

Improved Disease Management Practices for Production of Disease Free Groundnut

The major diseases of groundnut, its casual agents, disease symptoms and management practices are given below.

Collar Rot (*Aspergillus niger*)

Prevalent in almost all groundnut-growing states and the losses in terms of mortality of plants ranges from 28 to 50%.

Symptoms

Pre-emergence rotting of seeds, rotting of hypocotyl, post emergence seedling blight, rapid wilting of entire plant or its branches are characteristic diagnostic symptoms. Collar region of the affected plants becomes shredded and becomes dark brown.

Survival and Favourable Conditions

Soil borne inoculum is the primary source of infection. The pathogen can tolerate low soil moisture upto 16 %. The fungus develops best at temperature between 31 and 35°C.

Disease Management

- Follow crop rotation with wheat and gram or mixed cropping with moth bean.
- Avoid deep sowing (not more than 2 inches).
- Soil application of neem cake or castor cake @ 500 kg ha⁻¹
- Use of resistant or tolerant varieties.
- Seed treatment with *Trichoderma harzianum* or *T. viride* @ 10 g kg⁻¹ seeds and their soil application.
- Seed treatment with carbendazim 1-2 g kg⁻¹ seeds or mancozeb 2- g kg⁻¹ seeds.



**Seed rot-
*Aspergillus Niger***



**Collar rot - sporulation of
*Aspergillus Niger***



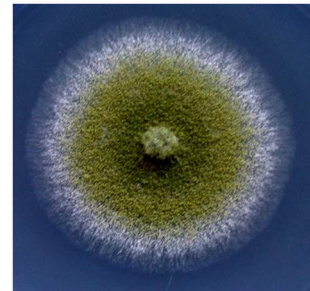
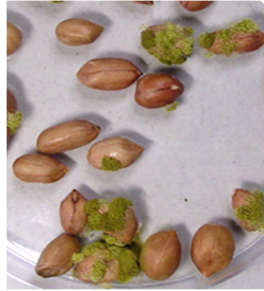
Collar rot

Afla-root / Yellow Mold (*Aspergillus flavus*)

Prevalent in almost all groundnut-growing states.

Symptoms

The yellow mold fungus, *Aspergillus flavus*, is commonly found in the seed of both rotten and apparently healthy pods of groundnut. It first appears on cotyledons after the emergence of seedlings. Infected plants generally become stunted and leaf size greatly reduced with symptoms of vein clearing and chlorosis on the leaflets. Such seedlings lack a secondary root system, a condition known as "aflaroot". Yellow-green *Aspergillus* colonies develop on over mature and damaged seeds and pods.



***Aspergillus flavus* growth on pods and kernels**



Afla root



Afla root

Survival and Favourable Conditions

Soil borne inoculum is the primary source of infection. Additionally, infected seeds and spores contaminated on the surface of seeds act as source of inoculums. The pathogen can tolerate low soil moisture and the fungus develops best at temperature between 25 and 35⁰C.

Disease Management

- Follow a crop rotation, *i.e.*, cereal-cereal-groundnut.
- Sow good quality and disease-free seed or certified seeds from seed certification agency
- Avoid damage to the seed testa during shelling, sowing, and deep placement of seed at sowing.
- Treat the seed with thiram or carbendazim 4g kg-1 seeds.

Stem Rot (*Sclerotium rolfsii*)

The pathogen has a wide host range. The disease is very severe in all groundnut growing states particularly in Maharashtra, Gujarat, Andhra Pradesh, Madhya Pradesh, Karnataka, Orissa and Tamil Nadu. Latur, Raichur, Dharwad, Junagadh and Hanumangarh have been identified as

hot spots for the diseases. Up-to 27% or more yield losses has been reported. The indirect losses such as reduction in dry weight and oil content are also reported.

Symptoms

Initial symptoms are partial or complete wilting of the stem or branches that are in contact with the infected soil. The leaves turn brown and show wilting but remain attached to the plant. White mycelial growth around the infected stem are visible, later stage, abundant sclerotia develops. Infection of pegs, pod rot and leaf blight are some of the symptoms of stem rot infected plants.



Stem rot disease in field



Stem rot-brown Sclerotia



Pods infected by *S. rolfisii*

Survival and Favourable Conditions

Sclerotia survive in the soil for more than 4 years. Besides, the pathogen has wide host range. Crop residues, soil moisture to the extent of 40 to 50% of water holding capacity, temperature 29 to 32⁰C during day and 25⁰C during nights favours the pathogen infection and disease development.

Disease Management

- Deep burial of surface organic matter and crop debris by ploughing it to a depth of 8-10 inches.
- Rotation with cotton, wheat, maize, jowar, onion and garlic.
- Use of tolerant varieties.
- Seed treatment with *T. viride*/*T. harzianum* @ 10 g kg⁻¹ seeds, soil application of castor cake or neem cake or mustard cake @ 500 kg ha⁻¹ enriched with *T. viride* or *T. harzianum*.
- Seed treatment with captan @ 3g kg⁻¹ seeds may effectively reduce the stem rot incidences.

