III. Integrated Pest Management strategies

- Destruction of debris, crop residues, weeds & other alternate hosts
- Deep summer ploughing.
- Frequent raking of soil beneath the crop to expose and kill the eggs, grubs & pupa.
- Hand collection and destruction of infested leaves and fruits.
- Adoption of proper crop rotation and avoid growing of cucurbit crops in sequence.
- Use of resistant and tolerant varieties recommended by the State Agricultural Universities of the region.
- Install light trap.
- Treat the seed with *Trichoderma viride* @ 4gm/Kg of seed to control seed and soil borne diseases. Apply *Trichoderma viride* @ 50gm in 10 Kg FYM during early stages of crops along the rows, against soil borne fungal diseases.
- Use pheromone traps @ 12 / ha for *Helicoverpa armigera*.
- Apply NPV @ 250 LE / ha + 0.1 % teepol for *Helicoverpa armigera*.
- Apply NSKE 5% fortnightly.
- Apply neem cake @ 100 kg per acre for reducing nematode population.
- Conservation and augmentation of natural enemies to manage the pest population should be done.
- Release green lace wing insect @ 2 grubs/plant against aphids.
- Apply *Bacillus thuringiensis* @ ½ to 1 Kg/acre against cowpea pod borer and army worms.
- Need based application of CIB&RC of chemical pesticides may be done at higher population level of pests.

For more details please contact:

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Cowpea, *Vigna unguiculata*, is an important legume crop is grown for vegetables as well as grain purpose in India. Insects are a major factor in the low yields of cowpea crops, and they affect each tissue component and developmental stage of the plant. In bad infestations insect pressure is responsible for over 90% loss in yield. The legume pod borer *Maruca testulalis vitrata*, is the main pest of the cowpea. It causes damage to the flower buds, flowers and pods of the plant. Other important insects include pod sucking bugs, aphid while among disease anthracnose is important disease.

**I. Important pest of cowpea**

1. **Spotted pod borer (*Maruca testulalis)*:**
   It is an important pest of cowpea. Larvae are brownish green with black warts. Eggs are laid near the flower buds. Young caterpillar enters the bud, flower or the pod. Caterpillars feed on the seeds within pod. The entrance hole is plugged with excreta. Sometimes larvae bore into stem. It pupates within debris or near surface of ground. The adult is a small moth with characteristic white streaks on forewings.

   ![Larva](image1.jpg)

   ![Larva](image2.jpg)

   ![Larva](image3.jpg)

   ![Larva](image4.jpg)

   ![Larva](image5.jpg)

2. **Aphid (*Aphis craccivora)*:**
   Aphid is polyphagous in nature and major pest of cowpea. The adults are shiny black, pear shaped and 2mm long. Some are winged. Aphids reproduce parthenogenetically. Young ones mature within a week. Large colonies of nymphs and adults suck sap from under surface of leaves, young stems and pods. Affected parts show chlorosis, get curled, wrinkled, ultimately dry and die. Aphids excrete honey dew which attracts sooty mould and ants. *A. craccivora* transmits cowpea banding mosaic virus disease.

   ![Aphid](image6.jpg)

   ![Aphid](image7.jpg)

3. **Pod Bug (*Anoplocnemis phasiana, Clavigralla spp)*:**
   Pod bugs are serious pests of cowpea. Adult of *Anoplocnemis* is brown or black with rounded shoulders while *Clavigralla* is brownish grey in colour, about 2mm long with a spin on the pronotum. The nymphs are reddish with prominent lateral spines. The eggs are laid on pods, sometimes on leaves or flowers. Both nymph and adult suck sap from the developing seeds through the pod wall. Infested pods show pale yellow patches and seeds shrivel up and lose germination ability. The total life cycle takes 25-30 days.

   ![Pod Bug](image8.jpg)

   ![Pod Bug](image9.jpg)

4. **Gram pod borer (*Helicoverpa armigera)*:**
   Defoliation in early stages & later feed on seed larva’s thrust head inside the pods and the rest of the body hanging out & make round holes. Eggs are spherical and creamy white, laid singly, larva - greenish to brown with with dark brown grey lines laterally on the body. Pupa – brown in colour, occurs in soil, leaf, pod and crop debris. Adult - Fore wing grey to pale brown with V shaped speck.

   ![Gram pod borer](image10.jpg)

   ![Gram pod borer](image11.jpg)

5. **Army worms (*Spodoptera exigua)*:**
   Larvae make singular, or closely grouped circular to irregularly shaped holes in foliage; heavy feeding by young larvae leads to skeletonized leaves; shallow, dry wounds on fruit; egg clusters of 50-150 eggs may be present on the leaves; egg clusters are covered in a whitish scale which gives the cluster a cottony or fuzzy appearance; young larvae are pale green to yellow in color while older larvae are generally darker green with a dark and light line running along the side of their body and a pink or yellow underside. The moths are moderately sized, the wing span measuring 25 to 30 mm.

   ![Army worms](image12.jpg)

   ![Army worms](image13.jpg)

**II. Pest Surveillance**

Weekly monitoring through pest scouting with the help of monitoring device like pheromone traps, colored sticky traps should be practiced. For field scouting 300 fruits in 100 plants/acre in a cross diagonal pattern through zig zag manner is required to be observed for counting of each and every type of insects. Pest monitoring for fruit flies using Cue-lure traps should be done regularly from fruiting stage onwards. If 95% plants are found free from insect pests then the field will be considered fit for export.