Major Insect-pests of Groundnut and their Control Measures

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Abstract
The weather and pests in a given season plays a significant role in determination of crop productivity because the crop and its pests are sensitive to extreme weather events. It is assumed that the crop and the pests in their occurrence and abundance are likely to change with the changing climate. The crop productivity of rainfed groundnut cultivation in different regions is hampered and highly reduced due to intermittent drought and seed contamination with aflatoxin and biotic stresses from insect pests and foliar fungus diseases. Hence, to suggest a suitable eco friendly management the identification, nature of damage of insect-pests of groundnut crop becomes inevitable.

Introduction
In India, groundnut (Arachis hypogea) is cultivated during Kharif, Rabi and summer seasons on an area over 4.91 million hectares with an annual production of 9.18 million tonnes. The major growing states are Gujarat, Andhra Pradesh, Tamil Nadu, Madhya Pradesh, Karnataka, Maharashtra and Rajasthan constituting and contributing around 80% of area and production, respectively. Rainfed groundnut cultivation coupled with attack by a variety of insect pests and diseases hence, the national average yield of Rabi groundnut is higher over Kharif. Groundnut being considered as a high-input high-risk crop because of the appropriate production technologies, the scarcity of good quality inputs and large seed requirement. Moreover, insect pests are often considered to be a major constraint to groundnut production worldwide. Climate change is expected to trigger the changes in diversity, geographical and temporal distribution of insect pests, their activity and efficacy of crop protection technologies which in turn will have a major bearing on food and nutritional security. In general, insect pests cause 10-20% crop loss and post-harvest losses in groundnut range between 10 to 25% of the production in India and even higher during long term storage. In India, farmers, seed agencies and oil extraction units store about 65% of the groundnut produce for 6-9 months before final use. The adoption of inappropriate management strategies such as excessive application of insecticides, unfavourable storage conditions, ineffective crop rotations, etc induces the pest outbreaks. While most groundnut pests are of localized importance, they often reach epidemic proportions. The major groundnut pests can be classified as specific to this crop i.e. aphids, leaf miner and pod borers; or general feeders that attack a wide range of crops i.e. tobacco caterpillar (armyworm), gram pod borer, hairy caterpillars and other defoliators; and soil inhabiting species such as white grubs and termites.
Integrated Pest Management in Groundnut

A. Monitoring for Pest & Diseases

- Community level monitoring to know change in destruction and abundance of pest.
- Organise regular pest monitoring and assess bio control potential at every 5 to 10 km distance at 12 spots/ha and 5 plants/spot selected randomly.
- For monitoring moth activity, install 1-2 light traps/ha and pheromone traps @ 10 traps/ha for tobacco caterpillar and gram pod borer and 25 traps/ha for leaf miner.
- Collection and destruction of egg masses, gregarious larvae (tobacco caterpillar and red hairy caterpillars) and adults (white grub).
- Conserve the natural enemies like coccinellids, spiders, hymenopteran and dipteran parasitoids.

