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FIELD DIAGNOSTIC AND MANAGEMENT AID OF MAJOR INSECT PESTS

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ICAR (RC) FOR NEH REGION
KRISHI VIGYAN KENDRA HAILAKANDI
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PREFACE

India is the second largest rice producing country in the world and it is the principal food grain crop of North Eastern region. On the other part, vegetables are the integral part of our daily diet and are important source of vitamins, minerals and plant proteins. Moreover, vegetables are rapidly becoming an important source of income generation for the rural population. Biotic stresses by insect pests are the primary constrains in production of different crops in this region that leads to a considerable yield loss. These crops could be adequately protected with proper diagnosis and timely management of insect pests. Therefore, proper diagnosis and timely management of these insect pests are very much important. We attempted, in our information bulletin, to provide relevant information for better diagnosis and management of insect pests that will help the farmers and other followers in field situation.

We are thankful to all the staff of KVK Hailakandi for their support and help. We are highly indebted to the innumerable researchers whose findings are compiled in this information bulletin.

Authors

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INTRODUCTION

Insects, the most dominant group of animals exist in nearly all habitats and in most areas of the world. They form an important component of almost all types of ecosystems. They have an immense potentiality for rapid increase in population if the climatic conditions are favourable. Man's relation with insects exists since the drawn of human civilization. With the advancement in human civilization and increase in agricultural production, the damages caused by insect pests have recently assumed serious status, which cannot be ignored.

In the North Eastern region, insect excel all other animals in both diversity and magnitude. Pest problems in the region are innumerable and as many as 600 species of insects have assumed pest status in various crops through the decades.

Proper identification of the insect pests causing damage in a given situation is essential for collecting further information about the pest as well as for undertaking necessary control measures.

The thought behind bringing out this publication to help the farmers and the extension workers in identifying various insect pests of different crops in the field situation. Therefore, an attempt has been made to bring out this pictorial guide to help the followers in identifying and solving the pests problems.

MAJOR INSECT PESTS OF PADDY

1.Rice thrips, *Stenchaetothrips biformis*

Thrips

Hand test in the field

Damage symptoms in the field

Nature of damage

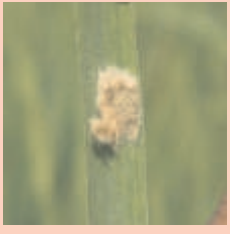
- Laceration of the tender leaves and suck the plant sap.
- Yellow (or) silvery streaks on the leaves of young seedlings.
- Terminal rolling and drying of leaves from tip to base.
- It causes damage both in nursery and main field.

Management

- Clipping off the tip of seedlings in the infested nursery plot helps in reduces the infestation.
- Spraying of 2 % neem oil.
- Spraying of Chlorpyriphos or Phophamidon @ 1.5 ml/ lit of water.

2.Yellow stem borer, *Scirpophaga incertulas*

Adult



Egg mass

Pheromone trap

White ear head symptoms

Dead heart symptoms

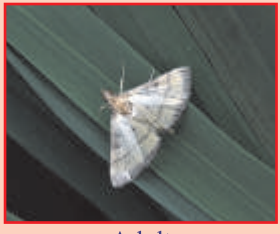
Nature of damage

- Cause damage to rice crop throughout the growth period.
- Larvae feed inside the rice stem causing "dead heart" or drying of the central whorl of leaf during the tillering stage.
- If the attack occurs during panicle formation or heading stage then "white ear heads" are formed and the whole panicle becomes chaffy.

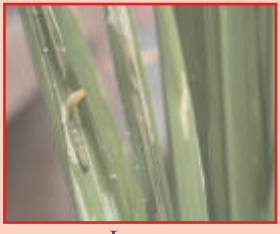
Management

- Summer ploughing to expose resting stages of insects to heat of the sun and predators.
- Setting up of pheromone traps @ 20-25 nos./ha.
- Clipping of tips seedlings before transplanting
- Seedling root dip treatment with Chlorpyriphos (@ 3ml/ lit)+ urea (3 g/lit) for 3-4 hrs.
- Release of *Trichogramma japonicum* @ 1 lakh / ha starting from 15 days after planting at 7-10 days intervals 5-6 times.
- Spraying of Flubendiamide @ 04 ml/15 lit of water tank or 30 ml / acre at the onset of adult or after 25-30 days after transplanting is effective.
- Broadcasting of Fipronil at 15-25 days after transplanting @ 05-06 kg/ acre is effective.

