach, Pear, Cherry, Walnut, Ber, Amla, Loquat, Strawberry, Watermelon, Fig, Phalsa, Persimmon, Custard apple, Raspberry, Kiwi, Passion fruit), spice and plantation crops (Small Cardamom, Large Cardamom, Black Pepper, Ginger, Coriander, Cumin, Fennel, Coconut, Cashew and Arecanut) have been finalized.

IPM technology manages the pest population in such a manner that economic loss is avoided and adverse side effects of chemical pesticides are minimized. The IPM packages encompass various management strategies for containing the pest and disease problems. Pest monitoring is one of the important components of IPM to take proper decision to manage any pest problem. It can be done through Agro-Ecosystem Analysis (AESA), field scouting, light, pheromone, sticky/yellow pan traps. The economic threshold levels (ETL) of important pests and diseases are also given in the packages to take appropriate control measures when pest population crosses ETL.

These IPM packages developed with the technical inputs from experts from Indian Council of Agricultural Research, State Agricultural Universities, Central Directorate of Plant Protection, Pesticide Industries and State Departments of Agriculture/Horticulture will provide technical backup in the management of pests, diseases, weeds, nematodes and rodents in the agriculture and horticulture. These will also be useful in reducing the pesticide residues in agricultural commodities and would also help in the management of pests/diseases/weeds/nematodes which may get inadvertently introduced in the country.

IPM Package of Practices for agricultural and horticultural crops will be helpful to minimize the ill-effects of chemical pesticides to promote the IPM for sustainable production. These IPM packages will be useful for the researchers, extension workers and farmers alike who are engaged in the agricultural practices.

7th October, 2003



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- | | | |
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IPM PACKAGE FOR AMLA

I. MAJOR PESTS:

A. Pests of National Significance

1. Insect Pests

- 1.1 Bark eating caterpillar (*Inderbela tetraoris*)
- 1.2 Aphical twig gall maker (*Betonsa stylophora*)
- 1.3 Mealy bugs
- 1.4 Aphids

2. Diseases

- 2.1 Leaf rust (*Phakopsora phyllanthi* Diet)
- 2.2 Ring rust (*Ravenelia emblicae* Syd.)

3. Disorder

- 3.1 Necrosis

4. Weeds

- 4.1 *Cyperus rotundus*
- 4.2 *Digitaria sanguinalis*
- 4.3 *Setaria glaucae*
- 4.4 *Cleome viscosa*
- 4.5 *Tridox procumbent*
- 4.6 *Cynodon dactylon*

5. Rodents

- 5.1 Lesser bandicoot (*Bandicota bengalensis*)
- 5.2 Soft furred field rat (*Melardia meltada*)
- 5.3 House rat (*Rattus rattus*)

6. Birds

- 6.1 Rose ringed parakeet.

B. Pests of Regional Significance

1. Insect Pest

- 1.1 Pomegranate butterfly (*Virachola isocrates*)
- 1.2 Fruit sucking moths (*Achaea sp.*)
- 1.3 Hairy caterpillars (*Euproctis spp.*)
- 1.4 Leaf roller (*Gracillaria theivora*)
- 1.5 Leaf miner
- 1.6 White fly

2. Diseases

- 2.1 Fruit rot

3. Weeds

- 3.1 *Panicum repens*
- 3.2 *Trainthema monogynae*

II. PEST MONITERING

1. Roving Survey

The object of survey is to monitor the initial development of pests and diseases in endemic areas. In the beginning of crop season, survey routes based upon the endemic area are required to be identified to undertake the surveys. Based upon the roving survey, the state extension functionaries have to concentrate for greater efforts at block and village level as well as through farmers to initiate field scouting. Farmers should be mobilised to observe the pest and disease occurrence by field scouting at the intervals as stipulated here under. The plant protection measures are required to be taken as per result of fields scouting.

2. Agro-Ecosystem analysis (AESA)

AESA is an approach, which can be gainfully employed by extension functionaries and farmers to analyse field situation with regard to pests, defenders, soil condition, plant health, influence of climatic factors and their interrelationship for growing healthy fruit crop. Such a critical analysis of the field situation will help in taking appropriate decision on management practices. Basic component of AESA are: -

- 1. Plant health at different stages,
- 2. Pest and defender population dynamics
- 3. Soil conditions
- 4. Climatic factors
- 5. Farmer past experiences

III. INTEGRATED PEST MANAGEMENT STRATEGIES

A. Cultural Practices

1. Remove & destroy all the infested fruits at regular intervals.
2. Keep the orchard clean & avoid over crowding of trees.
3. Prune & destroy the affected plant part to prevent further spread and build up of infection/inoculum.
4. Ants population which attract the sap suckers be controlled.
5. Weeds which acts as alternate hosts should be removed. Orchard sanitation is advantageous in keeping the pest population low.

