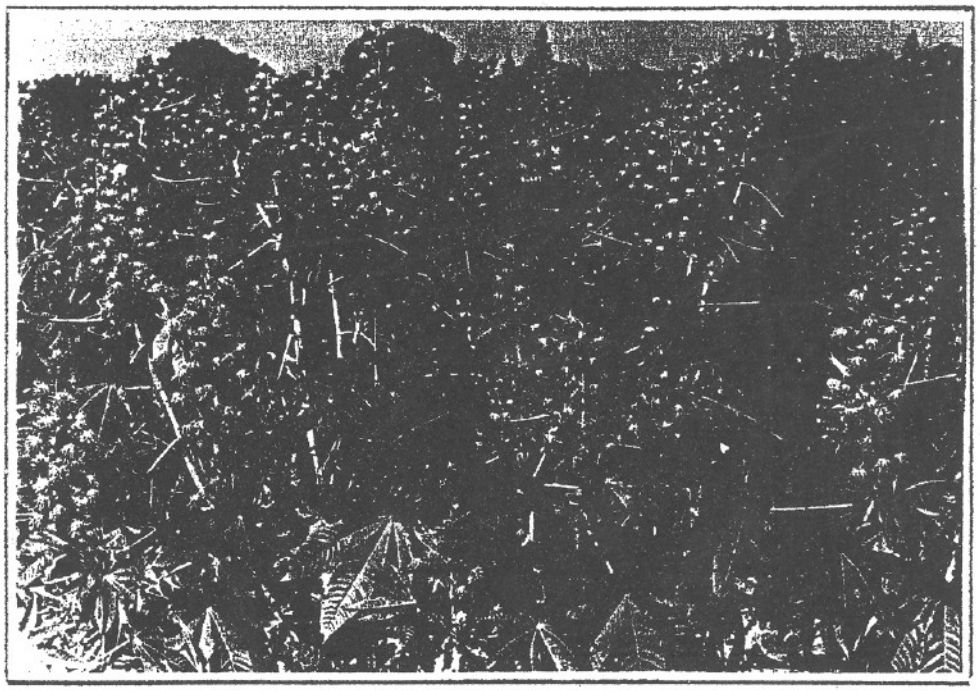
IPM PACKAGE NO. 14

INTEGRATED PEST MANAGEMENT PACKAGE

FOR

CASTOR



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

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IPM PACKAGE FOR CASTOR

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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 based Crop Production Progamme 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 and 2002 to update and develop IPM package of practices for agricultural and horticultural crops. Presently, IPM package of practices for 51 crops have been finalised to help the extension workers and farmers to manage the pests/ diseases and to minimise 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. 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.

April 1, 2002

(V. Ragunathan)

PREFACE

In order to minimise 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 harmonisation of Package of Practices was organized at National Plant Protection Training Institute (NPPTI), Hyderabad during June 29-30, 1992. Subsequently workshops were organized from April 15-17, 1998 and Nov. 5-6, 1998 at Directorate of Plant Protection, Quarantine & Storage, Faridabad and IPM package of practices for 20 crops were evolved 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 May 14-17, 2001 and Feb. 20-22, 2002 respectively to update 20 available IPM Packages and develop 31 new IPM Packages specially for Horticultural crops. In these workshops, 51 IPM Package of Practices for cereal crops (Rice, Wheat, Maize, Sorghum, Millets), commercial crops (Cotton, Sugarcane, Tobacco, Tea), pulse crops (Pigeonpea, Gram, Black gram/Green gram, Pea, Rajma), oilseeds (Groundnut, Soybean, Rapeseed/Mustard, Sesame, Safflower, Castor, Sunflower, Oilpalm), vegetables (Potato, Onion, Tomato, Brinjal, Okra, Chillies, Cruciferous vegetables, Leguminous vegetables, Cucurbitacious vegatables), fruit crops (Citrus, Banana, Apple, Mango, Guava, Grapes, Pineapple, Sapota, Pomegranate, Litchi), spice and plantation crops (Small Cardamom, Large Cardamom, Black Pepper, Ginger, Coriander, Cumin, Fennel, Coconut, Cashew and Arecanut) have been finalised.

