IPM of Sugarcane pests
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 per cent in sucrose and 20-25 per cent in total solids was estimated due to its attack.
Integrated pest management (IPM) strategies

A. Cultural practices:

• Remove stubble and debris of previous crops.
• Deep summer ploughing.
• Inter culture and hand weeding.
• Timely irrigation.
• Proper crop rotation: paddy, wheat, maize, jowar, potato, vegetables, pulses, oilseeds etc.
• Collect and destroy the adult beetles on trees like *Azadirachta indica* (neem), *Ailanthus excelsa* and *Acacia spp.* Helps in minimizing root grub infestation
- **Resistant/tolerant varieties:**

<table>
<thead>
<tr>
<th>Pest Type</th>
<th>Varieties</th>
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<tbody>
<tr>
<td>Early shoot borer</td>
<td>CO 312, CO 421, CO 661, CO 917 and CO 853</td>
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<tr>
<td>Internode borer</td>
<td>CO 975, CO 7304, COJ 46 CO-285, CO-453 and CO-77-1</td>
</tr>
<tr>
<td>Top shoot borer</td>
<td>COJ-69, CO-1158, CO-67, CO 419, CO 745, CO 6516, CO 859, CO1158 and CO 7224</td>
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<tr>
<td>Scales</td>
<td>CO-617, 678, 671, 1132</td>
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<tr>
<td>Woolly aphid</td>
<td>COVC 2003 165</td>
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<tr>
<td>White grubs</td>
<td>Co 6304, Co 1158, Co 5510</td>
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<tr>
<td>Mealy bug</td>
<td>CO 439, CO 443, CO 720, CO 730 and CO 7704</td>
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</tbody>
</table>
- 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, predators and parasitoids and 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 along the rows for woolly aphids.
• Propping the canes to prevent lodging to reduce the damage by stalk borer and rodents.
B. Physical control

For termite management:
• Locate and destroy the termite colony and affected setts.
• Set up 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.

For scale insects:
• De-trash the crop at 150th and 210th day of planting.
B. Mechanical control

- Collection and destruction of adult moths, egg masses and dead hearts
- Installation of light trap @ 1 per acre
- Use of pheromone traps @ 4-5/acre for monitoring of early shoot borer
- Installation of yellow sticky traps for woolly aphids and white fly
• 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 fields to 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.
Biocontrol practices

- Conservation of biocontrol agents: *Sturmiopsis, stenobracon, isotima, Rhaconotus, Telenomus, Trichogramma, Beauveria, Metarhizium, Encarsia, Brumus, Menochilus, Pharoscymnus, Chilocorus, chrysopa, Dipha, Micromus, 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:**

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

*Pyrilla nymph carrying the larvae of *E. melanoleuca*

Pupa of *E. melanoleuca*  
Egg laying female  
Adult
Natural enemies of sugarcane wooly aphid

*Dipha aphidivora*

Hover fly maggots feeding on sugarcane wooly aphids
**Chemical control**

<table>
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<tr>
<th>Chemical Control</th>
<th>Treatment Details</th>
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<tbody>
<tr>
<td><strong>Early shoot borer</strong></td>
<td>• Fipronil 5% SC @ 600-800 ml in 200 l of water/acre</td>
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<td></td>
<td>• Chlorantraniliprole 0.4% GR @ 7.5 g/acre</td>
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<tr>
<td><strong>Scales:</strong></td>
<td>Monocrotophos 36% SL @ 600 ml in 200-400 l of water/acre</td>
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<td><strong>Termite:</strong></td>
<td>Chlorantraniliprole 18.5% SC @ 200-250 ml in 400 l of water/acre or</td>
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<td></td>
<td>clothianidin 50% WDG @ 100 g in 400 l of water/acre or</td>
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<td></td>
<td>imidaclorpid 17.8% SL @ 140 ml in 750 l of water/acre or</td>
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<tr>
<td><strong>White grubs</strong></td>
<td>Fipronil 40% + imidacloprid 40% WG @ 175-200 g in 400-500 l of water/acre or phorate 10% CG @ 10,000 g/acre</td>
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<td>-----------------</td>
<td>----------------------------------------------------------------------------------------------------------</td>
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</tbody>
</table>
| **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 and fenitrothion - 1 ml/l against puparia are effective measures. |