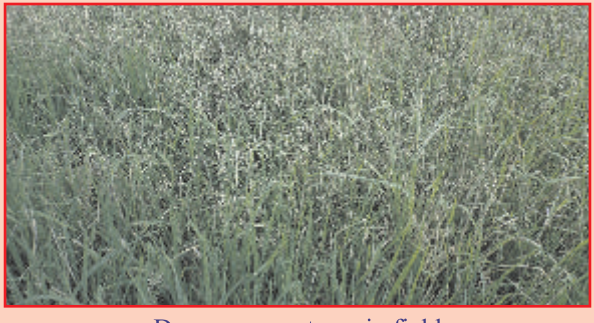
3.Rice leaf folder, *Cnaphalocrocis medinalis*



Adult



Larva



Damage symptoms in field

Nature of damage

- The larva folds 3-4 leaves of young plants feeding from within.
- Whitish membranous folded leaves with typical white streaks.
- In severe infestation, the folded leaves entirely dry up and give a scorched appearance.
- Damage appears as white feeding areas in a field.

Management

- Early clipping of infested, folded leaf tips.
- Seedling root dip treatment with Chlorpyriphos (@ 3ml/ lit)+ urea (3 g/lit) for 3-4 hrs.
- Passing a rope 2-3 times over the crop at tillering stage mechanically to dislodge caterpillar.
- Foliar sprays with Deltamethrin @ 05 ml / 15 lit of water tank or Flubendiamide @ 04 ml/15 lit of water tank give good result against the pest.

4.Green leafhopper, *Nephotettix virescens*

Adults and nymphs

Rice tungro disease

Nature of damage

- Both nymphs and adults cause serious damage by sucking plant sap.
- Infested plants become stunted and reduced tillering.
- In severe infestation paddy field becomes blighted.
- Apart from direct feeding, both nymphs and adults act as vectors of rice tungro virus disease.

Management:

- Use resistant varieties like IR 50, CR 1009, Co 46.
- Use of balanced fertilizer dose and avoid using excessive 'N' fertilizer or manure.
- Setting up of yellow sticky traps to attract and kill hoppers.
- Set up light traps
- Foliar spraying of NSKE @5% or neem oil 0.5% can suppress the pest population.
- Spraying of Imidacloprid @ 05 g/ 15 ltr of water or 30 g/ acre at 45 days after transplanting onwards gives good control of the pest.
- The vegetation on the bunds should also be sprayed with the insecticides.

5. Rice brown plant hopper, *Nilaparvata lugens*

Adults and nymphs

Hopper burn symptom in field

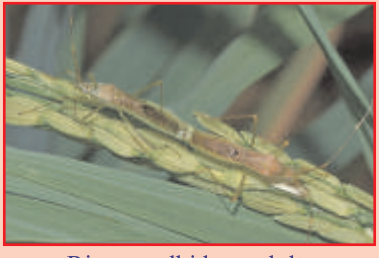
Nature of damage

- Both nymphs and adults suck sap from the plant tissues.
- Excess draining of the plant sap results in wilting and drying of the plants in clusters known as "hopper burn".
- It starts in circular patches and then covers the whole field.

