PREFACE: Chickpea and mungbean are among the most important pulse crops, however; their production is under the constant threat of diseases that inflict heavy yield losses. To avoid these losses, proper disease management is necessary which is only possible with the proper identification of involved causes. This brochure is designed as a quick guide to provide a brief symptomatology, cause and control measures together with photographic illustrations of important diseases of chickpea and mungbean in Pakistan. This knowledge is important for students, scientists, farmers and extension agents etc.

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CHICKPEA FUNGAL DISEASES

CHICKPEA WILT

CAUSE: *Fusarium oxysporum* f. sp. *ciceris*

SYMPTOMS: Dead seedlings by wilt disease can be confused with other diseases of wilt complex. Fusarium infected seedlings collapse and lie flat on the ground retaining their dull green color. Adult plants show typical wilt symptoms of drooping of petioles, rachis and leaflets. The roots of the wilting plants do not show any external rotting but when split opens vertically, dark brown discoloration of internal xylem is seen. Pods look normal but seeds are generally smaller, wrinkled and discolored. A normal looking seeds harvested from wilted plants may also harbor the wilt pathogen.

Infected soil and seeds are the sources of primary inoculum. The pathogen can survive in soil and plant debris as chlamydospores for at least 6 years.

CONTROL: Use resistant variety. Use healthy seed from healthy crop. Seed treatment with proper fungicides. Removal of host debris and soil solarization.


Spores of *F. oxysporum*


Wilted plants

CHICKPEA BLIGHT (CB)

CAUSE: *Ascochyta rabiei*

SYMPTOMS: Disease can develop on leaves, stems, petioles, pods and seeds. Initial infection produces small water soaked spots that gradually turn necrotic. Pycnidia are often arranged in concentric rings on infected plant parts. Ascochyta blight initially appears as small patches of blighted plants, but it can spread rapidly across entire field and affects severely all the plants under conducive conditions.

The pathogen survives on infected plant debris or on seeds. Optimal conditions for infection are temperature of 15-25 ^{O}C and 6-12 h of high relative humidity.

CONTROL: Use resistant variety. Use healthy seed from healthy crop. A 3-4 year rotation is recommended as *A. rabiei* on chickpea debris may survive for more than 12 months in same production areas. Seed treatment with proper fungicides. Removal and burning of host debris. Use of preventive and protective sprays with proper fungicides during favorable conditions.


Spores of *A. rabiei*


CB infected stems, pods and leaves

STEM ROT DISEASE (SRD)

CAUSE: *Sclerotinia sclerotiorum*

SYMPTOMS: SRD can cause chlorosis or necrosis of branches or whole plant. The necrotic parts can display a rot at the collar region. Affected parts progressively turn yellow or droop then dry up and turn straw colour. A web of white mycelium will be evident at the base of the diseased portions, however, production of sclerotia on infected plants will rarely been observed right above or below the soil line.

Fungus can survive in soil as sclerotia for 10-12 years without susceptible host. The disease is favored by cool moist weather.

CONTROL: Use of resistant variety. Deep plowing to burry the sclerotia. Select cultivars with an upright growth habit. Use of preventive and protective sprays with proper fungicides during favorable conditions.


SRD infected branch


SRD infected plant

CHICKPEA VIRAL & PHYTOPLASMA DISEASES

CHICKPEA STUNT DISEASE (CSD)

CAUSE: *Chickpea chlorotic dwarf virus (CpCDV)*

INSECT VECTOR: Leafhopper *Orosius albicinctus*

SYMPTOMS: CSD caused by CpCDV is the most common viral disease of chickpea in Pakistan. CpCDV can cause stunting, internode shortening, phloem browning in the collar region and leaf reddening in desi, while yellowing in kabuli-type chickpea varieties.

CONTROL: Use resistant varieties. Control insect vectors with proper insecticides. Eradication of weeds.


CSD infected Kabuli & Desi-type — *O. albicinctus*

CUCUMBER MOSAIC VIRUS

CAUSE: *Cucumber mosaic virus (CMV)*

INSECT VECTOR: Aphids (*Myzus persicae* & *Aphis crassivora*)

SYMPTOMS: Infected leaflets can show pale chlorosis, reduced size, narrowing, mild mosaic and marginal reddening (in desi-type), internode reduction, slight stem kinking and shoot proliferation. At the time of crop maturity when the healthy plants will be drying, the diseased plants in the field remain green.

CMV can be transmitted through seed.

CONTROL: Use of resistant variety. Control of insect vectors with proper insecticides. Eradication of weeds. Collect seed from disease free plants.

