

Soil Borne Diseases of Groundnut (*Arachis hypogaea*) and Its Management

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Introduction

The groundnut (*Arachis hypogaea*) also known as peanut, monkey nut is a legume crop belongs to the family of Fabaceae, commonly known as the legume, Bean or Pea family. The groundnut is an annual herbaceous plant growing 30 to 50 cm (12 to 20 in) tall. Groundnut, like most other legumes harbor symbiotic nitrogen-fixing bacteria in root nodules. The capacity to fix nitrogen means Groundnuts require less nitrogen-containing fertilizer and improve soil fertility, making them valuable in crop. Groundnuts are similar in taste and nutritional profile to tree nuts such as walnuts and almonds, and as a culinary nut, are often served in similar ways in Western cuisines. Groundnut is a crop cash and useful rotation crop. It is easy to grow, with stands drought to some extent and so a choice crop for dry farming. Gujarat tops with 27.87 percent of total production followed by Andhra Pradesh 24.19 percent, Tamil Nadu 14.84. In Tamil Nadu, cultivated around 6.19 lakh hectares with the production of 10.98 lakh tonnes. In this 70% under rainfed cultivation and remaining 30% under irrigated condition. Southern districts such as Madurai, Virudhunagar, Sivaganga, Ramanathapuram and Pudukottai districts groundnut was cultivated in 56163 hectares. Out of this 84% in dryland cultivation but some important diseases like root rot and stem rot is major yield losses in groundnut cultivation. Diseases cause considerable yield losses in groundnut. Fungal, virus and bacterial pathogens attack the crop at various stages of growth and cause severe yield losses, and in some cases impairing quality. The major soil borne diseases of groundnut caused by fungi are stem rot/*Sclerotium* wilt (*Sclerotium rolfsii* Sacc.), dry root rot/dry wilt (*Macrophomina phaseolina*) and collar rot/crown rot/seedling blight (*Aspergillus niger*)

Symptomology

Root rot: *Macrophomina phaseolina*:

The fungus remains dormant as sclerotia for a long period in the soil and in infected plant debris. Generally, the infection is caused through soil borne and seed-borne sclerotia. In the early stages of

infection, reddish brown lesion appears on the stem just above the soil level. The leaves and branches show drooping, leading to death of the whole plant. The decaying stems are covered with whitish mycelial growth. The death of the plant results in shredding of bark. The rotten tissues contain large number of black or dark brown, thick walled sclerotia. When infection spreads to underground roots, the sclerotia are formed externally as well as internally in the rotten tissue. Pod infection leads to blackening of the shells and sclerotia can be seen inside the shells.

Stem rot: *Sclerotium rolfsii*

In Groundnut, the pathogen causes the sudden drying of a branch which is completely or partially in contact with the soil. The leaves turn brown and dry but remain attached to the plant. Near soil on stems white growth of fungus mycelium is appeared. As the disease advances white mycelium web spreads over the soil and the basal canopy of the plant. The sclerotia, the size and colour of mustard seeds, appear on the infected areas as the disease develops and spreads. The entire plant may be killed or only two or three branches may be affected. Lesions on the developing pegs can retard pod development, infected pods are usually rotted.

Crown rot: *Aspergillus niger*

The pathogen survives in plant debris in the soil. The disease usually appears in three phases in groundnut.

Pre-emergence rot

Seeds are attacked by soil-borne conidia and caused rotting of seeds. The seeds are covered with black masses of spores and internal tissues of seed become soft and watery.

Post-emergence rot

The pathogen attacks the emerging young seedling and cause circular brown spots on the cotyledons. The symptom spreads later to the hypocotyl and stem. Brown discolored spots appear on collar region. The affected portion become soft and rotten, resulting in the collapse of the seedling. The collar region is covered by profuse growth of fungus

and conidia and affected stem also show shredding symptom.

Crown rot

The infection when occurs in adult plants show crown rot symptoms. Large lesions develop on the stem below the soil and spread upwards along the branches causing drooping of leaves and wilting of plant.

Management

The highest yield and pathogen control was recorded in *T. viride* (ST+SA) treatment (17.2 q ha⁻¹) and carbendazim (ST) treatment (33.9 q ha⁻¹). Treatment with *T. viride* and *P. fluorescence* recorded the yield increase of 14-35 % and 22-33 % over control, respectively. Seed inoculation with plant growth promoting bacteria have been reported to result in higher pod yield in the field trials in addition to suppression of soil borne fungal pathogens (Dey et al., 2004). Antagonistic ability of several PGPR on *M. phaseolina* and their growth promotion ability were demonstrated by (Ramesh and Korikanthimath 2006).

This may be due to the difference in soil conditions, initial inoculum and other parameters. In spite of these differences, the biocontrol agents performed consistently in reducing disease incidence and increasing yield. Hence besides treating the seeds with fungal biocontrol agents, seed treatment with Plant growth promoting Rhizobacteria is effective in controlling the pathogen responsible for causing Groundnut root rot (*Macrophomina phaseolina*) and stem rot (*Sclerotium rolfsii*).

References

- Dey, R.K.K.P., KK. Pal, DM. Bhatt, SM. Chauhan.2004. Growth promotion and yield enhancement of peanut (*Arachis hypogaea* L.) by application of plant growth-promoting rhizobacteria, Microbiological research: 159 (4),371-394.
- Ramesh R., and VS. Korikanthimath .2006. Management of groundnut root rot by *Trichoderma viride* and *Pseudomonas fluorescens* under rainfed conditions. Indian Journal of plant protection: 34 (2), 239.

Fig. 1. Images showing Root Rot, Stem Rot and Aspergillus Rot

Root rot; *Macrophomina phaseolina*



Stem rot: *Sclerotium rolfsii*



Aspergillus rot


