1. Banana pseudostem weevil: *Odoiporus longicollis*
2. Rhizome weevil: *Cosmopolites sordidus*
3. Banana aphid *Pentalonia nigronervosa*
4. Fruit fly: *Bractocera dorsalis*
5. Banana lacebug / tinged bug: *Stephanitis typicus*
7. Flower thrips: *Chaetanaphothrips signipennis*
8. Scales: *Aspidiotus destructor, Aonidiella aurantia.*
10. Spittle bug: *Phigmotostetha deschampsi.*
Defoliators:

1. Leaf eating caterpillar: *Pericallia ricini*, *Spodoptera litura*, *Spilosoma obliqua*.

2. Leaf beetles: *Nodostoma sabcostatum*, *N. viridipennis*.

3. Bag worm: *Kophene cupera*
Banana pseudostem weevil: *Odoiporus longicollis*

Family: Curculionidae. 
Order: Coleoptera.

- Since last 5 years it has become a very severe pest.
- Eggs are yellow colour, Elliptical in shape.
- The banana Pseudostem weevil attacks the plant during flowering and bunch formation stage and cause severe yield loss by preventing the bunch development.

✔ **Distribution and status:** It is widely distributed in all banana growing areas. Major pest. 

**Host range:** Banana.
Eggs are laid in the pseudostem about 1-1.5 m above ground level.

Grub are apodous, with five larval instars.

Pupation site: in side pseudostem tunnel.

It has overlapping generation, and it completes 2 life cycle in a year.

Life cycle:

1. Incubation period :- 3-5 days
2. Grub :- 30-35 days
3. Pupa (Exorate) :- 7-19 days
4. Adult :- 90-120 days.
Damage symptom of pseudostem weevil on banana plant
NATURE OF DAMAGE :-

1. Female make holes on pseudostem by making pin holes with the help of snout (1 egg in each pin hole)

2. After hatching of eggs, grubs bores into the pseudostem and make tunnels and feed on internal content of pseudostem.

- On an average we can see **150-200 weevils along with grubs** in each stem.
SYMPTOMS OF DAMAGE :-

1. The early symptoms are the jelly exudation on the banana stem which indicate the weevil and grub activity inside the stem.

2. Ooze of resinous substance from pseudostem

3. Yellowing and drying of leaf.

4. **Sequential pin holes** on pseudostem in a line.
   
   (Equal distance, Equal diameter, and line arrangement on stem).

5. The Pseudo stem becomes hollow and break at the apical region due to gush of wind.

6. Collapsing of plant during heavy wind due to severe infestation.
MANAGEMENT :-

- Earthing up at 45 days interval from planting.
- Maintain healthy plantation by periodical removal of dry leaves and suckers.
- Prune the side suckers every month.
- Do not dump infested materials into manure pit.
- In case of severe infestation uproot and burn the plants.
- Monitor the banana weevil activity in a garden by keeping banana stem traps.

1. Longitudinal split trap (30 cm),
2. Disc-on-stump trap at the rate of 10-15 traps /ha.
i) Longitudinal split trap (30 cm) :-

- Swab the cut surface of the longitudinal split traps with 20 g of the formulation either entomopathogenic fungus, *Beauveria bassiana*, *Matarhizium anisopliae* or entomopathogenic nematode, *Heterorhabditis indica* (1x10^8 spores/ mg) and keep the split traps near the banana plant facing cut surface to soil.

- **Instalation of disc on stump trap :-**

  It is prepared by longitudinal splitting of pseudostem + monocrotopos/ *Buveria barsiana* + corse material of maize.

  (*Buveria barsiana* is long lasting and stable, it self perpetuating.)
• If infestation is noticed after 7 months of planting, stem injection is the only way to control.

• Inject pseudostem with monocrotophos 36 WSC (50 ml + 350 ml water) @ 2 ml at 45 cm height and another at 150 cm height from ground level at monthly intervals from 5th - 8th month. **Beyond 8 months (after flowering), this should not be done.**

• Celphos (3 tablets/plant) is recommended for control of egg, larva, pupa and adult population of the insect, application of. After placing the tablet inside the pseudostem, the slit should be plastered with mud.
• Application of Carbofuran (3 g of granules/stool) is very effective to control the pest.

• Spray Chlorpyriphos 20 EC 2.5 ml/liter + 1 ml wetting agent or Azadirachtin (5 ml/litre) for two or three times at three weekly intervals.

• After harvesting, the pseudo stem has to be cut into 30 cm length bits and use it as a trap for weevil collection, instead of keeping it in heaps.

• **NOTE** :- No injection should be given after flowering  *(8 month after planting.)*
2. Rhizome weevil :- *Cosmopolites sordidus*.