PEA SEED-BORN MOSAIC VIRUS (PSbMV)

CAUSE: *Pea seed-born mosaic virus (PSbMV)*

INSECT VECTOR: 22 different aphid species can transmit PSbMV, of which pea aphid (*Acythosiphon pisum*) is the most important.

SYMPTOMS: Leaflet narrowing and twisting downwards with indistinct mosaic pattern, mottling, chlorosis, reddening or necrotic lesions. Necrosis of shoot tip, plant stunting, stem proliferation, and pods abortion. Smaller seeds with necrotic rings and line markings mostly in kabuli-types.

PSbMV can be transmitted through seed.

CONTROL: Same as in case of CMV.

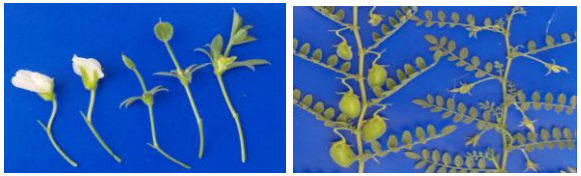
CMV infected chickpea PSbMV infected chickpea

ALFALFA MOSAIC VIRUS

CAUSE: *Alfalfa mosaic virus (AMV)*
INSECT VECTOR: 14 different aphid species can transmit AMV, of which pea aphid (*Acythosiphon pisum*) is the most important.
SYMPTOMS: Chlorosis, stunting and often have chlorotic & necrotic shoot tips in both desi and kabuli-types. Some times marginal reddening in desi-types. Premature death of plant mostly during early infection.
AMV can be transmitted through seed.
CONTROL: Same as in case of CMV.

CHICKPEA PHYLLODY DISEASE

CAUSE: *Phytoplasma (16Sr II-B subgroup)*
INSECT VECTOR: leafhopper *Orosius albicinctus*
SYMPTOMS: Phyllody disease can produce different types of symptoms; however, the major symptoms are phyllody, floral proliferation and stunting. The most characteristic symptom of the disease is transformation of floral parts into green leaf like structures (phyllody). Infected plants become sterile, resulting in total loss of yield. At the time of crop maturity, when the healthy plants are drying, the diseased plants in the field become conspicuously green.
CONTROL: Same as in case of CSD.



Healthy flowers/pods on right and phyllody infected on left

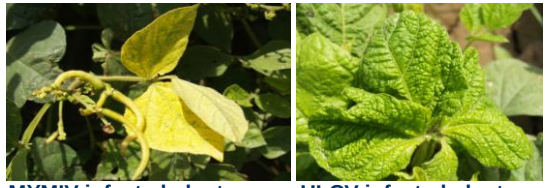
MUNGBEAN VIRAL & PHYTOPLASMA DISEASES

MUNGBEAN YELLOW MOSAIC DISEASE (MYMD)

CAUSE: Mungbean yellow mosaic India virus
INSECT VECTOR: Whitefly (*Bemisia tabaci*)
SYMPTOMS: Mungbean plants infected with YMD generally show yellowing or chlorosis of leaves followed by necrosis, shortening of internodes and severe stunting of plants with no yield or produce few deformed, small, immature and shriveled seeds.
Disease may be initiated at any time during summer cropping season but not in spring crop.
CONTROL: Use of resistant variety. Control of insect vector with proper insecticides. Eradication of weeds.

LEAF CRINKLE DISEASE

CAUSE: *Urdbean leaf crinkle virus (ULCV)*
INSECT VECTOR: Whitefly, Leaf feeding beetle (*Henosepilachna dodecastigma*) and Aphids (*Aphis crassivora; A. gossypii* & *Myzus persicae*).
SYMPTOMS: Disease appears as extreme crinkling, curling, puckering and rugosity of leaves, stunting of plants and malformation of floral organs. Pod formation is severely reduced on infected plants which can cause 35 to 81% reduction in grain yield.
ULCV can be transmitted through seed. Disease may be initiated in both spring and summer cropping season at any time.
CONTROL: Same as in case of MYMD.



MYMIV infected plant ULCV infected plant

MUNGBEAN PHYLLODY DISEASE (MPD)

CAUSE: *Phytoplasma (16Sr II-D subgroup)*
INSECT VECTOR: leafhopper *Orosius* spp.
SYMPTOMS: The most characteristic symptoms of the disease are smalling of leaves, transformation of floral parts into green leaf like structures (phyllody) followed by abundant vegetative growth. Phyllody-infected plants produce deformed pods and become sterile, resulting in total loss of yield.
Control: Same as in case of chickpea phyllody.

Leaf smalling & pod deformation due to MPD

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IMPORTANT DISEASES OF CHICKPEA AND MUNGBEAN IN PAKISTAN

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