

Disease & Insect Pest Management in Turmeric & Ginger



All India Coordinated Research Project on Spices,
High Altitude Research Station
(Orissa University of Agriculture & Technology) Pottangi

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PATANGI

Diseases of Ginger and Turmeric

Introduction :

Ginger and Turmeric being under zingiberaceous species have disease and pest problems all most similar to each other. There are diseases that affect rhizomes such as Rhizome rot, which kills the plant and those affecting aerial shoots such as leaf blotch and leaf spots which lead to severe reduction in yield.

Ginger :

1. Soft rot / Rhizome rot :

Causal organism - *Pythium sps*, *Fusarium oxysporum f.sp. zingiberi*, *Pratylenchus sps*.



Disease symptoms:

- The infection starts at the collar region of the pseudostem and progresses upwards as well as downwards.
- Affected pseudostem becomes water soaked and the rotting spreads to the rhizome resulting soft rot. At a later stage root infection is also noticed.
- Affected pseudostem comes off easily with a gentle pull.
- Lower leaves being affected by the disease show yellowish colour at the tips, which gradually spreads inwards and to rest of the upper leaves.
- The affected pseudostem breaks at the infected zone and hangs down.
- The disease symptoms can be observed July onwards up to September-October.

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Survival and spread:

- The pathogen is both seed (rhizome) and soil borne which may survive producing chlamydospore and oospore.

Favourable conditions:

- Younger sprouts are the most susceptible to the pathogen.
- A high temperature above 30° C and high soil moisture are the important predisposing factors favouring the disease.
- Water logging in the field due to poor drainage increases the intensity of the disease.

Management:

- Seed treatment with Metalaxyl Mancozeb (Ridomil MZ) @ 2 gms /l of water.
- Remove the affected plants and drench around the infected plants with Copper oxychloride @ 2gms /l of water.

2) Dry rot:

Causal organism :*Fusarium oxysporum*, *Pratylenchus* sps., *Scale insect*



Disease symptoms:

- It appears in field in small patches and spreads slowly.
- The affected plants appear stunted and exhibit yellowish colour in affected leaves.
- The affected leaves dry up and defoliate.
- In advanced stage when the rhizome cut open, show a brownish ring and is mainly restricted to cortical region.

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- The pseudo stem of the dry rot affected plants does not come off with a gentle pull in contrast to soft rot. The affected rhizomes are shrunken, dry and are not marketable.

Survival and spread:

- Soil and infected rhizome pieces are source of primary inoculum.
- The fungus also produces resting structures (Chlamydospores) in the decomposing tissues of infected rhizomes.
- Therefore, tissues from infected crops remaining in the field serve as primary source of infection.

Favourable conditions:

- The pathogen rapidly multiplies in warm wet weather, coupled with high soil moisture.

Management :

Seed treatment with Carboxin + Thiram (Vitavax power) @ 2gms/kg of seeds or Carbendazim @ 2 gms/kg of seeds.

3) Bacterial wilt:

Causal organism - *Ralstonia solanacearum*



Disease symptoms:

- The leaf margins of the affected plant turn bronze and curl backward.
- The symptoms first appear as mild drooping and curling of leaf margins in the lower leaves which gradually spread upwards.
- In the advanced stage, severe yellowing and wilting symptoms observed.
- The vascular tissues of the affected pseudostems show dark brown black discoloration.

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- The affected pseudostem emit foul smell and when it pressed gently extrudes milky ooze from the cut end when dipped in clear water in a clean beaker.

Survival and spread

- Bacterial wilt is soil and seed borne disease that occurs during the period from July - October.
- The bacteria spread through soil, water, infected or contaminated rhizomes.
- The bacteria enter the plant through wounds made in the roots during intercultural operation and through nematodes and insects.

Favourable conditions:

- Relatively high soil moisture and soil temperature
- Disease, occurs during

Management

- Seed treatment with Streptocyclin @ 2gms/10l of water.
- Remove the affected clumps and drench the soil with Copper oxychloride @ 2gms/l of water at 15 days interval.

4) Leaf spot:

Causal organism - *Phyllosticta zingiberi*



Disease symptoms:

- The disease starts as small spindle to oval water soaked spots on leaves which gradually increase in shape and size with light greyish center surrounded by yellowish halo.
- The spots in severe case coalesce and form blighted patches.
- The affected leaves dry up and defoliate.

Survival and spread

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- Spread through wind and rain splashes.
- Disease is soil-borne.

Favourable conditions:

- Noticed on the leaves from July to October.
- High humidity and temperature.