B. Pre-Sowing stage

- Carry out deep ploughing to a depth of 8-10 inches during summer to reduce pests and inoculums of pathogens in soil.
- Soil solarisation, deep tillage and clean cultivation (keep the field free from weeds and crop debris).
- Remove volunteer groundnut plants, crop debris and weeds.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the pest</th>
<th>Distribution</th>
<th>Possible yield loss (%)</th>
<th>Chemical control</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Leafminer</td>
<td>Tamil Nadu, Andhra Pradesh, Telangana, Karnataka, Maharashtra Madhya Pradesh and Orissa</td>
<td>49-56</td>
<td>Carbaryl 50 WP 0.2% Fenitrothion 50 EC 400 ml in 400 litres of water/ha Monocrotophos 0.05%</td>
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<td>2.</td>
<td>Aphid</td>
<td>Sporadic pest in India</td>
<td>16-40</td>
<td>Dimethoate 0.05% Monocrotophos 0.05%</td>
</tr>
<tr>
<td>3.</td>
<td>Thrips</td>
<td>Major pest in Karnataka, Madhya Pradesh &amp; Orissa</td>
<td>17-40</td>
<td>Dimethoate 0.05% Monocrotophos 0.05%</td>
</tr>
<tr>
<td>4.</td>
<td>Jassid</td>
<td>Major problem in Gujarat, Maharashtra, &amp; Tamil Nadu</td>
<td>40</td>
<td>40</td>
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<tr>
<td>5.</td>
<td>Red hairy caterpillars</td>
<td>North India, Tamil Nadu, Andhra Pradesh, Telangana &amp; Karnataka</td>
<td>26-75</td>
<td>Carbaryl or Quinolphos 25-30 kg/ha or Dichlorovos 100 EC 200 ml</td>
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<td>6.</td>
<td>Gram caterpillar</td>
<td>Andhra Pradesh, Telangana, Karnataka, Punjab &amp; Gujarat</td>
<td>-</td>
<td>Quinolphos 2ml or Chloropyriphos 3ml</td>
</tr>
<tr>
<td>7.</td>
<td>White grubs</td>
<td>North Rajasthan, Punjab, Haryana, Uttar Pradesh, Maharashtra, Karnataka, Tamil Nadu and Madhya Pradesh</td>
<td>-</td>
<td>Seed treatment with Chloropyriphos (Dursban 20 EC) 12.5 ml/kg of seed. Soil application of Quinolphos or Isofenphos 1.5 kg a.i./ha</td>
</tr>
<tr>
<td>8.</td>
<td>Termite</td>
<td>West Bengal, Uttar Pradesh</td>
<td>-</td>
<td>Seed dressing with Chloropyriphos Drenching with Chloropyriphos (spot application)</td>
</tr>
<tr>
<td>9.</td>
<td>Tobacco caterpillar</td>
<td>Andhra Pradesh, Telangana, Karnataka, &amp; Tamil Nadu</td>
<td>-</td>
<td>Quinolphos 2ml or Chloropyriphos 3ml</td>
</tr>
<tr>
<td>Partial or complete lopping of host plants and retaining of preferred host trees in area of white grub adults.</td>
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<tr>
<td>Collection and destruction of white grub adults.</td>
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<tr>
<td>Installation of 12 light traps/ha or bonfire against Red Hairy Caterpillar.</td>
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</tbody>
</table>

| Use insect and disease resistant or tolerant varieties. |
| Use certified quality seeds that are free from diseases or any insect damage. |

**C. Sowing stage**

- Grow 3-4 rows of pearl-millet as border crop and castor as

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**Figure 1: Aphids on shoot and leaves**

**Figure 2: Thrips damage**

**Figure 3: Jassids damage (Yellowing and V shaped necrosis on leaf tip)**

**Figure 4: Leaf minor damage**

**Figure 5: Defoliation due to red hairy caterpillar**

**Figure 6: Larvae of spodoptera**
Figure 7: Photo of Red hairy caterpillar

Figure 8: Spiders

Figure 9: White grubs/Root grubs

Figure 10: Damage due to Gram pod borer (Helicoverpa armigera)

Photos of major pest and their nature of damage in groundnut

of RHC egg masses/caterpillars.

• Install one pheromone trap per ha. for monitoring or 5 trap/ha for mass trapping of Spodoptera.

• Collection and destruction of early stage larvae of Bihar hairy caterpillar.

• Collection and destruction of white grub adults from jujube or neem trees around the field.

• Install per ha. 10-12 bird perches.

• Two hand or mechanical weeding at 15-20 days after sowing.

• Spray commercial formulation of nuclear polyhedral viruses (NPV- Spodoptera and NPV- Helicoverpa) for the management of tobacco caterpillar and gram pod borer @0.4 ml/L and granulosis virus (GV- Amsacta) @0.3 ml/L for red hairy caterpillars.

• Spray Endosulfan 35 EC or Quinalphos @ 1250 ml/ha to control hairy caterpillar.