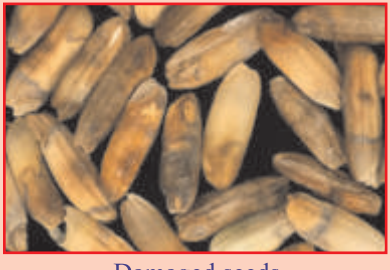
Management

- Management is same as suggested for green leaf hopper.
- Spraying of Phosphamidon 40 SL@ 1000 ml/ha or Carbofuran 3 G @ 17.5 kg/ha or Thiomethoxam 20 WDG@ 100 ml/ha or Dichlorvos 76 WSC @ 350 ml/ ha or Ethiprole 40% + Imidacloprid 40% @ 07 g/ 15 ltr of water tank or 50 g/ acre is effective.

6.Rice gundhi bug, *Leptocorisa acuta*



Rice gundhi bug adults



Damaged seeds

ITK for managemnt of gundhi bug

Nature of damage

- Both nymphs and adults are active during early morning and late afternoon feeding on the milk of the rice during the milky stage.
- The area around the puncture hole turns brown.
- The puncture hole serves as a point of entry of several pathogens which cause grain discolouration.
- Affected grains in the panicle become chaffy.
- Attack in dough stage causes shrivelled grains.
- Before the grain is formed the bugs feed on succulent young shoots and leaves.

Management

- Keep fermented snail or crab bait @ 20-25/ha to attract and divert pests from sucking milk of rice grain.
- The extract of 2.5 kg garlic + 500 g tobacco leaves + 500g washing powder sprayed over one hectare area during milky stage of rice controls 80% gundhi bug.
- When the pest crosses ETL i.e. 1 bug/ hill then spray with phosphamidon 40SP @ 1 lit/ha or dusting with lindane or malathion 5%D @ 25-30 kg/ha.

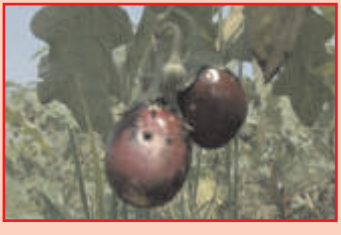

MAJOR INSECT PESTS
OF VEGETABLES

A.Crop: Brinjal

A.1.Brinjal Fruit and Shoot Borer, *Leucinodes orbonalis*

Adult

Damage on shoot



Fruit damage by larva

Larvae inside the fruit

Nature of damage

- In the early stage of the crop caterpillars bore into young tender shoots and the affected shoot become dry and drop off.
- At the later stage of the crop caterpillars bore into flower buds and fruits, entering from under the calyx leaving no visible sign of infestation while the larvae feed inside.
- The damaged flower buds are shed without blossoming whereas the fruits may show circular exit holes.

Management

- Avoid continuous cropping of brinjal crop.
- Regular clipping and burning of withered dead shoots, leaves and plant residues.
- Use of lucilure sex pheromone trap @ 100 traps/ ha at 20–25 days after transplanting till the harvest of the crop.
- Application of Neem Seed Kernel Extract @ 5 ml/ lit or *Bacillus thuringiensis* @ 0.5 kg/ ha
- Spraying of cartap hydrochloride @ 1 g/ lit or lamda cyhalothrin @ 1.5 ml/ lit of water is effective against pest.

A.2. Brinjal leaf roller, *Eublemma olivacea*

Adult

Larva

Nature of damage

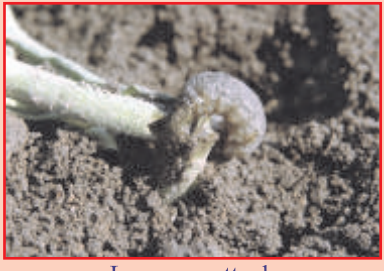
- Eggs are laid on leaves and on hatching, the larvae fold leaves from tip downwards and feed within by scrapping the green matter resulting withering and drying up of affected leaves.
- Pupation takes place within the folded leaf.
- The caterpillars may also bore in green shoots and feed on inner tissues resulting in withering of the entire plant.

Management

- Remove and destroy of folded leaves along with caterpillars inside.
- Spraying cartap hydrochloride @ 1 g/ lit or chloropyriphos @ 1.5 ml/ lit of water is effective to control the pests.