Management:

Seed treatment with Mancozeb @ 2gms/kg of seeds and then foliar application @ 2.5 gms/l at the initial stage of disease development 15 days interval twice.

5) Sheath blight / leaf blight:

Causal organism:*Rhizoctonia solani*



Disease symptoms:

- The lesions are usually observed on the leaf sheaths and leaf blades.
- Initially, lesions are small, ellipsoid or ovoid and greenish-grey in colour.
- Under favourable conditions, they enlarge and may coalesce to form bigger lesions with irregular outline and greyish-white center and dark brown borders.
- In later case large spots on a leaf sheath coalesce to cause the death of the whole leaf.

Survival and spread:

- Fungus survives in the soil for many years in the form of sclerotia

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and spreads through soil & infected rhizomes.

Favourable conditions:

- The pathogen prefers warm wet weather condition.

Management :

Sheathmar / Validamycin @ 3ml/l of water or Propiconazole @ 2gm/l of water.

Turmeric :

1) Rhizome rot:

Causal organism - *Pythium graminicolum*, *Pythium aphanidermatum*, *Fusarium solani*



The disease is soil-borne and seed borne and occurs with the onset of monsoon.

This disease mostly occurs during the months of June to September.

Disease symptoms:

- The infection starts at the collar region of the pseudostem and progresses upwards as well as downwards.
- The collar region of the affected pseudo stem becomes water soaked and the rotting spreads to the rhizome resulting rhizome rot.
- At a later stage root infection is also noticed.
- Foliar symptoms appear as light yellowing of the tips of lower leaves which gradually spreads to the leafblades.
- Later, the yellowing spreads to all leaves of the plant from the lower region upwards and is followed by drooping, withering and drying of pseudostem.

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Rhizomes and roots of wilted plant found rottened.

Survival and spread:

- The pathogen is both seed (rhizome) and soil borne which may survive producing chlamydospore and oospore.

Favourable conditions:

- Younger sprouts are the most susceptible to the pathogen.
- A high temperature above 30° C and high soil moisture are the important predisposing factors favouring the disease.
- Waterlogging in the field due to poor drainage increases the intensity of the disease.

Management:

- Seed treatment with MetalaxylMancozeb(Ridomil MZ) @ 2 gms/l of water.

Remove the affected plants and drench around the infected plants with Copper oxychloride @ 2gms/l of water

2) Leaf spot:

Causal organism - *Cercosporacurcumae*



Disease symptoms:

- Symptom appears as brown spots of various sizes on the upper surface of the young leaves.
- The spots are irregular in shape with whitish grey in the centre.
- Later, spots may coalesce and form an irregular patch covering almost the whole leaf.
- The centre of spots contains fruit head shaped fruiting structures of the fungus.

Survival and spread:

- Disease is soil borne and survives in plant debris.

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- The disease spreads through rain splashes during intermittent showers.

Favourable conditions:

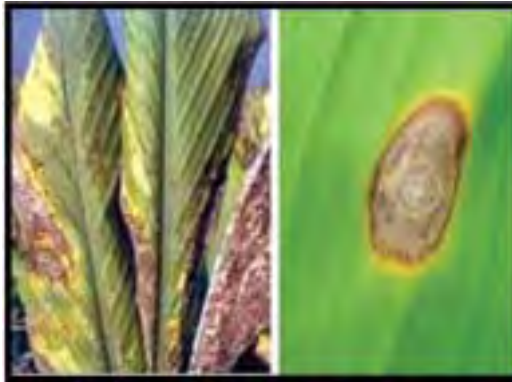
- High soil moisture, temperature 25 0 C and leaf wetness.
- Disease noticed on the leaves from July to October.

Management:

Seed treatment with Mancozeb and Carbendazim @ 2gms/kg of seeds and then foliar application @ 2.5 gms/l at the initial stage of disease development at 15 days interval twice.

3) Leaf blotch:

Causal organism: *Taphrina maculans*



Disease symptom:

- Disease symptom appears as small, oval and irregular brown spots on either side of the leaves which soon become dirty yellow or dark brown with black concentric ring.
- The leaves also turn yellow.
- In severe cases the plants present a scorched appearance and the rhizome yield is reduced.

Survival and spread:

- Soil and seed borne and survive in soil on infected plant debris.

Favourable conditions:

- High soil moisture, temperature 25 0 C and leaf wetness.

Management:

Foliar application with Copper oxychloride @ 2.5-3 gms / l of water.

