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Integrated Management of Sugarcane Insect

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INTRODUCTION

As an important commercial crop of Indian agriculture, sugarcane provides raw material to sugar industry, the second largest agro-based industry after textiles. In contrast, the moderate climate in tropical India favours good crop growth but low pest levels. Insect pests attack sugarcane from planting to harvest and these include borers, sucking pests, defoliators and subterranean pests. Cultivated in two broad agro-climatic regions of the country, namely tropics and subtropics characterized by moderate or ideal and extremes of climatic conditions, accounting for 45 and 55% area, respectively, sugarcane will continue to remain a major agro-industrial crop of the country despite several limitations. The significant growth in the sugar industry and the expansion of sugarcane cultivation brought in their wake biotic stresses. Amongst these, insect pests, though ranking behind diseases, inflict considerable losses in terms of cane yield as well as sugar output. Sugarcane displays different pest profiles in subtropical and tropical India.

Sugarcane whitefly, *Aleurolobus barbodensis*; *Neomaskellia bergii* (Aleurodidae: Hemiptera)

- Adults of *A. barbodensis* are tiny, moth-like with white powdery coating, while *N. bergii* have spotted translucent wings.
- Both nymphs and adults suck the sap from leaves which show characteristic *yellow streaks*.
- In severe cases the leaves dry and plants remain stunted. Yield and sucrose content are drastically reduced.
- Loss of 30-40 percent in sucrose and 20-25 percent in total solids was estimated due to its attack.

Integrated pest management (IPM) strategies

1. Cultural practices: (Remove stubble and debris of previous crops)

- Deep summer ploughing.
- Interculture and hand weeding.
- Timely irrigation.
- **Proper crop rotation:** paddy, wheat, maize, jowar, potato, vegetables, pulses, oil seeds etc.
- Collect and destroy the adult beetles on trees like *Azadirachta indica* (neem), *Ailanthus excels* and *Acaciasps.*
- Helps in minimizing root grub infestation.

Resistant/tolerant varieties:

Early shoot borer	CO 312, CO 421, CO 661, CO 917, CO 853
Internode borer	CO 975, CO 7304, COJ 46 CO-285, CO-453, CO-77-1
Top shoot borer	COJ-69, CO-1158, CO-67, CO 419, CO 745, CO 6516, CO 859, CO1158, CO 7224
Scales	CO-617, 678, 671, 1132
Woolly aphid	COVC 2003 165
White grubs	Co 6304, Co 1158, Co 5510
Mealy bug	CO 439,CO 443, CO 720, CO 730, CO 7704

- Earthing up after 4-5 weeks after planting (Early shoot borer).
- Planting in deep furrows of 20 cm depth.
- Always use well rotten Farm Yard Manure (FYM) to avoid the damage by termites.
- Avoid untimely high nitrogenous fertilizers to minimize the pyrilla, white woolly aphid and stalk borer attack.
- Irrigation at closer intervals for managing early shoot borer.
- Detrashing of canes in the scale insect, mealy bugs, white woolly aphid and stalk borers prone areas.
- **Inter crop:** Onion or Garlic or Coriander for early shoot borer.
- Removal of water shoots to destroy scale insect stages, stalk borers and white woolly aphid.
- Practice deep harvesting to destroy stubbles. Take green burning which will be helpful to conserve moisture, redator and parasitoid sand minimize the weeds growth except in black bug endemic pockets.
- Trash mulching at the rate of 3 tons per ha immediately after planting for early shoot borer.
- Dig the termatoria and destroy the queen.
- Paired row system of planting.
- Rapping of canes all a long the rows for woolly aphids.
- Propping the canes to prevent lodging to reduce the damage by stalk borer and rodents.

2. Physical control:

Management for Termite:

- Locate and destroy the termite colony and affected setts.
- Setup light trap for trapping of white grubs adults and kill them in kerosene oil water.
- At onset of monsoon collect and destroy the adult beetles by shaking the branches of trees on which they settle during night.

