Key Pests and Diseases

Diamond Back Moth (*Plutella xylostella*), leaf webber (*Crocidolomia binotalis*), stem borer (*Helicuta undalis*), black rot (*Xanthomonas campestris*), aphids (*Brevicoryne brassicae*) and soft rot.

IPM Approach

**Nursery**

- About two to three weeks before sowing, undertake soil solarization of nursery beds with polythene sheets (60-100 gauge).
- Add 50 g of *Trichoderma harzianum* to FYM and mix in 1 m² of nursery beds to prevent infection from soil and seed borne fungal diseases.
- Soak 1 kg seed in 100 ppm Streptocycline sulphate solution for 15 minutes before sowing to prevent the black rot infection.
- Use nylon nets in nursery beds to avoid entry of white fly, aphids etc.

**Main field**

- If Diamond Back Moth (DBM) population is observed at early stage after transplanting, spray *Bacillus thuringiensis* @ 500g/ha and repeat it after every fortnight.
- Starting from 30 days of transplanting, take up inundative releases of *Trichogramma bactrae* @ 0.5-0.75 lakh/ha at weekly interval. Four to five releases will be required.
- Periodically remove Alternaria affected bottom leaves.
- Spray Chlorothalonil @ 0.2% incase the Alternaria disease is severe.
- Periodically remove black rot affected heads. If the disease is severe, then spray Blitox 0.2%+100ppm Streptocycline sulphate/ ha.
- Spray of Neem seed kernel extract (5%) or Pongamia soap solution for the management of Diamond Black Moth.

**TOMATO**

Tomato is highly susceptible to diseases and pests. The most prevalent among those are fruit borer, whitefly, tomato leaf curl virus, Alternaria blight, collar rot, and bacterial leaf spot. A comprehensive pest and disease management module has been developed by the Indian Institute
of Vegetable Research (IIVR), Varanasi with least use of chemical pesticides. Beside use of bioagents in management of pest and disease, this IPM approach can reduce the pesticide residue to a tolerance level.

**IPM TECHNOLOGY**

**Nursery**
- Undertake soil solarization of nursery bed as well as main crop field.
- Use disease/bacteria free seeds collected from healthy plants.
- Treat seeds with *Trichoderma harzianum* @ 4 g/kg of seeds and also with *Imidacloprid* @ 3 g/kg of seeds.
- Cover the nursery bed with nylon net (of 200 gauge) or muslin cloth for 25–30 days.

**Main field**
- Plant one row of marigold for every 16 rows of tomato.
- After 45 days of transplanting apply 2–3 sprays of NSKE (4%) at 10 days interval.
- Monitor fruit borer (*Helicoverpa*) adults through pheromone traps @ 4 traps/ha and release *Trichogramma pretiosum* @ 50,000 adults/ha per release (3–4 times) at weekly interval when adults are noticed in the trap.
- Spray NPV 250 LE (1.5 × 10^{12} POB)/ha 2–3 times at 6–7 days interval in the evening.
- In case of collar rot, uproot disease infected plants along with infested soil and burn it.
- Give two sprays of Streptocycline @ 150 ppm followed by foliar spray of Blitox–50 @ 0.3% to control Alternaria blight, collar rot and bacterial diseases.

**ECONOMICS**

By adopting the above IPM technology, the cost benefit ratio is around 1: 2.09. The produce obtained by the IPM is much safer in terms of pesticide residue as well.
AVAILABILITY OF TRICHODERMA

Trichoderma is available with several ICAR Institutes, State Agricultural Universities and Plant Protection Department of States and the Central Government.

It is also available with several private firms like Pest Control (India) Limited, No. 36/2, Siriramnagalli Rajankunte (P.O.) P.O. Box No. 6426, Yelahanka, Bangalore; Biotech International, New Delhi; Excel Industries; Anu Biotech International etc. with different brand names.

BRINJAL

Brinjal shoot and fruit borer (Leucinodes orbonalis) are the most important insects in cultivation of brinjal as these may cause more that 80% damage if left unprotected. Farmers often resort to frequent insecticide application and spending approximately Rs 12,000 to 15,000 per season on insecticides. This increases the insecticide resistant level without much satisfactory control of the pest. The Indian Institute of Vegetable Research (IIVR), Varanasi has developed Sex Pheromone based Integrated Pest Management (IPM) Technique in which there is least use of insecticides and thus reduces the chances of health hazards caused by insecticides residues. Besides, the cost of plant protection is also less compared to chemical insecticides. The natural enemies are more abundant causing higher parasitization of the pest.

PACKAGE OF PRACTICES

- Keep seedlings free from pest infestation by raising the nursery under nylon net cover.
- Treat the seedlings by putting the root zone in Imidacloprid solution (1 ml/lit) for 3 hours.
- Starting from 25 days after transplanting, remove and destroy the borer infested shoots at weekly interval along with the insect larvae.
- Install sex pheromone baited pheromone traps @ 100/ha at 10 m distance from each other and 5 m away from the crop border. Plastic funnel trap may be used for trapping the moths. The traps should be installed at such height that the pheromone septa remains just above the plant canopy. Increase the height periodically to retain the relative height of the traps as the plants grow taller. The septa should be