



IPM PACKAGE NO. 71



INTEGRATED PEST MANAGEMENT PACKAGE

**FOR
PHALSA**



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 PHALSA

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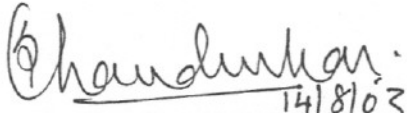
DIRECTORATE OF PLANT PROTECTION, QUARANTINE & STORAGE
N. H. IV, FARIDABAD - 121 001 (HARYANA)

DR. P. S. CHANDURKAR
Plant Protection Adviser
to the Government of India

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, Cucurbitacious 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 (AESAs), 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.

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(A. D. Pawar)
Addl. PPA-cum-Director(IPM)

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- I. Coordinator : Dr. A. D. Pawar, Addl. PPA-cum-Director (IPM)
Dte. Of PPQ&S, Faridabad.
- II. Co-coordinator : Dr. B. G. Naik, Addl. PPA-cum-Director
NPPTI, Hyderabad.

Sh. V.K. Yadav, Joint Director (IPM),
Sh. D.D.K. Sharma, DD(PP)
Dte. of PPQ&S, Faridabad.
- III. Chairman : Dr. M. V. B. Rao, DD(PP),
Technical Session NPPTI, Hyderabad.
- IV. Co-Chairman : Dr. Jasvir Singh, AD(E)
Technical Session CIPMC, Jalandhar.
- V. Expert input :
1. Dr. Bhaskar Tripathy, DD(WS), NPPTI, Hyderabad.
2. Dr. Prasad, Nematologist, Dte. of Rice Research, Hyd.
3. Sh. A. K. Purkar, AD(E), CIPMC, Nagpur
4. Sh. S. M. Singh, AD(E), CIPMC, Faridabad
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1. Sh. S. P. Singh, APPO, Dte. of PPQ&S, Faridabad.
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IPM PACKAGE FOR PHALSA

(*Grewia asiatica*)

I. MAJOR PESTS

1. Insect Pests

- | | | |
|-----|-------------------------|---------------------------------|
| 1.1 | Phalsa bug | (<i>Gargara mixta</i>) |
| 1.2 | Mealy bug | (<i>Drosicha mangiferae</i>) |
| 1.3 | Bark eating caterpillar | (<i>Inderbella tetraonis</i>) |
| 1.4 | Mango hairy caterpillar | (<i>Euproctis fraterna</i>) |
| 1.5 | Psylla | (<i>Psylla</i> sp.) |
| 1.6 | Brown beetle | (<i>Anomala</i> sp.) |
| 1.7 | Phalsa beetle | (<i>Oxycetonia</i> spp.) |
| 1.8 | Phalsa caterpillar | (<i>Giaura septica</i>) |

2. Diseases:

- | | | |
|-----|----------------------|---------------------------------|
| 2.1 | Leaf-spot/Brown spot | (<i>Cercospora grewiae</i>) |
| 2.2 | Rust | (<i>Dasturella grewiae</i>) |
| 2.3 | Pin spot | (<i>Phyllosticta grewiae</i>) |

3. Nematodes

- | | | |
|-----|--------------------|-------------------------------|
| 3.1 | Root knot nematode | (<i>Meloidogyne</i> sp.) |
| 3.2 | Spiral nematode | (<i>Helicotylenchus</i> sp.) |

4. Weeds

- | | |
|-----|--------------------------------|
| 4.1 | <i>Cyperus rotundus</i> |
| 4.2 | <i>Tridax procumbens</i> |
| 4.3 | <i>Lagasca mollis</i> |
| 4.4 | <i>Acanthospermum hispidum</i> |
| 4.5 | <i>Digitaria sanguinalis</i> |

5. Rodents

- 5.1 Soft furred field Rat (*Rattus melstada*)
- 5.2 Indian Mole Rat/Smaller bandicoot (*Bandicata bengalensis*)
- 5.3 Common House Rat (*Rattus rattus*)

II. PEST MONITORING

1. Agro Eco-system Analysis (AESAs):

AESA is an approach, which can be gainfully employed by extension functionaries and farmers to analyse field situations with regard to pests, defenders, soil conditions, plant health, the influence of climatic factors and their inter relationship for growing healthy crop. The basic components of AESA are:-

- 1. Plant health at different stages
- 2. Built-in-compensation abilities of the plants.
- 3. Pest and defender population dynamics.
- 4. Soil conditions.
- 5. Climatic factors.

