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Insect Pest of Ginger in Meghalaya

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Ginger is an important spice crop of the North Eastern region of India, particularly Meghalaya, where favourable agro-climatic conditions support its cultivation. However, its productivity is adversely affected by major insect pests such as stem borer (*Conogethes punctiferalis*), rhizome scale (*Aspidiella hartii*), rhizome fly (*Mimegralla coeruleifrons*), white grub (*Holotrichia spp*.), and rhizome weevil (*Prodioctes haematicus*). These pests damage the crop by boring into pseudo stems and rhizomes, feeding on plant sap, and destroying underground tissues, leading to considerable yield loss. Pest incidence is largely influenced by environmental factors, with peak activity observed during July to October. Adoption of integrated pest management (IPM) practices, including use of neem-based products, biological control agents, and healthy seed rhizomes, is essential for effective and sustainable pest control.

Keywords: Ginger, insect pest, IPM, northeast India

Introduction

Ginger (*Zingiber officinale* Rosc.) is a commercially valuable crop cultivated for its aromatic rhizomes, which serve as both a spice and a medicinal ingredient (Rymbai *et al*., 2021). It is a herbaceous perennial crop belonging to the Zingiberaceae family, believed to originate in southeastern Asia. The eastern Himalayan states of India possess immense potential for cultivating a wide variety of spice crops, including ginger, turmeric, chilli, bay leaf (tejpata), large cardamom, coriander, and garlic, owing to their highly suitable agro-climatic conditions. Ginger is the most significant cash crop among spices, supporting livelihoods and enhancing the socio-economic conditions of many ginger farmers in the region (Rymbai *et al.*, 2018). Ginger is produced in nearly all states in the region, with Meghalaya, Mizoram, Arunachal Pradesh, and Sikkim being the main producers. Meghalaya is recognized as a major ginger-producing state in the North Eastern region. The crop plays a significant role in the livelihood of small and marginal farmers, particularly in districts such as West Jaintia Hills, East Khasi Hills, Ri-Bhoi and West Garo Hills. The state's agro-climatic conditions-moderate temperature, high rainfall (2000-3000 mm annually), and well-drained loamy soils are highly suitable for ginger cultivation. The area and production of ginger at the national level are 0.176 million ha and 1.89 million metric tonnes, respectively. The cultivated area of ginger in the Northeastern region of India extends to 67.82 thousand Ha, with a production of 532.4 thousand MT and a productivity of 7.85 MT/Ha, which exceeds the national average productivity (2.56 MT/ Ha, Spice, 2025). The region accounts for 22.53% of the country's total ginger production. Approximately 67.6 thousand MT of ginger was produced in Meghalaya from an area of 10.2 thousand Ha (Spice, 2025).

Insect pest of ginger

1.Stem borer (*Conogethes punctiferalis*): Eggs are laid on leaves or tender stems. The larval stage stays concealed under silk and frass. Pupation occurs within this cover and total life cycle is completed in about 38±2 days. Shoot borer damage began in early July and peaked

during mid to late August. Larvae bore into pseudo stem and feed on inner tissues, causing yellowing, drying, bore holes with frass, and "dead heart" symptoms (Devasahayam *et al*., 2010; Chong *et al*., 1991). Early larvae also feed on leaf margins and sometimes damage rhizomes.

Management: The shoots infested by the borer are cut open. Caterpillar should be handpicked and destroyed. Grow neem trees along with ginger crops to repel the pest. An integrated strategy involving pruning and destroying freshly infested pseudo stem during July-August (at fortnightly intervals) and spraying Neem oil-based formulation @ 5 Ml/ L during September-October (at monthly intervals).

2.Rhizome scale (*Aspidiella hartii*): Females lay about 100–180 eggs beneath the protective scale, which hatch within about 1 day. The nymphal stage lasts around 30 days, during which the nymphs feed on rhizomes and develop under a waxy covering. The male undergoes a pupal stage before emerging as a winged adult, while the female remains sessile. The life cycle is generally completed in about 30–40 days, depending on environmental conditions. They feed on sap, and when the rhizomes are severely infested, they become shrivelled and desiccated, affecting their germination. The injury of scale insect (*Aspidiella hartii*) to rhizomes is seen as encrustations on the rhizomes and severely infested rhizomes wither and dry. The scale insect feeds from the phloem of the host plant. Feeding damage due to an individual scale is small. However, when large populations are present, yellowing, defoliation, reduction in fruit set and loss in plant vigour result. Feeding sites are usually associated with discolorations, depressions and other host tissue distortions. The rhizome scale infests rhizomes of ginger both in the field and in storage. In the field, the pest is generally seen during the later stages of the crop.

