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## Integrated Pest Management Strategies of Ginger: A New Experience

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### Abstract

Ginger, *Zingiber officinale* is a perennial root crop that is cultivated in almost all parts of India. The crop is commercially grown for its aroma, and its rhizomes are used both as a spice as well as for medicinal purposes. A number of limiting factors were reported in production and productivity but one of the major constraints in healthy ginger cultivation and storage due to the activity of many key pests in the field as well as in storage. It is also rife with pests which include soft rot, yellows bacterial wilt, leaf spot, storage rot, root-knot nematodes, shoot borer, rhizome scale, pigweed and swine cress, etc. The purpose of this study is to focus on eco-friendly, environmentally safe, economically viable Integrated Pest Management (IPM) strategies, which can minimize the level of infestation and enhance the farmer income.

### Introduction

Ginger, *Zingiber officinale* is cultivated in all states of India as an important spice crop. India ranks first in production and productivity in the world. It is an herbaceous perennial crop, however farmers in India cultivating it as an annual crop for usages of its rhizome. However, it is cultivated in almost all tropical and subtropical countries like Brazil, China, Indonesia, Jamaica, Japan, Nigeria, and Syria are also cultivating this crop. India shares 30-40 percent world production of the crop, major growing states are Arunachal Pradesh, Kerala, Meghalaya, Odisha, Tamil Nadu, and West Bengal. The majority of farmers are growing this crop to either use in their own houses or to sell in the market to fetch more profits as people all over the world are using this crop for food crops or medicinal purposes. It is propagated through healthy 2.5 to 5 cm long and weighs about 25 g seed tubers having at least one or two viable nodes. The number of seed tubers used in plains and hilly regions is different which is about 1,600 kg/ha and 2,200 kg/ha, in plains and hilly regions, respectively. During harvesting, good healthy seed tubers were separated and treated it before using it as seed tubers. A number of pests were recorded as follows.

#### 1. Insects

- a. Shoot Borer, *Conogethes punctiferalis*
- b. Rhizome Scale, *Aspidiella hartii*

#### 2. Diseases

- a. Rhizome soft rot, *Pythium* spp.
- b. Bacterial wilt, *Ralstonia solanacearum*
- c. Leaf Spot, *Phyllosticta zingiberi*
- d. Storage rot, *Pythium* spp., *Fusarium* spp., *Verticillium* spp.
- e. Fusarium yellow, *Fusarium oxysporum*

### 3. Nematodes

a. Root-Knot Nematode, *Meloidogyne incognita*

### 4. Weeds

a. Pigweed: *Amaranthus viridis*

b. Swine cress, *Coronopus didymus*

c. Black nightshade, *Solanum nigrum*

d. False amaranth, *Digera arvensis*

## Management Tips for Crop

- Mix *Trichoderma* spp. with cow dung manure at 250 g per quintal.
- Soil solarisation with a transparent polythene sheet of 0.45 mm thickness 15-20 days before sowing.
- Seed rhizomes can also be oxidized by putting them in polythene bags of plastic for 2 hours.
- Treat seed rhizomes in hot water at 51 degrees centigrade for 10 minutes before sowing.
- Before sowing, soak the seed rhizomes with a fungicide such as *Trichoderma harzianum* for 30 minutes in 6-8 g per litre of water.
- At the rate of 0.2 percent of Carbendazim 50 WP or Mancozeb 64% + Metalaxyl 8% in standing crops, wet the fields by making a slurry in a month old standing crop or after one rain, in the meantime. Soil should be removed so that the fungicide can have better contact with the process.
- For the purpose of making seeds (7-80 kg) from rhizomes, soak the rhizomes for 4 hours in a solution of Carbendazim 50 WP (100 g) + Mancozeb 75 WP 250 g + Chlorpyrifos 20 EC 250 ml per 100 litres of water. Dry and store.



(a) Shoot borer

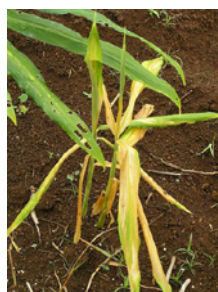


(b) Rhizome scale

Figure 1: Major Insects of Ginger

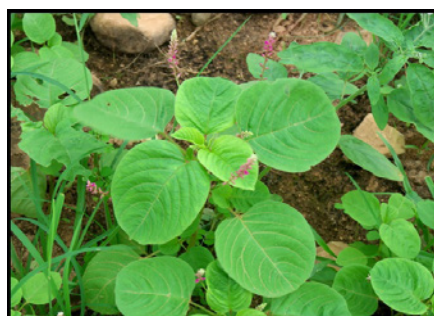


(a) Rhizome soft rot



(b) Bacterial wilt

Figure 2: Major Diseases of Ginger



(a) False amaranth



(b) Pigweed



(c) Black nightshade



(d) Swine cress

Figure 3: Major Weeds of Ginger

## Conclusion

In one of the studies conducted in different part of Sikkim. It was noticed the major constraint is low germination, attack of various pests at crop stage cause more than 55 percent loss to the crop and farmers are taking too causal behaviour about the use of fertilisers. Farmer participatory efforts were made to demonstrate the pest management strategies viz., use of healthy rhizomes, hot water treatment at around 50 °C for 30 minutes and after proper drying use of *Trichoderma harzianum*. Farmers were advised to follow proper water management, regular monitoring, and application of COC immediately on set of disease and should be continued at regular interval of 10 days until disease is visible in field, continuous removal of infected plant parts. After studying data it was revealed that IPM farmers fetch 6.67 t/ha in comparison to farmer practice, 4.35 t/ha. The Benefit:Cost ratio is 2.34:1.54 of IPM and Farmers practices, respectively.