2. Field Scouting:

AESA requires skill and so only the trained farmers can undertake this exercise. However, other farmers also can do field scouting in their fields at regular intervals to monitor the major pest situation. Simple field scouting on pest situation by the farmers helps to minimize pesticides usage to large extent.

3. Field Monitoring through Traps:

Setup light trap for monitoring Phalsa bug and adults of Bark eating caterpillars.
Use light trap 2-3 hours after sunset.

III. INTEGRATED PEST MANAGEMENT STRATEGIES:

1. Cultural Practices:

- 1.1 Summer ploughing.
- 1.2 Soil solarization with a thin polythene sheet for 30-40 days during hot summer.
- 1.3 Racking of soil around the tree trunks and mixing with some soil dust in the early part of November for the control of early instar mealy bug.
- 1.4 Application of Neem cake @ 2 kg/tree/annum.
- 1.5 Pruning of plants at 0.9 to 1.2 m height from soil surface during December-January for better quality fruit.
- 1.6 Trunk banding with 300 mm alkathene sheet 400 gauge.
- 1.7 Growing sunhemp as trap crop and marigold as repellent.
- 1.8 Proper drainage, as the crop is water sensitive.

2. Mechanical Practices

- 2.1 Use light trap for collection and killing adults of hairy caterpillar.
- 2.2 Use of light traps to monitor and control of defoliating beetles before onset of monsoon.
- 2.3 Bark eating caterpillar infested branches may be pruned and destroyed. The caterpillars may also be killed by inserting pointed iron peg.
- 2.4 Inject kerosene/petrol in holes and plugging with mud during December-January after pruning once a year.
- 2.5 Collect and destroy early instar gregariously feeding larvae of hairy caterpillar.
- 2.6 Keeping the orchards free from weeds to avoid pest infestation.

3. Bio-control Practices:

3.1 Conservation:

Conservation of parasites, general predators like, coccinellids, Spiders, Reduvid bug, Predatory Thrips, Dragonfly, Damselfly & Wasps which

helps in suppressing the pest population. Avoiding unnecessary spray is the best way to conserve them.

3.2 Augmentation:

- 3.2.1 Release of egg parasitoid *Trichogramma chilonis* @ 50,000/ha against hairy caterpillar.
- 3.2.2 Release of *Chrysoeprla carnea* against soft bodied insects.
- 3.2.3 Augmentation of reduvid bug against lepidopterans.
- 3.2.4 Use of 5% NSKE helps in reducing pest population.

4. Chemical Control Measures:

- 4.1 Application of Carbofuran 1-2 kg ai/ha at the time of nursery preparation for nematode management.
- 4.2 Root dip in Chlorpyrifos @ 0.02% before planting for nematodes and soil borne insects as a repellent.
- 4.3 Holes of bark eating caterpillar may be injected with 0.013% dichlorvos 76 WSC solution and plaster with mud, after pruning.
- 4.4 Spray dichlorvos 76 WSC 0.05% solution if mealy bugs are still noticed on the trees.
- 4.5 Spray dimethoate 0.03% for psylla or any other sucking pest.
- 4.6 Apply wet sulphur @ 0.2% or zineb @ 0.2% for rust and carbendazim @ 0.1% or copper oxychloride @ 0.3% against leaf spot.

5. Rodent Management

- 5.1 Adopt orchard sanitation.
- 5.2 Don't cultivate fodder crops especially oats in the orchards.
- 5.3 Make use of Bromodiolone concentrate in bait @ 0.005% a.i. in 2 applications at the interval of a fortnight.
- 5.4 Adoption of community approach.

6. **Weed Management:**

- 6.1 The common method of weed control is manual weeding by using small hand tools like KHURPI or cut lasses.
- 6.2 Power tiller can also be used for cultivating the inter-rows and between bushes. At least 3-4 cultivations in year are necessary to keep the weeds under check.
- 6.3 Cover cropping with short duration crops like beans & cowpea could also be done.

BASIC PRECAUTIONS IN PESTICIDE USAGES

A. 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.

B. 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.

C. Handling

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

D. 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.

E. 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 toothbrushes tied with the sprayer and clean with water.
5. Do not use same sprayer for weedicide and insecticide.

F. 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.

G. 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.