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 encompasses various management strategies for containing the pest and disease problems. Pest monitoring is also one of the important component 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 Agriculture 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 Indian Agriculture and Horticulture. These will also be useful in reducing the pesticide residues in exportable 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 packages will be useful for the researchers, extension workers and farmers alike who are engaged in the agricultural practices.

April 1, 2002

(A.D. Pawar)
Director (IPM)

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IPM PACKAGE FOR CASTOR

I. MAJOR PESTS

A. Pests of national significance

1. Insect pests:

1.1 Red hairy caterpillar (*Euproctis lunata)*
1.2 Bihar hairy caterpillar (*Spilosoma obliqua)*
1.3 Castor semi looper (*Achaea janata)*
1.4 Castor capsule borer (*Dichocrosis punctiferalis)*

2. Diseases :

2.1 Wilt
2.2 Botrytis gray rot

3. Weeds :

3.1 *Cyprus sp*
3.2 *Euphorbia sp.*

B. Pests of regional significance :

1. Insect pests :

1.1 Jassids (*Empoasca spp)*
1.2 Whitefly (*Trialeurodes ricini)*
1.3 Thrips (*Scirtothrips sp)*
1.4 Mites (*Tetranychus sp)*
1.5 Tobacco caterpillar (*Spodoptera litura)*
1.6 Castor slug caterpillar (*Latoia lepida)*

2. Diseases :

2.1 Microphormina
2.2 Phytopthora seedling blight
2.3 Collor rot.

II. PEST MONITORING:

1. Organise regular pest and disease monitoring and use potential biocontrol agents at 15 days intervals. Observations are taken at 5-10 Km distance at 10 spots per ha randomly and 10 plants per spot. Semilooper population may be recorded based on per plant. For hairy caterpillars, record egg masses and larvae per plant basis. Leaf hopper per leaves per plant along with hopper burn symptoms on 0-5 scale (0 free from damage, 5-100% hopper burn).

2. Install pheromone traps to monitor moth population of *Spodoptera litura* @ 10/ha.

III. ECONOMIC THRESHOLD LEVELS (ETLs)

Pest	ETL
1. Jassids	15-20 jassids/plant
2. Whitefly	8-10 adults/leaf or 20 nymphs/leaf
3. Semilooper	4-5 larvae/plant during vegetative phase of crop growth

IV. INTEGRATED PEST MANAGEMENT STRATEGIES:

A. Cultural practices :

1. Deep summer ploughing
2. Clean cultivation
3. Use wilt tolerant/resistant varieties like Jyoti, Jawala, GCH-4, GCH-5, DCH-32 and DCH-177.
4. Use tolerant/resistant varieties against jassids like Double bloom/triple bloom genotypes viz. GCH-4, GCH-5, DCS-9 and 48-1.
5. Avoid use of tripple bloom varieties in whitefly endemic areas and vice verca for jassids.
6. Seed treatment with *Trichoderma viride & T. harzianum* @ 4 gm/Kg seeds.
7. Seed treatment with Thiram or Captan 3 gm/Kg seeds or Carbendazim (0.1%) for wilt management.
8. Management of red hairy caterpillar (RHC) with light traps at vegetative phase. Dig trenches around the field to entrap and destroy migrating larvae.
9. Remove botrytis affected spikes and follow spot application of nitrogen 10 Kg/ha.

B. Mechanical control :

1. Collect and destroy egg masses and gregarious stage larvae of *Spodoptera litura* and *Spilosoma obliqua.*
2. Uproot and destroy diseased plants.