B. Cole crops (Cabbage, Cauliflower, Knol Khol, Broccoli)

B.1. Cut worm, *Agrotis ipsilon*



Larva on attack

'C' shaped larva

Field damage

Nature of damage

- On hatching, the tiny caterpillars feed gregariously on foliage for a few days and then segregate and enter into the soil.
- They are nocturnal in habit and cut the seedlings near ground level and eat only the tender part at the night time.

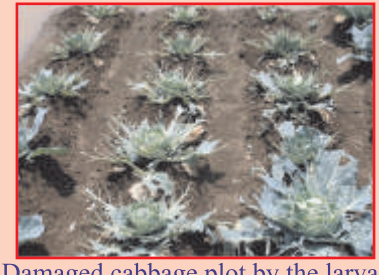
Management

- Deep off-season ploughing of the field.
- Spraying of *Metarrhizium anisopliae*, *Bacillus thuringiensis* to regulates cut worm populations.
- Soil drenching with chlorpyriphos or lamda cyhalothrin @ 5 ml/ lit is effective to control this pest.

B.2. Cabbage butterfly, *Pieris brassicae*

Adult

Larvae feeding on cabbage leaves



Damaged cabbage plot by the larvae

Nature of damage

- The caterpillars alone cause damage.
- Early instar caterpillars just scrape the leaf surface.
- The subsequent instars eat up leaves from the margins inward, leaving only the main veins.
- Often, entire plants are eaten up by the larvae.

Management

- Hand picking and destruction of egg masses and caterpillars during the early stage of attack.
- Spraying of neem oil or Neem Seed Kernel Extract @ 5 ml/ lit of water reduces the pest attack.
- Spraying of lamda cyhalothrin or profenofos + cypermethrin @ 1.5 ml/ lit at fortnightly interval is effective.

B.3. Diamond backed moth, *Plutella xylostella*

Adult

Larva damaging cabbage leaf

Nature of damage

- Damage is caused by the larvae only.
- In the earlier stages, larvae feed in mines on the lower side of leaves whereas, in the later stages, larvae feed exposed on the leaves.
- The caterpillars bite holes by feeding on the leaves giving a shot hole effect all over the leaves.

Management

- Remove and destroy all the remnants, stubbles, debris etc. after the harvest of the crop and plough the field.
- Use Indian mustard as a trap crop of the pest.
- Intercropping with tomato reduces the incidence of the pest.
- Spraying of neem oil or Neem Seed Kernel Extract @ 5 ml/ lit of water reduces the pest attack.
- Spraying of cartap hydrochloride @ 1 g/ lit or imidacloprid @ 1.5 ml/ lit is effective to control the pest.

B.4. Cabbage stem borer, *Hellula undalis*

Larva damaging inside the stem

Larva damaging the cabbage head

Nature of damage

- Caterpillars first mine into the leaves; later on feed on the leaf surface, make silken passes.
- At later stage they bore into the heads of cauliflower and cabbage.
- When the attack is heavy, the plants are riddled with worms and outwardly the head looks deformed.

Management

- Collection and mechanical destruction of caterpillars in the early stage of attack helps to check the pest infestation.
- Trap cropping of Indian mustard and radish in cabbage field effectively controlled the pest.
- Spraying of chloropyriphos or profenofos + cypermethrin @ 1.5 ml/ lit of water is effective against the pest.