Family :- Curculionidae.
Order :- Coleoptera

- Most destructive pest, widely distributed in all banana growing areas.
- Specific pest of Musa spp. Malbhog and Champa varieties highly susceptible.
- The banana weevil is most important where it is an introduced pest (e.g. Africa –Australia -the Americas). **Area of origin in Southeast Asia.**

**Identification of pest :-**

- **Adult** weevils (10-13mm) are shiny reddish brown to black, with a long and curved snout.
- **Grubs** are creamy white, stout, fleshy, legless, wrinkled and spindle shaped, with red head.
- **Eggs** are white in colour and laid singly in collar region or on underground rhizomes.
• **Life cycle** :-
  1. **Egg** :- 3-15 days
  2. **Grub** :- 15-45 days
  3. **Pupa** :- 7-28 days (inside pseudostem)

• **Insect behavior** :-
  • The adult weevil is black and measures 10-15 mm.
  • It is free living, though most commonly found between leaf sheaths, in the soil at the base of the mat or associated with crop residues.
  • The weevil is **nocturnally active** and very susceptible to desiccation.
  • The weevils rarely fly. Dissemination is primarily through infested planting material.
  • Adults feed on dead or dying banana plants and live under newly cut or rotting pseudostems.
  • The female weevil either lays its eggs in the rotting pseudostem or moves to a living plant where eggs are inserted singly into a hole.
  • Most commonly, oviposition has been estimated at 1 egg/week.
NATURE OF DAMAGE :-
✓ Grubs bore into the pseudostem and rhizome.
✓ The grub of corm weevil attacks the plant by feeding on the corm portion and thereby making bore holes and tunnels in the corm (downward tunneling.)

SYMPTOMS OF DAMAGE :-
✓ Presence of dark coloured tunnels in the rhizomes.
✓ Sick appearance and yellow lines on the top leaves are early symptoms.
✓ Death of unopened pipe, withering of outer leaves.
✓ In advanced stage of infestation, plant show tapering of the stem at crown region, reduction in leaf size, poor bunch formation and choked throat appearance due to grub damage in corms.
✓ The corm decays and becomes a mass of rotten tissue.
✓ Cause death of the plant (toppling of plant.)
✓ Note :- The weevil spreads through infested suckers to different places.
Grub feeding

Damage symptom of Rhizome weevil on Banana plant
MANAGEMENT :-

- Earthing up at 45 days interval from planting.
- Commercial pheromone (cosmolure) are available, this attract both male and female adults. (2 traps/ acer or 5 traps / ha.). 6 month lure life span.
- The position of traps should be changed once in a month.
- Use of bucket traps for monitoring and for mass trapping of adults.

- The myrmicine ants *Tetramorium guinense* and *Pheidole megacephala* have reportedly contributed to the successful control of banana weevil in plantain in Cuba.

- Ants can be encouraged to nest in pseudostem pieces that can then be used for their dissemination. Myrmicine ants are widespread and may also be important predators on the weevil.
It is most important to use clean planting material from fields, known to be free of weevils. Sucker or rhizomes before planting should be washed and dip in a solution of Chlorpyriphos 20 EC @ 2.5 ml/liter before planting.

(OR)

- Dipping suckers in a 20% neem (Azadirachta indica) seed solution at planting protects the young suckers from weevil attack by reducing oviposition through its repellent effect on adult weevils.

(OR)

- Before planting, the suckers should be dipped in 0.1 per cent quinalphos emulsion.
• Avoid growing Robust a, Karpooruvally, Malbhog, Champa and Adukkar Grow less susceptible varieties like Poovan, Kadali, Kunnan, Poomkalli

• Apply castor cake 250g (or) carbaryl 50g dust (or) phorate 10g per pit before planting also prevents infestation.

• In Severe attack dimethoate, methyl demeton, or phosphamidon may be sprayed around the collar region.
• Soil application of carbofuron @ 20g/plant during 3rd, 5th & 7th month after planting.

• Regular monitoring of weevil by keeping banana traps viz.
  (i) longitudinal cut stem trap of 30 cm size at 10-15 per acre.
  (Bio control agents have to be swabbed on the cut surface of the stem traps and keep the cut surface facing the ground.)

✓ **Beauveria bassiana** and **Metarhizium anisopliae** these effect mortality of > 90%.

• Traping of insect by chopped pseudostem (1 piece = 6-10 inches) & spreading chopped pieces on gunny bag and on pieces spray methomil / monocrotophos. **Place 10-15 bag traps /acer.**
Treatment of Entomopathogenic fungi *Beauveria bassiana*, to banana rhizome.

Grub infected by Entomopathogenic fungi *Beauveria bassiana*
• In case of post-planting infestation, spray the pseudostem and drench around the base of the tree with Chlopyriphos 20 EC @ 2.5 ml/liter. After one week spray and drench with Malathion 50 EC @ 2 ml/liter.