Dry Root Rot (*Macrophomina phaseolina*)

Dry root rot or charcoal rot is sporadic in occurrence in the states of Rajasthan, Uttar Pradesh, Tamil Nadu, Andhra Pradesh and Maharashtra. The pathogen causes severe seedling mortality results in patchy crop stand, thus reduce optimum plant population.

Symptoms

Water soaked necrotic spots appear on the stem just above the ground level. If the initial lesion girdles the stem, wilting follows. The infected stem portion is shredded with the

development of sclerotia becomes black and sooty in appearance. Roots, pegs, and pods also rotten and covered with sclerotia and the infected kernels turn black.

Survival and Favourable Conditions

The pathogen has wide host range. The pathogen is facultative saprophyte and a soil dweller. Infected soil, plant debris and pods serve as sources of inoculums. The optimum temperature for seedling infection is 29 to 35°C, for pods invasion is between 26 and 32°C. The sclerotia are dissemination via plant debris, soil, infected pods, shell, and kernel.

Disease Management

- Avoid pods and kernels damage.
- Seed treatment with *Trichoderma polysporum* or *T. viride* or *T. harzianum* @ 10 g kg⁻¹ seeds or carbendazim @ 2-3 g kg⁻¹ seeds or captafol or thiram @ 3 g kg⁻¹ seeds reduces the root rot incidence.

Early Leaf Spot (*Cercospora arachidicola*)

Early leaf spot disease occurs in northern, southern and central groundnut growing states. The losses in yield estimated to be in the range of 15 to 59 %. Besides the losses in pod and kernel yield, the fodder quality is also adversely affected.

Symptoms

The disease normally occurs 30 days after sowing. Initially minute circular to sub-circular chlorotic spots develop on upper surface of leaf, later turn into brown in colour surrounded by yellow halo (Fig. 11). Corresponding lower surface of the leaf shows dark brown colour due to abundant sporulation. Severely infected leaves may drop off prematurely. The lesion may extend to the stem and branches.



Early leaf spot



Tikka Leaf spot

Survival and Favourable Conditions

The pathogen survives through conidia on affected plant debris in soil or on the infected groundnut shell. The pathogen also survives from one season to another on volunteer groundnut plants. Temperature between 25 and 30°C, prolonged leaf wetness hours, and high RH (>80%) favours the infection and disease development.

Disease Management

- Removal of volunteer groundnut plants.
- Deep burying of crop residues.
- Growing of tolerant varieties.
- Intercropping pearl millet or sorghum with groundnut (1:3 or 1:5).
- Foliar application of carbendazim (0.05%) + mancozeb (0.2%) or difenoconazole 25EC 1 ml L⁻¹ of spray solution or tebuconazole 25 EC @ 1.5 ml L⁻¹ of spray solution at 2-3 weeks interval, 2 or 3 times from the initiation of the disease effectively reduces the early leaf spot severity.

Late Leaf Spot (*Phaeoisariopsis personata*)

Commonly present wherever groundnut is grown and yield losses ranges from 15 to 59 %. Besides the losses in pod and kernel yield, the fodder quality is also adversely affected.

Symptoms

The disease normally occurs on 60 days old crop to till harvesting. Initially minute chlorotic spots develop on upper surface of leaf, later turn into irregular dark brown spot. Corresponding lower surface of the leaf shows dark brown to black colour due to abundant sporulation. Several lesions may coalesce and in severe cases, infected leaves may drop off prematurely. Oblong lesions occur on the stem and branches. Simultaneously both the leaf spots can be observed on standing crops in field.



Late leaf spot

Survival and Favourable Conditions

As of early leaf spot pathogen, the late leaf spot pathogen survives through conidia on affected plant debris in soil or on the infected groundnut shell and also from one season to another on volunteer groundnut plants. Temperature between 25 and 30⁰C, prolonged leaf wetness hours, and high RH (>80%) favours the disease.

Disease Management

- Removal of volunteer groundnut plants.
- Deep burying of crop residues.
- Growing of resistant/tolerant varieties.
- Intercropping pearl millet or sorghum with groundnut (1:3).

- Foliar application of carbendazim (0.05%) + mancozeb (0.2%) or difenoconazole 25EC 1 ml L⁻¹ of spray solution or tebuconazole 25 EC @ 1.5 ml L⁻¹ of spray solution at 2-3 weeks interval, 2 or 3 times from the initiation of the disease effectively reduces the early leaf spot severity.

Rust (*Puccinia arachidis*)

The disease is prevalent throughout groundnut grown areas, however, more severe in the southern states. Losses in yield due to rust have been reported in the range of 10 to 52%. In addition to yield loss, the disease reduces seed size and oil content of groundnut.