C. Biological control :

1. Conservation:

1.1 Conserve biocontrol agents like *Microplitis sp,. Cotesia sp.,* Spiders, mantids, *Trichogramma spp. and Eurytoma spp.*

1.2 Use bird perchers @ 15/ha in the initial stage of the crop.

2. Augmentation:

2.1 Seed treatment with *Trichoderma viride and Trichoderma harzianum* @ 4 gm/Kg seeds.

D. Chemical control :

Need based, judicious and safe application of pesticides are the most vital tripartite segments of chemical control measures under the ambit of IPM. It involves developing IPM skills to play safe with environment by proper crop health monitoring, observing ETL and conserving natural biocontrol potential before deciding in favour of use of chemical pesticides as a last resort.

1. Spray monocrotophos 0.05% or dimethoate 0.03% against jassids and whiteflies. Repeat if required after a fortnight.
2. Spray of monocrotophos 0.05% or *endosulphan 0.07% or *fenvalerate 0.02% or *quinalphos 0.05% or methyl parathion 0.05% against hairy caterpillars and semilooper.
3. Spary with monocrotophos 0.05% or dust the spikes with quinalphos 1.5% or methyl parathion 2% if more than 10% capsules are damaged.
4. Treat the seeds with Thiram or Captan @ 3g/kg of seed or spray *Copper oxychloride 3g/lit of water against seedling blight and fusarium wilt.
5. Spray *Carbendazim 0.05% before start of cyclonic monsoon to save from gray rot.
6. Spray *Copper oxychloride 0.3% or streptocycline 1g/10lit of water against bacterial leaf spot.

E. Weed management :

First hoeing 3 weeks after sowing followed by 2nd hoeing before initiation of first spikes.

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* Not as per approved usage under Insecticide Act 1968

CROP: CASTOR

\V. SAFETY PARAMETERS IN PESTICIDES USAGE

S. No	Name of pesticide	Classification as per Insecticides Rules, 1971	Colour of Toxicity Triangle	WHO classification by hazard	First aid measures	Symptoms of poisoning	Treatment of poisoning	Waiting period (No. of days)
INSECTICIDES ORGANOCHLORINE PESTICIDES								
1.	Endosulfan	Highly toxic	Yellow	Class II – Moderately Hazardous	Remove the person from the contaminated environment. In case of (a) Skin contact – Remove all contaminated clothings and immediately wash with lot of water and soap; (b) Eye contamination – Wash the eyes with plenty of cool and clean water; (c) Inhalation – Carry the person to the open fresh air, loosen the clothings around neck and chest, and (d) Ingestion – If the victim is fully conscious, induce vomiting by tickling back of the throat. Do not administer milk, alcohol and fatty substances. In case the person is unconscious make sure the breathing passage is kept clear without any obstruction. Victim's head should be little lowered and face should be turned to one side in the lying down position. In case of breathing difficulty, give mouth to mouth or mouth to nose breathing. Medical aid: Take the patient to the docotr/Primary Health Centre immediately along with the original container, leaflet and label.	Nausea, vomiting, restlessness, tremor, apprehension, convulsions, coma, respiratory failure and death	- Gastric lavage with 2-4 L. tap water – Catharsis with 30 gm. (10 oz) sodium sulphate in one cup of water - Barbiturates in appropriate dosages repeated as necessary for restlessness or convulsions - Watch breathing closely, aspirate, oxygen and/or artificial respiration, if needed. - Avoid oils, oil laxatives and epinephrine (Adrenalin) – do not give stimulants. - Give calcium gluconate (10% in 10 ml. Ampules) intra-venously every four hours.	