• Cut the banana plant after harvest at the ground level and treat it with carbaryl (1g/liter) or chlorpyriphos (2.5 ml/lit) at the cut surface.
3. Banana aphid :- *Pentalonia nigronervosa*

Family :-
Order :- Hemioptera

- The aphids are persistent *vectors of bunchy top disease in banana.*
- Aphids congregate below the leaf base and their direct damage is fairly less.
- High humidity favours rapid multiplication of this pest.

**Identification of pest :-** Yellowish green nymphs and adults suck cell sap and devitalise plants.
Aphid: *Pentalonia nigronervosa*

Damage symptom of Aphid: *Pentalonia nigronervosa* on Banana plant
NATURE OF DAMAGE :-

- Both adult and nymphs suck the sap from lower portion of leaf.

SYMPTOMS OF DAMAGE :-

- Due to sucking of sap (both by adult and nymph) from lower portion of leaf results in progressive leaf dwarfing and curling reduced bunch size and distorted fruits.
- Affected parts become discoloured and malformed.

MANAGEMENT :-

- Rogue out the virus-affected plants before spraying.
- Spray Dimethoate 30 EC@ 2ml/liter or Oxy-demeton methyl 25 EC @ 2ml/liter at first sign of attack.
- Spray lancergold at the rate of 2g/ liter (or) Imidacloprid at 0.25 ml/ liter.
4. Leaf eating caterpillar: - *Pericallia ricini*, (Fabricius)  
   *Spodoptera litura*,  
   *Spilosoma obliqua*, (Arctiinae)

**INSECT BEHAVIOR:** - *Spilosoma obliqua*.
- It lays eggs in mass (300-500 eggs.) on young growing tip leaf.
- Since 3-4 months it has become major problem to farmers.

✓ *Spodoptera litura* :- lays eggs in mass (500-600 eggs)

**IDENTIFICATION OF THE PEST :-**
1. **Eggs** : Laid in cluster on the underside of leaves.
2. **Larva** : Covered with long yellowish to black hairs
3. **Adult** :- Medium sized brown moth with a red abdomen. Wings pinkish with numerous black spots.

**NATURE OF DAMAGE :-**
- The early instars of caterpillar scrape the green matter of leaf, and later instars defoliate the leaf from the plant.
Damage symptom of *Spilosoma obliqua*. 
Damage symptom of *Spodoptera litura*.
Adult moth :- *Spodoptera litura*
SYMPTOMS OF DAMAGE :-

- Papery appearance of leaf and only midrib, veins are only left out on plant.
- In severe infestation the plant is completely defoliate.

MANAGEMENT :-

- Deep summer ploughing.
- Use of well rotten manures.
- Hand picking and mechanical destruction of caterpillars in early stage of attack.
- Remove and destroy the rolled leaves with larvae and pupae of leaf rollers.
- In case of severe infestation spray Carbaryl 50 WP @ 4g/liter during rainy season when incidence is noticed.
MANAGEMENT :-

- For hary caterpillar use dust formulations like melathion.
- For Spodoptera spray avant at 0.5 ml / liter.
- For Spodoptera application of poison bait (very effective.)

Poison bait preparation :-

1. 10 kg rice / wheat bran + 1 kg jagree – keep it over night by mixing both very well.
2. Next day morning before spreading mix methomil, / monocrotophos at the rate of 150 ml.

Note :- Jagree act a phagostimmulant, rice brawn act as food to caterpillar.
• Leaf beetles /Flea beetles, Fruit / leaf scaring beetle :- *Nodostoma sabcostatum, N. viridipennis.*

**NATURE OF DAMAGE :-**

• The beetles feed on tender unfolded leaves and fruits and they remain hidden under unfolded leaves.

• The leaves of central whirl are worst affected. The beetles scratch epicarp of the tender fruits, blemish them and render unmarketable.
MANAGEMENT :-

• Follow clean cultivation and sanitation in the orchards.
• Spray carbaryl (0.1%) during April-September coinciding with emergence of new growth.
• Repeat spray at fortnightly interval if required.
• Stop spraying 15 days before bunch harvesting.
**Fruit and Leaf Scarring Beetle:** *Colaspis hypochlora*

- Occurrence of this pest is usually **high during the rainy season.**

**NATURE OF DAMAGE:**
- The adult beetle feeds on young leaves and skin of young fruits.

**SYMPTOMS OF DAMAGE:**
- Infested fruits get spotted and severe scarring of fruit skin leads to underdeveloped fruit of less commercial value.

**MANAGEMENT:**
- Removal of grass weeds from plantations where the population of this pest is high.
- In case of severe infestation spraying with Carbaryl WP (0.1 %) controls the pest population.