

# Diseases of Groundnut

① Tikka → Jungal disease.  
disease of groundnut → major disease of groundnut in India.

↳ in every state of India growing groundnut.

USA, Africa, China, Australia, Indonesia, Sri Lanka, Malaysia.

→ The loss in pod production sometimes as high as 50%.

Tikka disease occurs as 2 different types of leaf spots

## Early leaf spot

Asexual stage - Cercospora aracidicola

Sexual stage - Mycosphaerella arachidis

Causal organism

Asexual - Cercosporidium personatum

Sexual - Mycosphaerella berkeleyi

## Late leaf spot

### Fav. conditions

- leaf wetness.
- heavy rainfall
- 22-25°C.
- wet weather
- RH → RH > 85%.

### Disease cycle

Primary infection - ascospores or conidia

- infected plant debris
- infected seeds.

Secondary infection - wind blown conidia

- rain splash.

### Symptoms

- circular/irregular reddish brown or dark brown spots with yellow halo on upper surface of leaves.

- also appear on petioles, rachis, stalks, etc. as elongated & elliptical spots with definite border.

- appears before 35 DAS.

- appears after 35 DAS.
- small dark spots, darker than early leaf spots & irregular shape with 3-8 mm diameter
- Yellow halo absent
- spots are deep black with clusters of conidiophores bearing conidia arranged in concentric manner
- Shedding of leaflet
- premature aging of crop.
- severe in flowering & harvest period.

## Early leaf spot

### Pathogen

## Late leaf spot

1. Mycelium first intercellular later become intracellular when host cells die
2. No haustoria
3. Asci are cylindrical to clavate bearing 8 ascospores.
4. Ascospores → hyaline, slightly curved, 2 celled → apical cell larger than lower cell.
5. The perfect stage of fungus produces perithecia as acrostromata which are globose with papillate ostiole.
6. Conidia → subhyaline, pale yellow  
↳ 3-12 septate  
→ 35 × 35-110 × 2.5-5.4 μm in size  
→ often curved  
→ develop on upper surface of leaves rarely on lower surface.  
→ not in concentric rings.

1. mycelium septate & intercellular
2. haustoria found in palisade & mesophyll cells.
3. Asci cylindrical to ovate bearing 8 ascospores.
4. 2 celled & constricted at septum & hyaline
5. --- which are globose or broadly ovate with papillate ostiole.
6. Conidia → hyaline, olive brown  
→ slightly curved or straight  
→ 1-7 septa  
→ 18-60 × 6-10 μm size  
→ conidia restricted to lower surface of leaves  
→ develop in concentric zones.

### Management

1. Spray Carbendazim + Mancozeb @ 0.2% repeat after 15 days.
2. Resistant variety - ALR-1.
3. Treat seeds with Thiram + Carboxin at 2g/kg
4. Roguing.
5. Eradicate the volunteer groundnut plants.
6. weeds under control.

## (2) WILT OF Groundnut

### Fungal wilt

C.O. - Fusarium oxysporum

Symptom - in 2 month old plant  
- yellowing of leaves, wilting & drying occurs.

- Roots → brown & brittle.  
- Vascular browning seen.

Disease cycle - primary infection - chlamydospores  
- secondary - conidia

### Management

1. Seed treatment → Trichoderma viridae @ 4g/kg & Thiram @ 3g/kg or Carbendazim @ 2g/kg seed.
2. Crop rotation for 2-3 yrs with non-host plants like red millet, finger millet, other cereals.
3. Roguing & burn soil debris regularly.
4. Select disease free seeds.

### Bacterial wilt

C.O. - Pseudomonas solanacearum

Sympt - infected plants appear unhealthy, chlorotic & wilt under water stress.

- dark brown discoloration on xylem.  
- grey slimy liquid ooze out of vascular bundles.

Disease cycle → primary - soil  
secondary - ooze spread by water

### Management

1. Spray Streptocycline @ 0.01% & Copper oxychloride @ 0.3%.
2. Seed treatment → Streptocycline @ 0.01%.

Disease  
Phytophthora blight  
caused organism  
Phytophthora colocasiae

low condn

COLD CASH

symptoms

- Early stage - small, circular water soaked lesions, generally dark brown or purple
- Lesions → produce clear fluid exudates
- fluid change into light yellow to dark purple then enlarges rapidly.

TEA

- small size spot initially seen on young leaves less than a week old
- leaves - spot become transparent enlarge
- After 7 days → lower leaf surface develop blisters like symptoms, surround the blisters dark green water soaked & zone found.