B.5. Cabbage aphid, *Bravicoryne brassicae*

Aphid attack on cabbage

Nature of damage

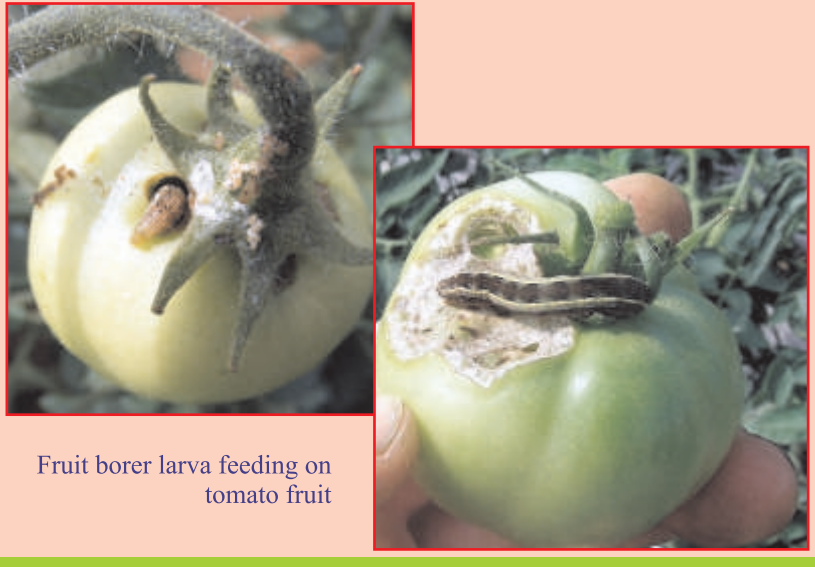
- Both nymphs and adults suck the sap from the tender part of the plants.
- In cabbage, aphids enter the inner leaves of the head and in cauliflower all the inner space in the head is filled by the aphids, thus making the vegetable unmarketable.
- Honey dew produced by aphids develop sooty mould that cover the dorsal surface of the vegetable; making it unfit for consumption.

Management

- In nature several coccinellids and syrphids are found predating on aphids.
- Apply Neem oil or Neem Seed Kernel Extract @ 5 ml/lit against soft bodied insects like aphids.
- If 5 % plants are noticed infested with low activity of predators, spraying of dimethoate, methyl demeton or acephate should be taken up.

C. Crop: Tomato

C.1. Fruit borer, *Helicoverpa armigera*



Fruit borer larva feeding on tomato fruit

Nature of damage

- The young caterpillars feed on the tender foliage.
- Advance stage caterpillars attack the fruit. They bore circular holes and thrust only a part of their body inside the fruit and eat the inner content.

Management

- Stacking of tomato plants and hand collection and destruction of larvae.
- Deep ploughing after harvesting of the crop to expose the pupae for natural killing.
- Use marigold as a trap crop (02 rows of marigold after every 16 rows of tomato) is very effective for management of the pest.
- Spray Neem Seed Kernel Extract (NSKE) @ 5 ml/ lit of water to control early instars larvae.
- Spraying of NPV @ 250 LE/ac is also effective to control the pest.
- Spraying of chlorpyriphos or profenofos + cypermethrin @ 1.5 ml/ lit or deltamethrin @ 05 ml / 15 lit of water tank is effective against the pest.

C.2. White fly, *Bemisia tabaci*

White fly adults on tomato leaf

Tomato leaf curl virus disease

Nature of damage

- They crowded in between the veins on the ventral surface of leaves, sucking the sap from the infested part.
- As a result of feeding the affected parts become yellowish, the leaves wrinkle and curl downwards and are ultimately shed.
- These flies secrets honey dew which favours development of sooty mould,that hinder the photosynthetic activity of the plant resulting in stunted growth.
- White fly also act as a vector of transmitting the leaf curl virus disease.

Management

- As flies are attracted to yellow background, place yellow plates/ plastics/ tins with oil/ grease so that the attracted flies get stuck to the surface.
- Spray triazophos 2.5 ml/ lit or profenophos 2.0 ml/ lit for management of the pest.

D.Crop: Chilli

D.1. Thrips, *Scirpothrips dorsalis*

Thrips

Thrips attcak symptoms on chilli plant

Nature of damage

- Both nymphs and adults lacerate the leaf tissues and imbibe the sap; sometimes even the buds and flowers are attacked.
- Tender leaves and growing shoots are preferred; the older leaves are rarely attacked.
- The pest activity increases during dry weather.
- The infested leaves starts curling and crumbling and is ultimately shed where as buds become brittle and drop down.
- Pest is also responsible for transmitting leaf curl viral disease.