• Release adults of Trichogramma chilonis or Telenomus remus @50000/ha, two times at 7-10 days interval followed by release of Bracon hebetor @5000/ha two times at 7-10
days against leafminer and defoliators.

- Spray entomopathogenic bacteria, *Bacillus thuringiensis* @ 2 g/L against red hairy caterpillar, tobacco caterpillar and gram pod borer.

- Spray entomopathogenic fungus like, *Nomuraea rileyi* and *Beauveria bassiana* 2 g/L for defoliator pests and *Verticillium lecanii* @ 5 g/L for sucking pests.

- Need based application of dimethoate 30 EC 2.0 ml/L or monocrotophos 36 SL @ 2.5 ml/L or imidacloprid 17.8 SL @ 0.3 ml/L or thiacloprid 480 SC @ 0.3 ml/L or thiamethoxam 25 WG @ 0.2 g/L or acetamiprid 20 SP @ 0.2 g/L between 25 and 30 days after sowing for managing sucking pests like thrips and leaf hoppers.

- Need based application of chlorpyrifos 20 EC 2.5 ml/L or quinalphos 25 EC @ 2 ml/L or profenofos 50 EC @ 2 ml/L or flubendiamide 480 SC @ 0.2 ml/L or novaluron 10 EC @ 1 ml/L for managing the defoliator pests like tobacco caterpillar and gram pod borer.

- Need based application of profenofos 50 EC @ 2 ml/L or spinosad 45 SC @ 0.3 ml/L or flubendiamide 480 SC @ 0.2 ml/L or quinalphos 25 EC @ 2 ml/L for managing leafminer.

- For managing red hairy caterpillar, dig furrow trenches around field and dust with carbaryl 50 WP @ 5%.

- For managing tobacco caterpillar, spread the poison bait (rice bran 12.5 kg + molasses/jaggery 2.5 kg + carbaryl 50 WP 1.25 kg) in the field at the evening hours.

**E. Flowering stage**

- Collect and destroy egg masses and early instar larvae of *S. litura*.

- Continue Pheromone trap @ 1/ha for monitoring or 5/ha for mass trapping of *S. litura*.

- Spray neem based formulation @ 2%.

- For monitoring moth activity, install 1-2 light traps/ha and pheromone traps @ 10 traps/ha for tobacco caterpillar and gram pod borer and 25 traps/ha for leaf miner.

- Collection and destruction of egg masses, gregarious larvae (tobacco caterpillar and red hairy caterpillars) and adults (white grub).

- Release *Trichogramma chilonis* (50000/ha) twice and *Cheilomenes sexmaculata* (1250/ha twice) against leaf miner and other defoliators.

**F. Fruiting stage**

- Collect egg masses and early instar larvae of *S. litura*.

- Spray neem based formulation @ 2%.

- Spray SNPV @ 250 LE for controlling defoliators.

- Spray entomopathogenic bacteria, *Bacillus thuringiensis* @ 2 g/L against red hairy caterpillar, tobacco caterpillar and gram pod borer.

- No chemical control applied at the maturity stage.

**G. During storage**

- Spray malathion 50 EC @ 5.0 ml/L or deltamethrin 2.5 SC @ 0.5 ml/L on the walls, floor and roof of the warehouses or godowns before storage and aluminium phosphate 56% @ 1 pouch (10 g)/t of pods for managing bruchids, *Caryedon serratus*.

- Store the pods in polythene lined gunny bags and fill the top of the bags with sand.

- Mouth of bags not be closed to avoid germination loss.

- Harvest at optimum maturity stage to avoid pod infection.

**Conclusion**

As groundnut being considered as a high-input high-risk crop but due to heavy infestation of 100 insects-pest results in low productivity and poor quality of produce. So, with the sound knowledge about the identification and nature of damage caused by insect-pests, their diversity, activity, geographical and temporal distribution and efficacy of crop protection technologies, it will be easy to formulate and provide a sustainable, eco friendly and suitable management practices to farmers adaptable in their regions and local situations.

**References**