Management: It is managed by removing and destroying infested plants, applying neem oil @ 3–5 ml/L, and incorporating neem cake into the soil. Use healthy, treated seed rhizomes and maintain field hygiene. In severe cases, apply recommended soil insecticides as per guidelines. The rhizome scale can be managed by timely harvest. Discards severely infested rhizomes. Treats the seed rhizomes before storage and before sowing in case the infestation persists. The seed rhizome may be stored in sawdust + Strychnos nux-vomica leaves (dried) after seed treatment.

3.Rhizome fly (*Mimegralla Coeruleifrons*): Eggs are laid near the base of plants, mostly around diseased rhizomes, with peak egg laying from August to September. The maggots bore into rhizomes and feed internally. Pupation occurs inside the infested rhizome tunnels. Rhizome fly infestation started in early July, gradually increased and reached its peak by the end of August. The maggots bore into rhizomes and roots and are commonly associated with plants affected by rhizome rot disease (Maxwell-Lefroy and Howlett, 1909).

Rhizome fly is a serious pest of ginger under the warm and humid conditions of regions like Meghalaya. The maggots bore into the rhizomes and feed internally, causing extensive tissue destruction. As a result, the rhizomes rot, become soft, and emit a foul odour. Infested plants show yellowing and wilting symptoms, starting from lower leaves, along with poor root development and stunted growth. In severe cases, plants may die completely due to internal damage and secondary infection through feeding wounds.

Management: Healthy and pest free seed rhizomes should be selected and the field must have good drainage. Application of neem-based product containing Azadirachtin can reduced larva activity. While soil application of bio control agents like *Beauveria bassiana* helps supress the pest population naturally (Rymnbai *et al*. 2021)

4.White grub (*Holotrichia spp*.): Females laid eggs in soil near newly planted rhizomes. Fresh eggs were oval, creamy white. Grubs were C-shaped, voracious feeders that damaged rhizomes and could kill plants under severe infestation.

White grub damage in ginger is peaked during October. Several species such as *Holotrichia consanguinea, H. fissa, H. coracea, and H. seticollis* are known to damage ginger in hilly regions (Koya *et al*., 1991; Misra, 1992). Rhizome damage at harvest may range from 5.7–26.5% (Misra, 1991). White grubs are destructive soil-dwelling pests that damage ginger by

feeding on underground rhizomes and roots. The grubs chew and bore into rhizomes, creating irregular holes and causing internal tissue destruction. As feeding continues, the rhizomes become hollow and start decaying, leading to poor plant growth. Infested plants show yellowing, wilting, and can be easily uprooted due to severe root damage, often resulting in complete plant death. Under heavy infestation, yield losses may be very high, even up to severe levels in susceptible crops.

Management: White grubs in ginger can be managed by removing crop residues to reduce breeding sites and practicing crop rotation with non-host crops. Deep ploughing helps expose and kill grubs, while biological control using nematodes like *Heterorhabditis* and *Steinernema*, along with natural predators, is effective. In severe cases, insecticides such as imidacloprid or chlorpyrifos may be used. Regular monitoring and use of light traps to catch adult beetles also help in controlling their population (Bhaskar pathak,2024)

5.Rhizome weevil (*Prodioctes haematicus***)**: Shylesha 2006), reported as a major pest in the North Eastern Hill region, causing 30–40% damage during July to September. Weather parameters, particularly temperature and rainfall, significantly influence pest population dynamics. This information is useful for developing effective integrated pest management (IPM) strategies for ginger in Meghalaya and other parts of Northeast India.

The grubs bore into the rhizomes and basal portion of the pseudostem, feeding on internal tissues and creating tunnels. This internal feeding leads to weakening of the plant, resulting in yellowing and drying of leaves, and in severe cases, breaking of the stem at the base. The characteristic symptom is the formation of "dead heart," where the central shoot dries up completely. Continuous feeding by the grubs may cause complete destruction of rhizomes and eventual plant death.

Management: Management requires a combination of sanitation, crop rotation, and targeted chemical or organic applications to control larvae boring into the rhizomes. Key practices include using healthy seed material, ensuring good drainage on raised beds, and using fermented Asuro extract (1:4) or soil application of neem cake (200 kg/ha) to manage infestations.

Rhizome fly, *Mimegralla spp*

White grubs, *Holotrichia spp*.

Rhizome weevil, *Prodioctes haematicus*

Rhizome Scale, *Aspidiella hartii*

ShootBorer, *Conogethes punctiferalis*

Conclusion

Ginger cultivation in Meghalaya is highly important but is greatly affected by major insect pests, leading to yield losses, especially during July to October. Effective control requires an integrated approach using healthy seed rhizomes, cultural practices, and neem-based and biological methods. Understanding pest dynamics and adopting IPM strategies are essential for sustainable production and improved farmer income.

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