II. **Pest Surveillance**
Weekly monitoring through pest scouting and with the help of monitoring device like pheromone traps, colored sticky traps should be practiced from germination to harvesting stage. For field scouting 100 plants per acre in a cross diagonal pattern through zig zag manner is required to be observed for counting of each and every type of insects. If 95% plants are found free from insect pests then the field will be considered fit for export of Betel leaf.

III. **Management Practices:**
The following Good Agricultural Practices should be adopted for the management of various betel vine pests:
1. Destruction of debris, crop residues, weeds & other alternate hosts and deep summer ploughing.
2. Adoption of proper crop rotation
3. Use of pest/disease free sets from healthy, vigorous vines and treat them before planting
4. Use well decomposed FYM @ 8-10 tones per acre or vermicompost @ 5 tons per acre treated with *Trichoderma* sp. and *Pseudomonas* sp. @ 2 kg per acre for seed / nursery treatment and soil application.
5. Apply neem cake @ 100 kg per acre for reducing nematode population.
6. Pheromone traps for *Spodoptera litura* should be installed @ 4-5 traps per acre. Fix the traps to the supporting poles at a height of one foot above the plant canopy. Change the lures after 2-3 weeks interval.
7. Set up yellow/blue traps/ sticky traps 15 cm. above the crop canopy for monitoring and mass trapping of Thrips, White fly and Aphids @ 10-20 traps per acre.
8. Conserve the existing bio-control agents like Spiders, Coccinellids, Syrphid flies, Anthocorid and mirid bugs, *Chrysoperla* spp., etc. in the field by avoiding, delaying and reducing the use of chemical pesticides and promoting the use of bio-pesticides including botanicals and microbial.
9. Augment the bio-control agents like *Cryptolaemus* sp., *Scymnus* spp., *Chilocorus* spp. etc.
10. Apply chemical pesticides strictly as per the recommendation of CIB&RC (www.cibrc.gov.in) as a last resort.

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**For more details please contact:**
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Betelvine, *Piper betel* with its high export potential has fast emerging as an important cash crop. Shoot Bug, Scale Insects, White Flies, Mealy Bug, Thrips, Aphids and Leaf eating Caterpillar are most serious pests from quarantine point of view as these pests may find a place in the pathway of Betel Vine export to European Union.

1. **Identification of different Betel Vine pests**

   1. **Shoot Bugs (*Dispunctus politus*):**  
      Adults light brown to reddish brown, single egg is laid in tender plant parts. Nymphs hatch out in 8-16 days. Both nymph and adult is sap feeder. Infested leaves faded, become waxy and appear watery in appearance and the blotches ultimately dry up whole leaf. Peak attack time is June to October.

   2. **Betel vine black fly (*Aleurocanthus rugosa*:)**  
      Pale White eggs are laid on the undersurface of leaf in concentric ring pattern. Late nymphal instars & puparia are orange red to scarlet red. Leaf lamina shrinks, curls up and crinkles due to sap feeding both by adult and nymphs. Adults are covered with mealy, flocculent wax.

   3. **White fly (*Aleurocanthus rugosa*:)**  
      Adults are soft-bodied, moth-like fly, yellowish dusted with white waxy powder and 1.0-1.5 mm in length. The wings are covered with powdery wax and the body is light yellow in color. Both adults and nymphs suck plant sap and reduce vigor of the plant. When the population is high they secrete large quantities of honeydew, which favours the growth of sooty mould.

   4. **Red Spider Mite (*Tetranychus sp.*):**  
      Adults are small soft bodied found in colonies in tender parts. Damage is caused by both nymphs and adults by sucking cell sap. Black sooty molds develop on honey dew secreted by aphids on leaves. Dry condition favours population flair up.

   5. **Scale Insects (*Lepidosaphes cornutus*):**  
      Adults are tiny, boat shaped, gnat like insects. Eggs laid beneath waxy covering. Newly hatched crawlers attach to succulent parts of leaves, petioles and main veins. Females lose their appendages after first molt and do not pupate. Males pupate and become adults without mouth parts. Affected parts look warty, crinkled and dry up. Vines look sickly.

   6. **Cotton Aphid (*Aphis gossypii*):**  
      Wingless female have ovoid body in various shades of green, with legs and antennae in yellow, siphunculi wide at base and black in color. Winged females have fusiform body. Nymphs have a variety of body color. These are true bugs and suck up plant sap.

   7. **Thrips (*Thrips tabaci*):**  
      Adults are slender, 1.5 mm, yellow to brown body, antennae seven segmented. Wings are heavily fringed which are shorter at the base, growing broader towards the distal ends. Young resembles the adult. Both nympha and adult suck sap from tender plant parts. Readily fly away when disturbed.

   8. **Leaf eating Caterpillar (*Spodoptera litura*):**  
      Eggs spherical, yellowish, flat-bottomed, laid singly on tender plant parts. Larvae vary in colour according to food, have darker broken lines along sides of the body and body covered with radiating hairs. Frass usually present.

4. **Mealy Bugs (*Ferrisia virgata*):**  
   Adult females are oval, greyish yellow with 2 longitudinal sub-median dark stripes on the dorsum which is further criss-crossed with many waxy, glassy lines. Females have enlarged dorsal ducts each with orifice surrounded by a sclerotized area.