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Major Diseases of Chickpea and Its Control Measures

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Abstract

Chickpea (*Cicer arietinum* L.) is one of the world's most important cool season food crops mostly grown in dry lands. The crop suffers from serious diseases that affect it in all growth stages. The pathogens that affect chickpea include fungi, bacteria, viruses, nematodes and mycoplasma, which results in severe economic losses globally. Among these, fungi are the largest and perhaps most important group affecting roots, stems, leaves, flowers and pods of chickpea. These diseases *viz.,* ascochyta blight, fusarium wilt, dry root rot, botrytis gray mold can causes grain yield and quality losses up to 100% so these diseases are important for manage.

Introduction

Chickpea (*Cicer arietinum* L.) is also known as garbazo bean/ Bengal gram and it is one of the world's most important cool season food crops mostly grown in dry lands. Chickpea grown extensively in India approximately 75% of world's chickpea production and this crop takes duration of about 4-5 months and can be grown on moderately heavy soils, black cotton soils and sandy loam soil. The crop suffers from serious diseases that affect it in all growth stages. Nearly 172 pathogens have been reported so far that infect chickpea in different parts of the world, but only a few of them have the potential to devastate the crop. Some diseases are persistent problems in chickpea production in wide geographical areas, notably, ascochyta blight, fusarium wilt, dry root rot, botrytis gray mold while others are sporadic in occurrence or endemic in distribution.

The main objective of this article is to provide knowledge of chickpea disease and its management so that they can increase their yield.

There are some major diseases of chick pea they may losses grain yield and quality given below:

1. Ascochyta Blight: *Ascochytarabiei* (Pass.) Labr.

Ascochyta blight (Figure 1) is a major disease of chick pea and the disease usually builds up in February and March in Pakistan and northern India when the crop canopy is very dense and temperatures are favorable for the disease development. The disease can cause grain yield and quality losses up to 100%. Ascochyta blight is a seed borne disease and diseased debris left over in the fields also serves as a source of primary inoculum. Ascospores were also found to play a role in the initiation of disease epidemics (Kaiser, 1990).

The disease builds up and spreads fast when night temperatures are around 10 °C, day temperatures are around 20 °C, and

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rains are accompanied by cloudy days. The disease symptoms appear first on the leaves as water soaked lesions which later develop into roundish spot. The disease initially appears in the form of several small water-soaked necrotic spots on the younger leaves of almost all branches. The disease is usually seen around flowering and podding time as patches of blighted plants in the field. Under conditions favorable for disease development these spots enlarge rapidly and coalesce, blighting the leaves and buds. Pycnidia are observed on the blighted parts.

Figure 1: Affected plant field, pods, leaves and stems by Ascochyta blight

Managements

• Seed treatment- seed can be treated with organomercurials (Agallol, Agrosan *etc*.), thiram, benomyl or Calixin M.

• Field control of chickpea ascochyta blight has been achieved by seed treatment with bavistin + thiram in 1:3 ratio @ of 2.5 gm/kg seed followed by three sprays of bavistin (0.5 kg/ha) at 10 days interval when the disease appear (usually at pod formation stage).

• Spray the crop with mancozeb @ 2.5 gm/lit., if noticed during the growth period or spray wettable sulphur @ of 2.3 gm/lit. of water.

• Use of resistant varieties is the most effective and economical way of management of ascochyta blight of chickpea. F8, C325, C727, I-13, Hima chana-1, Gaurav, Vardan, Samrat, EC 26414, EC 26435 and EC 26446 resistant to blight.

• Removal and destruction of dead plant debris, rotation and deep sowing also an effective measure to control the disease.

2. Botrytis Gray Mold: *Botrytis cinerea* Pers. ex Fr.

Botrytis gray mold (Figure 2) is a serious disease in parts of Bangladesh, India, Nepal, and Pakistan. It can cause yield losses up to 100%. Botrytis gray mold is a seed borne disease. Excessive vegetative growth due to too much irrigation or rain, close spacing, and varieties that have a spreading habit favor the disease development.