ORGANOPHOSPHATE PESTICIDES								
2.	Methyl parathion	Extremely toxic	Red	Class Ia – Extremely Hazardous		Mild – anorexia, headache, dizziness, weakness, anxiety, tremors of tongue and eyelids, miosis, impairment of visual acuity. Moderate- nausea, salivation, lacrimation, abdominal cramp, vomiting, sweating, slow pulse, muscular tremors, miosis. Severe – diarrhoea, pinpoint and non-reactive pupils, respiratory difficulty, pulmonary edema, cyanosis, loss of sphincter control, convulsions, coma and heart block.	For extreme symptoms of O.P poisoning, injection of atropine (2-4 mg., for adults, 0.5-1.0 mg for children) is recommended, repeated at 5-10 minute intervals until signs of atropinization occur. Speed is imperative - Atropine injection – 1 to 4 mg. Repeat 2 mg. when toxic symptoms begin to recur (15-16 minute intervals), Excessive salivation – good sign, more atropine needed; - Keep airways open, Aspirate, use oxygen, insert endotracheal tube. Do tracheotomy and give artificial respiration as needed. - For ingestion lavage stomach with 5% sodium bicarbonate, if not vomiting. For skin contact, wash with soap and water (eyes- wash with isotonic saline). Wear rubber gloves while washing contact areas. In addition to atropine give 2-PAM (2-pyridine aldoxime methiodide). 1 g and 0.25 g for infants	
3.	Profenophos	Highly toxic	Yellow	Class II – Moderately hazardous				
4.	Dimethoate	Highly toxic	Yellow	Class II – Moderately hazardous				

							intravenously at a slow rate over a period of 5 minutes and administer again periodically as indicated. More than one injection may be required. Avoid morphine, theophyllin, aminophyllin, barbiturates ofr phenothiazines. Do not give atropine to a cyanotic patient. Give artificial respiration first then administer atropine.	
CARBAMATES								
5.	Carbofuran	Extremely toxic	Red	Class I b – Highly hazardous		Constriction of pupils, salivation, profuse sweating, lassitude, muscle incoordination, nausea, vomiting, diarrhoea, epigastric pain, tightness in chest.	- Atropine injection 1 to 4 mg. Repeat 2 mg when toxic symptoms begin to recur (15-60 minute intervals). Excessive salivation – good sign, more atropine needed. - Keep airway open. Aspirate, use oxygen, insert endotracheal tube. Do tracheotomy and give artificial respiration as needed. - For ingestion, lavage stomach with 5% sodium bicarbonate, if not vomiting. For skin contact was with soap and water (eyes – wash with isotonic saline). Wear rubber gloves while washing contact	
6.	Carbaryl	Highly toxic	Yellow	Class II – Moderately hazardous				

							area. - Oxygen - Morphine, if needed. Avoid theophyllin and aminophyllin or barbiturates. 2-PAM and other oximes are not harmful and in fact contra indicated for routine usatge. Do not give atropine to a cyanotic patient. Give artificial respiration first then administer atropine.	
FUNGICIDES								
7.	Mancozeb	Slightly toxic	Green	Table 5 – Unlikely to present acute hazard in normal use.		Headache, palpitation, nausea, vomiting, flushed face, irritation of nose, throat eyes and skin etc.,	No specific antidote. Treatment is essentially symptomatic.	
8.	Carbendazim	Slightly toxic	Green	-do-				
SYNTHETIC PYRETHROIDS								
9.	Fenvalerate	Highly Toxic	Yellow	Class II – Moderately Hazardous		Headache, palpitation, nausea, vomiting, flushed face, irritation of nose, throat eyes and skin, allergic manifestations etc.,	No specific antidote. Treatment is essentially symptomatic.	

ANNEXURE - I

BASIC PRECAUTIONS IN PESTICIDE USAGE

A. **Purchase:**

1. Purchase only JUST required quantity e.g. 100,250,500 or 1000 g/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 your head with cap.
4. Use polyethylene bags as hand gloves, handkerchiefs or piece of clean cloth as mask and a cap or towel to cover the head (Do not use polyethylene 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.

11. The operator should protect his bare feet and hands with polyethylene bags.

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 tooth- brush tied with the sprayer and clean with water.

5. Do not use some sprayer for weedicide and insecticide.

F. **Precautions for applying pesticides:**

1. Apply only at recommended dose 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 burried deep into soil away from water source.

3. Never re-use empty pesticide container for any purpose.

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