Management

- Intercropping of chilli (capsicum) with tomato results in lowering the population of thrips.
- Spraying of NSKE and neemazal @ 5 ml lit of water at 2, 5, 7 and 11 weeks after transplanting help in lowering population of thrips and leaf curl index
- Spraying of chlorpyriphos or phophamidon @ 1.5 ml/ lit of water is effective.

D.2. Tobacco caterpillar, *Spodoptera litura*

Larva

Larvae feeding on capsicum

Nature of damage

- In vegetative stage, the larvae feed on leaves and fresh growth.
- At fruiting stage, it acts as a pod borer resulting in heavy yield loss.
- They are mostly active at night and cause extensive damage.

Management

- Installation of pheromone traps @ 5 nos. /ha for monitoring of *Spodoptera litura* in field condition.
- Spray flubendiamide or dichlorvos or cypermethrin or profenophos @ 1.5 ml/ lit of water at 15 days interval to reduce the population of *S. litura*.

E. Crop: Potato

E.1. Red ants, *Dorylus Orientalis*

Potato damaged by red ant

Nature of damage

- Ants feed on potato tubers in field condition and cause heavy loss.

Management

- Soil drenching with chlorpyriphos @ 5 ml/ lit is effective.

E.2. Potato tuber moth, *Pthorimaea operculela*

Adult moth

Damaged
potato tubers

Nature of damage

- The young larvae mine in the leaves causing silver blotches.
- Leaf veins, petioles and stems are tunneled followed by wilting of plants.
- Larva feeds on foliage and attack tubers in the field before and shortly after harvesting
- Larvae bore mostly near the eyes, fill the tunnels with excreta followed by fungal growth.
- Later the skin of the potato partially dries and the scars become very prominent
- The insect occasionally infest potato crops in the field but is particularly serious in storage.

Management

- Remove and destroy all the infested tubers.
- Four releases of *Trichogramma chilonis* Ishii @ 50000 adults /ha/ release at weekly interval and three sprays of *Bacillus thuringiensis* @ 1kg/ ha at 10 days interval.
- Covering tubers with dry sand, ash, rice husk or saw dust and mixing potato tubers with carbaryl or deltamethrin powder @ 5kg/ ton.
- Spray 2.5 kg of carbaryl 50 WP in 625 liters of water / ha.

F. Crop: Bean

F.1. Cowpea aphid, *Aphis craccivora*

Nature of damage

- Both the nymphs and adults suck the sap from ventral surface of tender leaves, growing shoots, flower stalks and pods.

Management

- Cut and destroy the infected parts in the initial stages.
- Early sowing and use of tolerant cultivars.
- Spray neem seed kernel extract @ 5 ml/ lit.
- Spray malathion 50 EC or chlorpyriphos or fenvalerate @ 1ml/lit of water.

G. Crop: Cucurbitaceous crops

G.1. Fruit fly, *Dacus cucurbitae*

Adult laying egg

Maggots

Fruit fly bait trap

Infested pumpkin

Infested ridge gourd

Nature of damage

- The female flies puncture the soft tender fruits with their ovipositor and lay eggs below the epidermis.
- On hatching, the maggots feed inside the fruit and the infested fruits can be identified by the presence of brown resinous juice which oozes out of the punctures made by the flies for oviposition.
- These punctures also helps in secondary infection by fungi and bacteria, as a result the infested fruits start rotting, get distorted and malformed in shape and fall off from the plants prematurely.

Management

- Monitoring and regular destruction of the fruit fly affected fruits to kill the maggots.
- Constant ploughing or racking of the soil under infested plant to kill the pupae.
- Spray neem oil (5%), which act as a oviposition deterrent to fruit fly adults.
- Use a poison bait like a mixture of fermented fruit juice + malathion
- Apply the bait spray containing 50 ml of malathion 50 EC or 50 ml chlorpyriphos 20 EC + 0.5 kg of jiggery in 50 liters of water/ ha. When attack is serious it should be repeated at weekly interval.
- Use fruit fly trap

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