Temperatures between 20 and 25 °C and excessive humidity around flowering and podding time favor the disease development. Lack of pod setting is the first indication of the disease. Shed flowers and leaves covered with the spore mass can be seen on the ground under the plants. When humidity is very high, the symptoms appear onstems, leaves, flowers and pods as gray or dark brown lesions covered with moldy sporophores. Affected leaves and flowers turn into a rotting mass.

Figure 2: Affected pod symptoms by Botrytis gray mold

Managements

• Seed treatment with carbendazim + thiram (1:1), vinclozolin, carbendazim, triadimefon, Dithane M 45® (maneb), Triadimenol, thiabendazole.

• Carbendazim @ 1 g/L, captan, chlorothalonil, mancozeb, thiophonate methyl (apply at 50 days after sowing or at the first sign of symptoms).

3. Fusarium Wilt: *Fusariumoxysporum* f. sp. ciceri (Padwick)

Fusarium wilt disease (Figure 3) in now widely spread in most chickpea growing areas of Asia, Africa, southern Europe and the Americas, and yearly yield losses are estimated at 10-15 % in India, with losses of 70-100 % in years of severe outbreaks of the disease. Wilt is a seed and soil borne disease.

Figure 3: Affected field and spited stem by Fusarium wilt

Wilt incidence is generally higher when chickpea is grown in warmer and drier climates (> 25 °C) and when crop rotations are not practiced.

Seedling stage: The disease can be observed within 3 weeks of sowing. When uprooted, they usually show uneven shrinking of the stem above and below the collar region (soil level). When split open vertically from the collar downwards or cut transversely, dark brown to black discoloration of the internal stem tissues is clearly visible.

Adult stage: The affected plants show typical wilting, *viz.,* drooping of the petioles, rachis and leaflets. Affected plants, when uprooted and examined before they are completely dry, show no external rotting, drying, or root discoloration. When

the stem is split vertically, internal discoloration can be seen. Around the collar region, above and below, the xylem in the central inner portion (pith and part of the wood) is discolored dark brown or black (Erwin, 1958).

Managements

• Deep summer ploughing, field sanitation by collecting and burning diseased crop debris helps in reducing chance of survival in the field.

• Seed treatment with bavistin + thiram is effective to eradicate the seed borne inoculam.

• Bioagent: Seed treatment *Trichoderma viride* + carboxin (4+1 g/kg seed) or carbendazim + thiram (1+2 g/kg seed).

• Resistant variety JG 315, Avrodhi, DCP 92-3, JG 74, KWR 108, Pusa 212, Pusa 362, DCP 92-3, Shubhra (IPCK 2002-29): Kabuli variety.

• Cropping system: Intercropping with linseed, wheat or mustard.

4. Dry Root Rot: *Rhizoctoniabataticola* (Taub.) Butler

Dry root rot is the most important root rot disease in chickpea (Figure 4) particularly in the central and southern India. The pathogen is a facultative sporophyte and is both seed borne and soil borne.

Figure 4: Affected field and stem of chickpea by Dry root rot

Maximum ambient temperatures above 30 °C, minimum above 20 °C, and moisture stress (dry conditions) at the reproductive stages favor disease development. The seedlings can also get infected. Drooping of petioles and leaflets is confined to those at the very top of the plant. Sometimes when the rest of the plant is dry, the top most leaves are chlorotic.

Managements

• Seed treatment with *Trichoderma viride* @ 4 g/kg seed or Thiram (2 g) + Carbendazim (1 g) @ 3 g/kg of seed or Carbendazim @ 2 gm/kg of seed.

• Follow crop rotation.

• Timely sowing to avoid post flowering drought and heat stress, which aggravate the disease.

• ICC 2644, ICC 10384, ICC 10630, ICC 11224, ICC 11332, ICC 12441, ICC 12450, ICCV 10, ICCL 81002 and ICCL 81010 showed moderate resistance against the disease.

Conclusion

The distribution and incidence of soil borne diseases of chickpea varied in each state of India. These diseases are emerging as potential threat in chickpea production. We need to use multiple line varieties, new emerging pesticides and ecofriendly management against these diseases of chickpea. A detailed analysis of the factors responsible for widespread incidence of these diseases needs further investigations.

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