Symptoms

Initially chlorotic spots develop on the upper surface of the leaf. Correspondingly in lower surface, orange colored pustules (uredinia) appears and later turn in to brown colour. The pustules range from 0.5 to 1.4 mm in diameter. Severely infected leaves turn necrotic and desiccate but remain attached to the plant. Symptoms appear on the above ground portions of the plant (leaf, stem, petiole) except flower. The kennels formed in the affected plants are shriveled and small. Presence of leaf spots and rust simultaneously on the same plants are common in fields.



Rust-Orange colour pustule



Rust disease in field

Survival and Favourable Conditions

The pathogen survives as urediniospores and self sown (volunteer) groundnut plants infected by rust. Temperature of 20⁰C, prolonged leaf wetness hours, and high humidity favours the rust disease. Spread of the disease within crops is facilitated by wind movement, by rain splash, and by insects.

Disease Management

- Destroy volunteer (self sown) groundnut plants.
- Early sowing (first fortnight of June) to avoid the disease.
- Intercropping pearl millet or sorghum with groundnut (1:3).
- Use resistant/tolerant varieties.

- Foliar application of aqueous neem leaf extract (2-5%) or 5% neem seed kernel extract or mancozeb or chlorothalonil @ 0.3%, or triodimefon @ 250 g ha⁻¹ reduces disease severity.

Alternaria Leaf Blight (Alternaria tenuissima)

In the past four years, *Alternaria* leaf blight occurs severely on summer groundnut. The disease reduced pod (up-to 22%) and fodder (up-to 63%) yield depending on severity. the quality of fodder.

Symptoms

Initially blighting starts from apical portions of leaflets, which turn light to dark brown colour 'v' shaped spots. Later the disease extends to midrib and the entire leaf shows blighted appearance. In the later stages of infection, blighted leaves curl inward and become brittle. Adjacent lesions join together, giving the leaf a ragged and blighted appearance in field.



Alternaria leaf blight



Alternaria blight in field

Survival and Favourable Conditions

Self sown (volunteer) groundnut plants as primary inoculums and secondary spread through conidia. Temperature of above 20⁰C, prolonged leaf wetness hours, and high humidity favours the disease. Spread of the disease within crops is facilitated by wind movement, and by insects.

Disease Management

- Avoid growing of susceptible cultivar
- Remove volunteer crops

Peanut Bud Necrosis (Peanut Bud Necrosis Virus)

Widely distributed and the hot spot locations are Jagtiyal, Hyderabad, Latur, Tikamgarh, Raichur and Mainpuri. The disease causes 30-90% yield losses.

Symptoms

Characteristic symptoms are axillary shoot proliferation and severe leaf deformity. Necrosis of the terminal and axillary buds.



Groundnut Bud Necrosis Disease

Survival and Favourable Conditions

The pathogen has wide host range and survives on ornamentals (zinnia, cosmos and sunflower), weeds and crop plants (tomato, brinjal, green gram, black gram, beans and pea). Temperature 30⁰C and a wind speed of 10km/h favour migration of thrips. The thrips population increases rapidly in late August and September. The population builds up again during January and February and hence rabi season crop also suffers very seriously.

Disease Management

- Growing of tolerant varieties.
- Early sowing (mid to late June) for central India and late sowing (July) for North India
- Adopt closer spacing of 20 or 22.5 x 7.5 or 10 cm
- Intercropping pearl millet or sorghum or maize with groundnut (1:3) for reducing movement of thrips.
- Seed treatment with imdacloprid @
- Foliar application of monocrotophos 2 ml L⁻¹ of spray solution or imidacloprid or acetamiprid or *thiamethoxam* @ 4 ml 15L⁻¹ of spray solution.

Peanut Stem Necrosis (*Peanut Stem Necrosis Virus*)

The disease is distributed in Anantapur district and to some extent in the adjoining Cuddapah, Kurnool and Chittoor districts of Andhra Pradesh, and Raichur area of Karnataka.

Symptoms

Characteristic symptoms are necrosis of stem and terminal leaflets followed by death of plant.



Peanut Stem Necrosis Disease

Survival and Favourable Conditions

The virus and vector (thrips) have wide host range (Parthenium, cowpea, black gram, and marigold)

Disease Management

- Avoid monocropping of groundnut.
- Control weeds.
- Growing of tolerant varieties.
- Adopt closer spacing of 20 or 22.5 x 7.5 or 10 cm
- Intercropping of redgram and bajra or redgram and castor with groundnut, alternate cropping of sorghum, bajra, maize, castor, sesamum with groundnut in endemic areas, at least once in three years.
- Seed treatment with imidacloprid @
- Foliar application of monocrotophos 2 ml L⁻¹ of spray solution or imidacloprid or acetamiprid or *thiamethoxam* @ 4 ml 15L⁻¹ of spray solution.