COFFEE

- affect mostly leaf & tender shoots
- small yellow spots on lower surface
- orange yellow spore mass appears
- defoliation & dieback
- upper surface → yellow then necrosis & leaf depletion.

disease cycle

Primary - oospores dormant in soil  
 secondary - zoospores.  
 pathogens - produce mycelium with sporangiospore

rainfall & basidiospores.  
 spores spread by wind  
 spore that land on a leaf with adequate moisture germinate & infect it producing like symptoms within 10 days

Management

- 1) Spray Bordeaux mixture 0.3%
- 2) Spacing
- 3) Rerouging

- 1) Spray Bordeaux mixture or copper oxychloride
- 2) Removal of debris

- 1) Spray before Bordeaux mixture 3 application
- 2) Grow R.V.
- 3) Rerouging

Blisters blight  
Exobasidium verum  
 pinkish spots on leaves  
 • small yellow or  
 • upper surface leaf spot → light brown  
 • under surface → bulges forming a blister like swelling  
 • lower portion covered with white powdery fungus  
 • leaf curling

Runt  
Hemileia vastatrix

# GINGER

## Synonym

Zingiber

Causal organisms

Phytophthora  
Verticillium

Soft rot

## Disease cycle

## Management

- ① Seed treatment with carb. 80 before storage.

- ① infection starts at collar region of pseudostem & progress upwards
- ② collar region becomes water soaked & rotting spread
- ③ It noticed at 1st stipe
- ④ foliar symptoms appear yellowing of tip of inner leaf
- ⑤ yellowing spread upwards followed by drooping.

# Diseases of Field & Horticultural Crops

## TOBACCO (Nicotiana glauca)

### Management

- Spot application of Bordeaux mixture @ 0.2%
- Sprays of Metldaxyl 0.2%
- Provide adequate drainage in nursery
- Burn seed bed with paddy straw at 15-20cm thick layer
- Rouging
- Select disease free seedling for transplanting
- Burn plant residues & debris

### Disease cycle

- Fungus lives as a saprophyte on organic waste & residues in soil
- Fungus also present in soil
- Dominant mycelium, spores more than 2 yrs.
- Primary infections - oospores through irrigation, in soil, animal manure
- Secondary spread - sporangia or zoospores by wind/water

### Symptoms

- Pathogen affect crop at any stage
- Injects chiefly on roots & base of stem
- In transplanted crop disease appears as minute black spot on stems it spreads along the stem to produce irregular black patches. Girdling occurs.

### Fav. condition

- Frequency & heavy rainfall
- High soil moisture
- High population of root knot nematode
- Malotiogone inagubhi favours the disease

(1) The upward movement leads to necrotic patches on stem

(2) tissues shrink, depression & withering occurs

(3) When one affected stem in plant shows pith region is dry in disc like patches and black discoloration.

(4) On leaves → large water soaked spots appear which causes blight of leaves

(5) Seedling - Black discoloration of stem near soil level & blackening of roots

### Causal organism

Phytophthora parasitica

Vas. nicotianae

Pathogenic - fungus produces hyaline & non-septate mycelium.

• sporangia - hyaline, thin walled, oval develop on sporangiophores in sympodial fashion

• sporangia geminate releasing zoospores → kidney shaped

• fungus also produces globose & thick walled oospores smooth, light yellow, globose & thick walled

Impaired

Disease

Black Shank

Avi Jain notes

# 2 Streaked Viruses

Black Root rot

Causal organism  
Tricholiaropsis  
basicola

## fav. condition

- High temperature (1) yellowing of foliage, marginal leaf scorch & severe plant decline

## symptoms

- (1) get a wither for a nutrient deficiency
- (2) infected herbaceous plants wilt rapidly during hottest part of day & recover → in evening hrs.
- (3) Branches may die back & entire plant dies.
- (4) Root system - roots short, stubby, black & decayed.

## Disease cycle

- primary infection - Chaetomyces present in soil
- Secondary infection - irrigation water & weeds.

## Management

- (1) Soil decontaining
- (2) Spray carbendazim + mancozeb @ 0.2-0.3%

Yield

(3) Mosaic Tobacco Mosaic Virus (TMV)

or Nicotiana virus I

Pathogen - Nicotiana virus I

(Masson tobacco var. vulgare)

- It is rod shaped 300 x 150 μm with central hollow tube of 4 μm diameter.

- made of centrally placed ssRNA covered with protein coat

- capable of remaining infective when stored dry for 50 yrs.