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4) Dry rot:

Causal organism - *Rhizoctonia bataticola*, *Fusarium oxysporum*, *Pratylenchus* spp., Scale insect



Disease symptoms:

- The disease causes root rot and rhizome rot resulting in typical dry rot of rhizomes from October onwards.
- In early stages, the affected rhizomes appear soft and shriveled, which later dry up and become hard.
- At maturity, foliar yellowing and drying up of foliage occur.
- When infected rhizomes are cut open, the infected zones typically appear as dull brown and dark.

Survival and spread:

- The pathogens survive in the organic matter in the soil for several years.

Favourable conditions:

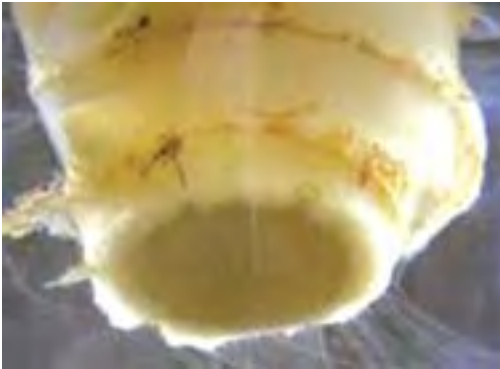
- The disease is favoured by 35° C soil temperature, 15-20 per cent soil moisture and alluvial or sandy soil.

Management:

Foliar application with Propiconazole or Validamycin @ 2 gms/l or Ridomil MZ @ 2 gm/l at the initial stage of disease occurrence.

5) BACTERIAL WILT

Causal organism- *Ralstonia solanacearum*



Disease symptoms:

- Rapid wilting and death of the entire plant without any yellowing or spotting of leaves are the characteristic symptom.
- All branches wilt at about the same time.
- When the stem of a wilted plant is cut across, the pith has a darkened, water-soaked appearance.
- Greyish slimy ooze comes out on pressing the stem.
- In later stages of the disease, decay of the pith may cause extensive hollowing of the stem.

Favourable conditions:

- The pathogen is destructive in moist soils at temperatures above 24° C.

Management :

- Seed treatment with Streptocyclin @ 2gms/10l of water.
- Remove the affected clumps and drench the soil with Copper oxychloride @ 2gms/l of water at 15 days interval

Seed treatment with Carboxin + Thiram (Vitavax power) @ 2.0gms/kg of seeds has always proven to be best preventive measures against any fungal diseases.

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Insect Pests of Ginger and Turmeric

1) Shoot borer: *Conogethes punctiferalis*



Damage symptoms:

- The larvae bore into pseudostems and feed on internal tissues, resulting in yellowing and drying of leaves.
- The presence of a bore-hole on the pseudostem through which frass is extruded.
- The withered and yellow central shoot is a characteristic symptom of pest infestation.

Favourable conditions:

- Temperature range 30-33°C and relative humidity range 60-90%.
- The pest is most active from July to October.

Management :

Spraying of Quinalphos @ 2ml/l or Triazophos @ 2ml/l.

2) Rhizome scale: *Aspidiella hartii*



Damage symptoms:

- Adult (female) scales feed on sap and when the rhizomes are severely infested, they become shriveled and dried, affecting its germination and desiccated, affecting its germination.

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- In initial stage of infection, the white coloured scales are seen scattered on rhizomes and later they congregate near the growing buds.
- When the infection is severe the rhizome and buds shrivel and dry up.

Favourable condition:

- Dry weather is the most favourable condition for the growth of the fungus.

Management :

- Discard severely infested rhizomes .
- Treating the seed rhizomes with Quinalphos @ 2 ml/l. for 20-30 mins before storage.
- Spraying of Dimethoate or Phosalone @ 2ml/l of water.

3) Leaf Roller- *Udaspesfolus*



Damage symptoms:

- Leaves become folded or rolled longitudinally.
- Complete defoliation takes place in severe condition

Favourable conditions:

- Temperature 26-35°C, relative humidity 41-100%.

Management:

- Spraying Malathion 2ml/l.
- Spraying of Dimethoate 5ml/l or Carbaryl 10ml/l

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4) Thrips- *Panchaetothrips indicus*



Damage symptoms:

- Thrips damage the undersides of leaves by sucking their plant sap.
- They damage young and soft parts of plants such as new leaves and shoots.
- Leaves become rolled up, and turn pale and gradually dry-up.
- Severe infection causes young leaves to wilt and dry out.

Favourable conditions:

- Warm and humid weather the most favourable condition.

