Wilt of Chickpea (Gram)

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

Taxonomic Position of the Pathogen: Sub Div.: Deuteromycotina, Class: Hyphomycetes, Order: Tuberculariales, Family: Tuberculariaceae.

Distribution and Importance: Chickpea (Gram) wilt was first reported from India by E.J. Butler in 1918. Currently the disease is worldwide in distribution and prevalent in several countries including India, Bangladesh, Burma, Ethopia, Mexico, Pakistan, Nepal, Sudan and USA. Yield losses vary between 10% to 100% depending on varietal susceptibility and agro-climatic conditions.

Symptoms: Symptoms of the disease can develop at any stage of plant growth, and affected plants may be grouped in patches or appear spread across a field. The chief symptoms of the disease are: yellowing and drying of leaves from base upward, drooping of petioles and rachis, improper branching, withering of plants, browning of vascular bundles and finally wilting of plants. Affected plants appear in patches in the field. When disease occurs at seedling stage, seedlings collapse and lie flat on soil surface. In case of adult plants, characteristics symptom is brown to black discoloration of xylem vessels seen.

Pathogen: Fusarium wilt of chickpea is caused by *Fusarium oxysporum* f. sp. *ciceris* the aerial mycelium is at first white and cottony, but later it may become cream or salmon in colour or remain white. *Fusarium* produces micro-conidia, macro-conidia and chlamydospores. The micro-conidia (2.5–4.5 µm x 5–11 µm) are oval or cylindrical, straight or curved. Macro-conidia (3.5–4.5 µm x 25–65 µm) are produced more sparsely than micro-conidia and usually they are three to five septate or fusoid. Chlamydospores are formed in infected chickpea tissues, formed singly, in pairs or in chains, and are smooth or rough-walled. Hyphae are septate and profusely branched. The fungus can grow at temperatures of 7–35 °C and pH 4–9.4. Optimal conditions for mycelial growth are 25–27 °C and pH 5.1–5.9.

Disease Cycle: *Fusarium* wilt of chickpea is a monocyclic disease. The fungus can be transmitted by seed and may survive as mycelium and chlamydospores in seed and soil and also on infected crop residues, roots and stem tissue buried in the soil for more than 6 years, even in the absence of the host. The fungus chlamydospores are found free in soil, in the hilum of the seed, in cotyledons and axis. The primary infection is through chlamydospores or mycelia. The conidia of the fungus are short lived; however, the chlamydospores can remain viable up to the next crop season. The pathogen survives well in roots and stems, even in apparently healthy looking plants growing among diseased ones harbouring sufficient fungus.

Management: Management of Fusarium wilt of chickpea is difficult to achieve and no single control measure is fully effective. Therefore, management of the disease should be targeted to exclusion of the pathogen as well as by reducing the amount and/or efficiency of the initial inoculum. For such a goal, measure of control should include:

1. Follow deep summer ploughing.
2. Follow crop rotation measures continuously with unrelated crops e.g. wheat, barley or oats.
3. Always use disease free seeds.
4. Avoid sowing when temperature is high.
5. Apply castor cake 500 kg/ha at the time of sowing.
6. Treat seeds with Trichoderma viride @ 4 g/kg seed or with carbendazim @ 2 g/kg. Do not use both of these treatments as the chemical will kill the biological control agent.
7. Seed treatment with a mixture of thiram 30% and benomyl 30% at 1.5 g /kg seed can eliminate seed-borne infection.
8. Grow resistant varietyies-BG-1053, PDG-4, PBG-5, Gujrat gram-1 ,Gujrat Gram-4, Himachal Chana-2, PKV Kabuli- 2, Virat (Kabuli), GM-547, Pragati, Vardan, Surya, Alok (KGD1168,CSAUAT), Pant G-186