- The (TIP) thermal inactivation point of virus is ~~at~~ 90°C for 10 min.

(1) Light discoloration along veins of youngest leaves

(2) Light & dark green patches on leaves on veins

(3) dark green areas with blisters due to were rapid growth

(4) Leaves → narrow, well formed beyond recognition, thin, pubescent on severe infestation

(5) Stems, dark brown necrotic spots develop under hot weather condition this symptom is called "Mosaic burn" or "Mosaic scorching"

(1) Virus has wide host range affecting 50 plant sp. in a different families

(2) Produces different types of symptoms on tobacco, brinjal, tomato, chili, Petunia, etc.

(3) Virus is sap transmissible & enters through wounds.

(4) Not seed transmitted tobacco but, seed transmitted → tomato

(5) Inplements, clipping & topping operations, clearing tobacco & stuff to smoking crops also transmit the virus.

(1) Resistant varieties - TMV RR-2, 3, 4, 6.

- Prabhat
- Godarai special,
- Jagadheer (M.R.)

(2) Spray nursery & water feed with leaf extracts of Bougainvillea at 1:2 of extract in 150 l water. 2 or 3 times weekly.

(3) Spray tannic acid 1% at 30M, 40M & 50th day after planting.

(4) Rearing & destroying

(5) Crop rotation by growing non host plants for 2 seasons

(6) Weed free fields

Diseases Fungal

① Caricospora leaf spot

② C. abelmoschi

causal organism

vari. conidia

Symptoms

Disease cycle

Management

Mancozeb  
0-25%

① Cercospora malayensis  
causes brown irregular spots.

→ causes brown irregular spots.  
→ both causes depletion.

Pathogen - Conidiophores  
Palm, olive brown, multi-septate branched & irregular, cylindrical straight to curved.  
mode of survival & spread  
fungus survives in diseased crop material.

② Yellow vein mosaic

• yellowing of entire network of veins in leaf blade

• interveinal areas → completely yellow or white

• severe infection → young leaves turn yellow & reduced in size & plant become stunted.

• fruits → yellow / white color.

• vector → whitefly -

① grow resistant / tolerant varieties

② Spray chlorpyrifos 2.5ml + neem oil 2ml & no control vector

③ Yellow sticky trap @ 12/ha.

④ seed treatment → Thiram 3g/kg seed

⑤ main field - Mancozeb + Carbendazim @ 3g/1000 plants

Diseases

① Early blight

Alternaria solani

caused organism

fav. condn

- high soil moisture creates high humidity favours disease initially in lower leaves.

effo

TOMATO

symptoms

- ① Small black spots enlarge & concentric rings in bulb eye pattern.

② Tissue → sunken No spots turn yellow.

③ Lesion on stem & girdling of stem

④ Fruits → dark brown

⑤ shading of immature fruits.

pathogen survives in infected debris.

Disease cycle

Pathogen survives in seed & soil

Management

- ① Removal of infected plant debris
- ② Spray Mancozeb @ 2g/l. twice at 15 days interval.
- ③ Crop rotation with non solanaceous family crop
- ④ Use disease free seeds.

② Late blight

Phytophthora blight

• disease occurs in rainy crops

- less frequent
- high humidity
- rainy season

① leaves stem & fruits are attacked

② lesions → purple to brown

which causes rotting & water humid condn inside.

③ water beaded areas on green fruits which become brown & completely shriveled.



# BRINJAL

## Disease

### causal organism

① Phomopsis (bigot)  
Phomopsis  
fruit rot

### Phomopsis verana

### fav carolin

→ spread through  
injection thro  
farm implement  
→ survive in soil and  
infected plant  
dabir

### symptoms

(1) initially on young  
seedling  
(2) girdling of plant  
causing yellowing of  
leaves  
(3) stem lesions of  
dark brown or  
wetness stem  
(4) these lesions coalesce  
& spread to fruits

(5) fruits → soft watery  
leaves later mummified with  
minute black spores called  
pycnidia.

### Disease cycle

Pathogen - Pycnidia with  
or without beak found on  
infected tissue

→ irregular conidiospores in  
pycnidia are hyaline, single  
& branched  
over called

→ Ascospores → hyaline, ellipsoid  
mode of survival & spread - in  
& infected plant debris

→ It is seed borne  
→ spores spread through rain  
→ implement & harvest.

