Proforma for of Pest/ Disease wise information for preparation of AL/ML tool

CROP- SUGARCANE

Name of Pest: Top Shoot Borer (*Scirpophaga excerptalis)*

Host Range:

The main host plant of the sugarcane stem borer is sugarcane (*Saccharum officinale*). Also infest other *Saccharum spp.*

Pest Distribution: Major sugarcane area of the country

Pest Identification features/Morphology:

Egg: Eggs are laid on the lower surface of top leaves in clusters particularly near midribs. The clusters are covered with buff coloured hairs. 10-80 eggs per egg mass.

Fig.1 Egg (Source: TNAU)

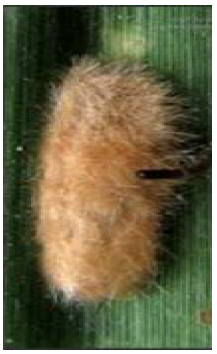

Fig.2 Egg (Source: IISR)

Larva: Smooth, white or cream coloured with a red coloured mid – dorsal line and yellow head.

Fig.3 Larvae (Source: TNAU)

Fig.4 Larvae (Source: IISR)

Pupa: Pupation takes place within the larval tunnel in a chamber with an exit hole Constructed by the caterpillar. Pupal period 6 - 21 days

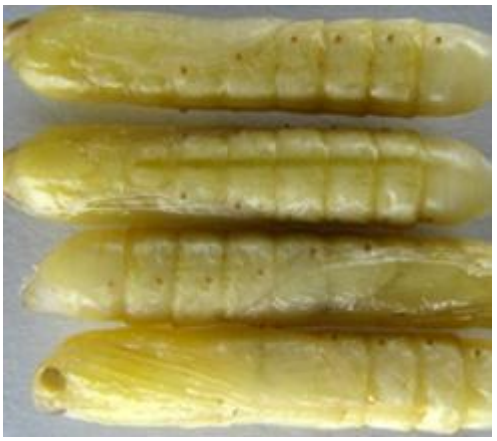

Fig.5 Pupa (Source: TNAU)

Fig.6 Pupa (Source: IISR)

Adult: White Coloured moth (with a buff Coloured anal tuft in the abdominal tip of female)

Fig.7 Adult (Source: TNAU)

Fig.8 Adult (Source: IISR)

Life Cycle & Biology:

It completes five generations (broods) in a year. First brood adult (moth) appears in February, second brood moth appears in April, the third brood in June, the fourth brood in August and the fifth in September. On an average 7-10 days are egg period and 7-10 days are pupal period and larval period is about 35-40 days. Thus, average brood period is around 54-60 days. The third generation (brood) which occurs in June and is more damaging as this attack takes place after completion of tillering and at starting of cane formation. The affected plants do not form good millable canes. The pest remains active from February to November and during winter months it hibernates as mature larva in the cane.

Amongst the borers of sugarcane, the moths of top borer are relatively easy to identify due to their silvery white colour which is distinctly different from straw coloured moths of other borers. Females have a tuft of crimson red/orange or buff colour anal hairs. Moths are nocturnal (emerge in night). However, top borer moths are often observed in the morning hours (cool hours) clinging on crown leaves of sugarcane. As day progresses moths take shelter in whorls / leaf sheath of sugarcane. Eggs are laid parallel to mid rib mainly on underside of younger crown leaves.

Egg mass is covered with orange tuft of anal hairs A female may lay upto 200 eggs. After about a week of incubation (7-10 days) hatching takes place. The fragile first instar larvae crawl actively on the leaves and bore into the mid- rib from the lower side of inner leaves of crown. Tunnelling through the mid-rib larva finally reach the inner core of the crown and then enter the central core making hole through the unfolded leaves. These leaves show the larval damage as shot holes on unfolding. The mid-rib tunnel initially remains white and later turns reddish. Presence of the reddish mid-rib tunnel on the crown leaf indicates top-borer infestation. Larva eats away the growing point and thus slender dead heart is formed. As a result of fourth brood attack side shoots develop and give an appearance of bunchy top. Mature larvae tunnels through the cane downwards and reach towards the rind to make an exit hole and after making the exit hole closes it with the cut portion of rind. Behind the exit hole it also produces several silken discs for self-protection. Second instar and onwards larvae are pale white to creamy, sluggish with atrophied legs. Pupa is cylindrical in shape and pale yellow in colour. Pupation takes place in the cane and pupal period lasts for about a week (7-10 days). Average life cycle is completed in 54-60 days.

Main Symptoms of Damage

1. Dead Heart
2. Emergence of side shoots and appearance of plant becomes like bunchy top.
3. Width wise shot holes are seen on two leaves just below the dead heart

Fig.9-14 Damaging symptoms (Source: TNAU)

Management Practices:

1. **Cultural Practices:**

- Use resistant variety and tolerant varieties.
- Small earthing up followed by trash mulching
- Prefer paired row system for planting
- Remove the dead heart plants and destroy them
- Avoid irrigation during the peak period of moth emergence

- Use only recommended doses of Nitrogen in the field
- Narrow leave weeds should not be in sugarcane field
- Do not undertake maize, sorghum as intercrops
- Dhaniya (Coriander) may be grown as intercrop with sugarcane

2. Mechanical/Physical practices:

- Surveillance and survey for noticing appearance of first moth in the crop
- During summer months (February to June), manual removal of plants infested by top shoot borer in plastic mesh begs so that parasitoid (if any) may escape to the field but not pest.
- Collection and destruction of adult moths
- Collection and destruction of dead hearts
- Use of pheromone traps @ 4-5/acre for monitoring coinciding with brood emergence
- Installation of light trap with exit option for natural enemies @ 1/ acre

3. **Biological methods**

- Release of *Trichogramma japonicum* @ 20,000/acre 2-3 times at 10 days interval.
- Release Ichneumonid parasitized *Gambroides (Isotima) javensis* @ 100 pairs / ha as prepupal parasitoid.
- Selective destruction of unparasitized eggs by placing the egg masses in 30 mesh nylon bags that permit escape of adult parasitoids while containg the neonate larvae hatching from unparasitized eggs.

4. **Chemical methods**

- Chlorantraniliprole18.5% SC @150 ml in 400 litre of water/acre
- Carbofuran 3% CG @ 26640 g/acre
- Chlorantraniliprole 0.4% GR @ 7.5 Kg/acre