Management for scale insects:

- De-trash the crop at 150th and 210th day of planting.

3. Mechanical control:

- Collection and destruction of adult moths, egg masses and dead hearts.
- Installation of light trap @ 1peracre.
- Use of pheromone traps @ 4-5/acre for monitoring of early shoot borer.
- Installation of yellow sticky traps for woolly aphids and whitefly.
- Sett treatments with moist hot air at 54°C for 2-2.5 hours for the control of RSD and GSD.

- Snap traps made of bamboo may be employed for rodent management in sugarcane, rice, wheat based cropping system.
- Growing of arhar around the field stop prevent root borer attack.
- Collection of white grub adults from favored host plant and grubs behind the ploughing operation.
- Avoid the planting of sugarcane under and around trees in order to prevent the perpetuation white woolly aphid.
- Use blind hoeing at 7-10 days after planting. After that use power/bullock/hand operated implements at 20-25 days interval for 3-4 times.

4. Biocontrol practices:

- **Conservation of biocontrol agents:** *Sturmiopsis, stenobracon, isotima, Menochilus, Pharoscymnus, Chilocorus, chrysopa, Dipha, Micromus, Rhaconotus, Telenomus, Trichogramma, Beauveria, Metarhizium, Encarsia, Brumus, coccinellids, syrphids* and spiders.
- Avoid trash burning to prevent destruction of hibernating *Epiricania* eggs on dry leaves, alternatively collect it and staple it in Pyrilla infested field in February so also to prevent of white woolly aphid.

Augmentation:

Pests	Natural enemies	Rate
Early shoot borer, root borer	*Sturmiopsis inferens* (Tachinidae)	125 gravid females per acre
Borer	*Trichogramma chilonis* (Trichogrammatidae)	20,000/acre 10 days interval at six releases
Termites and Root grubs	Entomopathogenic nematodes (EPNs)	100 million nematodes per acre (during May/ June and/or September for sugarcane root grub control.)
Pyrilla	*Epiricania melanoleuca* (Epipyropidae)	3,200 to 4,000 cocoons or 3.2-4.0 lakh eggs per acre

5. Chemical control:

Early shoot borer:	➢ Fipronil 5% SC @ 600-800 ml in 200 l of water/acre. ➢ Chlorantraniliprole 0.4% GR @ 7.5 g/acre.
Scales:	➢ Monocrotophos 36% SL @ 600 ml in 200-400 l of water/acre.
Termite:	➢ Chlorantraniliprole 18.5% SC @ 200-250 ml in 400 l of water/acre or Clothianidin 50% WDG@ 100g in 400 l of water/acre or imidacloprid 17.8% SL @ 140 ml in 750 l of water/acre .
White grubs	➢ Fipronil 40% + imidacloprid 40% WG @ 175-200 g in 400-500 l of water/acre or phorate10% CG @ 10,000 g/acre.
Top shoot borer	➢ Chlorantraniliprole 18.5 % SC @ 150 ml in 400 l of water/acre. ➢ Phorate 10 % CG @ 12,000 g/acre. ➢ Carbofuran 3 % CG @ 26640 g/acre. ➢ Chlorantraniliprole 0.4% GR @ 7.5 Kg/acre.

Pyrilla	➢ Chlorpyrifos 20% EC @ 600 ml in 200-400 l of water/acre. ➢ Dichlorvos 76% EC @ 150.4 ml in 200-400 l of water/acre. ➢ Monocrotophos 36% SL @ 200 ml in 200-400 l of water/acre.
Sugarcane white fly	➢ Foliar sprays with quinalphos 2 ml/l against young nymphs. ➢ Fenitrothion-1 ml/l against puparia are effective measures.

CONCLUSION

The main aim of the article was to collect the relevant contribution in the field of pests in sugarcane cultivation. All important information like sugarcane production, state wise production, major pests are clearly described in the article with the appropriate reference. Thus this article is very useful for farmers and research students to get detail about significant this topic.