• It is a sap transmission like  
disease  
• natural transmission  
through vector

### Management

- ① Carbendazim + Mancozeb @ 0-1%
- ② crop rotation
- ③ deep summer ploughing

② Little leaf Phytoplasma  
transmitted by  
leaf hopper.

③ Bacterial Pseudomonas  
wilt.

Pseudomonas  
root rot  
nematode  
Meloidogyne sp.

- ① Presence of root rot & nematode
- ② In soil & infected  
leaves
- ③ Ingestion water  
from inflorescences.

- ① Reduction in leaf size
- ② Leaves → smaller, short petioles  
later because thin & narrow
- ③ bushy appearance
- ④ fail to produce fruit
- ⑤ If fruits are there non dobit  
nature & remain  
mummified

- ① lower leaves droop
- ② yellow foliage, shriveling, withering
- ③ collapse of entire plant
- ④ vascular system → brown  
& bacterial sore covered  
from affected part.

Pathogen - bacteria in non-spore  
forming, non-capsulated &  
water have polar flagella  
② bacteria produce acid but no  
gas in sucrose, lactose,  
dextrase, glycerol.

- ① Crop rotation with  
cucifers
- ② Spray 2% Bordeaux  
mixture +  
Agriwycin 100  
ppm @ 100 ppm  
thrice at 10 days

Diseases

3. Bacterial wilt  
Burkholderia solanacearum

causal organism

fav. candida  
irrigation water & fumigants.

Symptoms

- 1) young seedling → yellowing & wilt
- 2) curling of leaves.
- 3) more advanced roots are brown.
- 4) vascular tissue → black discoloration with gummy bacterial ooze.

Disease cycle

• survives in soil & infected plant debris.

Management

- 1) crop rotation
- 2) spray Agri guardin - 100 @ 1g/l & 3 times at 10 days interval.

4) leaf curl virus (Tolcv).

- 1) stunting of plants
- 2) ~~distorted~~ rolling & curling of leaves
- 3) yellow coloration of tender leaves. later slow curling symptoms.
- 4) older leaves → leathery & brittle.
- 5) internodes → short & stunted growth.
- 6) bushy appearance of plants. also called broccoli or ~~bro~~ broccoli like growth.

- 1) Yellow sticky traps @ 12/ha to monitor colony.
- 2) raise border crop cereals.
- 3) spray Dimethoate 0.85% @ 15, 25, 45 days after transplanting to control vector.

Disease causal organism

1) Leaf spot Cercospora sojae

Fav Penicillium

- warm humid weather
- infected seeds & debris

# Soybean

Agonythrus

- 1) light to dark grey or brown areas on seeds
- 2) primarily affects foliage, buds, stems, pods & seeds.
- 3) leaf lesions are circular first brown then light brown to ash grey with dark margins.
- 4) spots coalesce forming larger spots
- 5) withering & drop of leaves.

Disease cycle

Management

- 1) resistant variety
- 2) healthy & certified seeds
- 3) rotate soybean with cereals with cereals
- 4) Spray Mancozeb @ 2g/l
- 5) Seed treatment with Karan + Carbendazim (1:1) @ 2g/kg seed
- 6) fungicide after harvesting

2) Mosaic Soybean mosaic virus

(SMV) virus

Pathogen → a polymeric bare ssRNA genome

→ temp 10°C → humid weather

3) Downy Rot Rat Macrophomina phaseolina

- days 30°C
- prolonged dry season followed by irrigation

- 1) plants → stunted & distorted (crinkled, necrotic)
- 2) pods → few & small seeds
- 3) infected seeds → mottled & deformed.
  - ↳ fail to germinate.
- 1) yellowing & drooping of leaves.
- 2) dark brown lesions on stem at ground level
- 3) bark → shredding
- 4) rotten tissues of stem & root have black sclerotia.

- seed borne
- transmit through sap
- 32 aphid species are involved in transmission.

- 1) fungus survive in infected debris & in soil as facultative parasite
- 2) primary → seed & soil borne sclerotia

secondary → ~~soil~~ soil borne sclerotia  
pycnidial spores (air borne)

Pathogen - fungus produce dark brown, septate mycelium with

- 1) resistant variety
- 2) certified seeds
- 3) pre sowing soil apply Phorate @ 10kg/ha.
- 4) 2 foliar spray with Nylath down spray @ 1L @ 30-45 D AS.
- 1) Seed treatment with Carbendazim or Thiram @ 2g/kg
- 2) FYM or green manure @ 10t/ha

→ also produce sclerotia  
→ pycnidiospores → thin walled, hyaline, single celled & elliptical.