B. Mechanical practices

1. Kill the caterpillars mechanically by inserting a thin wire/iron spike into the holes made by the larvae.
2. Galls bearing twigs be pruned.
3. Destroy the larvae inside by crushing the galls or burning the twig.
4. Use reflective ribbons in N-S direction to check birds damage.

C. Biological practices:

For effective pest management conserve the natural enemies population. Some of the important ones are spiders, coccinellids, beetles, cyrysopa, and at some places entomogenous fungus *Aspergillus condidus* causes considerable mortality to larvae of bark eating caterpillar during the rainy season.

D. Botanical pesticides

1. NSKE @ 5% helps in reducing the pest population.

E. Chemical control measures:

1. Remove the webbing and inject each borer hole with 5 ml emulsion prepared by diluting 2 ml dichlorvos or 5 ml methyl parathion or 30 ml endosulfan or 40 g carbaryl in 10 lit. water during Oct-November and again in Feb-March. The treated holes should be plugged with mud and those found opened should be retreated. This is very effective against bark eating caterpillar.

2. In case of severe infestation by sucking pest spray 1.0 lit. diazinon or quinalphos or 500 ml dimethoate or 600 ml oxydemeton methyl in 500 lit. of water per acre.
3. Spray of 0.5 to 0.6% borax in the month of September-October can minimise the problem of Necrosis. Combined spray of $ZnSO_4$ (0.4%), $CuSO_4$ (0.4%) and borax (0.47 to 0.6%) have been found also effective.
4. Spray of Dithane 2-78 (0.2%) has been found effective against rust.

IV. BASIC PRECAUTIONS IN PESTICIDE USAGES

Purchase

1. Purchase only JUST required quantity e.g. 100, 250, 500 or 1000 ml for single application in specified area.
2. Do not purchase leaking containers, loose, unsealed or torn bags.
3. Do not purchase pesticides without proper / approved LABELS.

Storage

1. Avoid storage of pesticides in the house premises.
2. Keep only in original container with intact seal.
3. Do not transfer pesticides to other container.
4. Never keep them together with food or feed / fodder.
5. Keep away from the reach of children and livestock.
6. Do not expose to Sun-light or rain water.
7. Do not store weedicides along with other pesticides.

Handling

1. Never carry / transport pesticides along with food materials.
2. Avoid carrying bulk pesticides (dusts / granules) on head, shoulders or on the back.

Precautions for Preparing Spray Solution

1. Use clean water.
2. Always protect your NOSE, EYES, MOUTH, EARS and HANDS.
3. Use hand gloves, face mask and cover head with cap.
4. Use polythene bags as hand gloves, handkerchiefs or piece of clean cloth as mask and a cap or towel to cover the head (Do not use polythene bag contaminated with pesticides).
5. Read the label on the container before preparing spray solution.
6. Prepare spray solution as per requirement.
7. Do not mix granules with water.

8. Concentrated pesticides must not fall on hands etc., while opening sealed containers. Do not smell the sprayer tank.
9. Avoid spilling of pesticide solution while filling the sprayer tank.
10. Do not eat, drink, smoke or chew while preparing solution.

Equipment

1. Select right kind of equipment
2. Do not use leaky, defective equipment
3. Select right kind of nozzle.
4. Don't blow / clean clogged-nozzle with mouth. Use old toothbrush tied with the sprayer and clean with water.
5. Do not use same sprayer for weedicide and insecticide.

Precautions for applying pesticides

1. Apply only at recommended doses and dilution.
2. Do not apply on hot sunny day or strong windy condition.
3. Do not apply just before the rains and also after the rains.
4. Do not apply against the wind direction.
5. Emulsifiable concentrate formulations should not be used for spraying with battery operated ULV sprayer.
6. Wash the sprayer and bucket etc. with soap water after spraying.
7. Containers, buckets etc., used for mixing pesticides should not be used for domestic purposes.
8. Avoid entry of animals and workers in the fields immediately after the spraying.

Disposal

1. Left over spray solution should not be drained in ponds or water lines etc. Throw it in barren isolated area, if possible.
2. The used / empty containers should be crushed with a stone / stick and buried deep into soil away from water source.
3. Never re-use empty pesticide container for any purpose.