Management:

Spraying of Imidachloprid @ 6ml/15lt of water.

5) White Grub / Root Grub - *Holotrichiasps.*



Damage symptoms:

- Root grubs occasionally feed on tender rhizomes, roots and base of pseudostems causing yellowing and wilting of shoots.
- The grubs make large holes in rhizomes and reduce market value

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of produce.

Favourable conditions:

- Warm and humid weather the most favourable condition.

Management :

Application of 3gmPhorate / plant can control white grub population.

NEMATODE

(**Root knot,Burrowing,Lesion nematode**)



Damage symptoms:

- Root-knot nematode feeds on tender rhizomes, roots and base of pseudostem causing stunting, chlorosis of the affected plant.
- Poortillering and necrosis of leaves are the common aerial symptoms.
- Characteristic root galls and lesions that lead to rotting are generally seen in roots.
- The infested rhizomes have brown, water soaked areas in the outer tissues.
- Nematode infestation aggravates rhizome rot diseases caused by fungi.

Survival and spread:

- Nematodes survive in soil and infected rhizomes serve as primary source of inoculum.

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- It spreads from infected plants or through soil.

Favourable conditions:

- Warm, moist soil are favourable conditions.

Management:

- Unless nematode population is beyond the Economic Threshold Limit one should not go for chemical management.
- Apply mustard cake @ 1t/ha 15-20 days before planting and then apply VAM @ 2gm/plant as the best preventive measures.
- If infection is more then soak the rhizome with carbosulfan solution @ 2ml/l of water before planting.
- Soil application with Cartap hydrochloride (4G) @ 25kg/ha. Or Carbofuran(3G) @ 33kg/ha in moist condition of the field

Integrated disease, pest and nematode management in Ginger and Turmeric

Physical:

- Before sowing treat the cut rhizome in hot water 510 c for 10 mins. Dry the rhizome in shade and then sow.
- Cover the Rhizomes with polythene sheets and expose to sunlight for a period of 2 hours in order to raise the temperature to 480 c. It helps to kill the bacterial and fungal pathogens.

Cultural:

- **Soil solarization** for 60 days during summer.
- Planting of **disease free seed** rhizomes.
- One of the predisposing factors for soft rot of ginger is an ill drained field, therefore, water stagnation should be avoided. A **raised bed** of 30 cm height and 1m width is recommended.
- Encourage **crop rotation** with non host crops like ragi, paddy, maize, sorghum etc.
- Avoid crop rotation with tomato, potato, chilli, brinjal and peanuts as these plants are hosts for the wilt pathogen *Ralstoniasolanacearum*.
- Use **bio fumigation** of cabbage and mustard plant refuses .
- **Mulching** with green leaves @ 4-4.5 t/acre at the time of planting. Which should be repeated @ 2 t/acre at 40 and 90 days after planting.
- **Attractant plants for natural enemies:** Intercropping with predator attractant plants like Carrot, sunflower, alfalfa, corn etc. which

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helps in control the population of insect and pests.

- **Intercropping** with marigold @ 5:1 is a best practice to control nematode population particularly Root knot nematode.
- Application of **organic manure** along with **balanced dose** of fertilizer which is helpful for disease management.

Mechanical:

- **Collection** and destruction of grubs, weevils, larvae and adult beetle periodically will reduce the incidence of insect pests

Biological:

- **Seed treatment** with *Trichoderma viride* and *Pseudomonas fluorescence* each @ 10gms/kg of seed .**Soil application** with 10kg *Trichoderma viride* and 10kg *Pseudomonas fluorescence* along with FYM @ 2t/ha and Neem cake 10q/ha during planting and 60 days after sowing.

Chemical:

- **Seed treatment** is done with the help of Macozeb @ 3g/l, Carbendazim @ 1g/l, Plantomycin @ 1g/l and Quinalphous @ 2mi/l of solution for 30m and shade dried.
- The foliar spray of carbendazim @ 1g/l, Mancozeb @ 3g/l, Plantomycin @ 1g/l and Quinalphous @ 2mi/l is done thrice at 15 days interval to control diseases and insect pests of ginger and turmeric.

Conclusion:

Considering the nature of the occurrence of diseases, pest of ginger and turmeric and their epidemic appearance under specific situation maximum attention should be paid for taking all shorts of preventive measure before sowing or planting of the crop. In addition to this proper care should be taken by selecting the effective chemicals which should be applied against the crop diseases in due course of time of disease appearance. Diagnosis of the disease and the causal organism are the most vital and important steps evaluating proper control measures.

