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A General Review of *Cercospora* Leaf Spot Disease of Mungbean and its Management

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Abstract

Mungbean is one the major pulse crops grown all over the world. *Cercospora* leaf spot disease is an important devastating disease of green gram (Vigna *radiata* L.). It is a widespread disease caused by the fungus *Cercospora canesens* with the reduction in crop yield up to 60 percentage. The disease was firstly reported in Delhi, India and spread all over the surroundings. Field conditions and basic environmental factors are responsible for the disease incidence. Many of the botanical extracts and fungicides are reported to be effective in the management of the disease.

History and Distribution

Mungbean (*Vigna radiata)* is a short duration legume crop belongs to family *Leguminosae* (Wilczek, 1954; Verdcourt, 1970). Mungbean was originated from India (De Candole, 1886; Zhukovsky, 1950; Bailey, 1970) or the Indo-Burmese region (Vavilov, 1951; H.B. Singh *et al*., 1970; Jain and Mehra, 1980). The crop is produced on a large scale in southern and eastern Asia. In Pakistan Mungbean is grown on an area of 2,053,000 hectare with the production of 0.13 million tons. *Cercospora* leaf spot is an important foliar disease of Mungbean caused by *Cercospora* canescens. The disease was reported first time in Delhi, India (Munjal *et al*., 1960) and can be occurred in all parts of the humid tropical areas of Asia and many other countries (Pandey *et al*., 2009) and is prevalent in all parts of humid tropical areas of India, Bangladesh, Indonesia, Malaysia, Philippines, and Thailand (Pandey *et al*., 2009). In Pakistan, maximum loss of 61 percentage was observed in case of grain yield (Iqbal *et al*., 1995). The disease causes qualitative and quantitative losses up to 96 per cent under natural epiphytotic conditions (Kasno, 1990; Iqbal *et al*., 1995; Kaur, 2007).

Symptomology and Histopathology

Cercospora canescens attacks the crop and the symptoms appear on leaves as water soaked spot with greyish borders. As the disease becomes severe cause death of the tissues of infected leaves. The petioles, stems and pods also get affected by the pathogen. During favorable condition the spots increase in size and at the time of flowering and pod formation lead to defoliation in case of severe attack of *Cercospora* premature defoliation is also observed. Sometimes the leaves may become unshaped and wrinkled. Poor pod formation, late maturity and immature seed formation is also reported (Poehlman, 1991). *Cercospora* spp. produce a perylenequinone toxin called cercosporin which is non-selective affecting bacteria, plants, fungi and animals unless these produce protective antioxidants such as carotenoids (Daub and Ehrenshaft, 2000).

Fig.1. Symptoms of *Cercospora* leaf Spot Disease of Mungbean

Dispersal and Epidemiology of the Disease

Once the disease has been developed, the pathogen can survive in the plant debris as dormant mycelium. The pathogen produces conidia in lesions of plant debris (Payne and Waldron, 1983). These conidia play a role of primary inoculum in disease incidence. Rain splashes also play as a major role in dispersal of conidia (William, 1987). *Cercospora* leaf spot is considered as an important pathogen not only due to its widespread range but also due to the susceptibility of many commercial crops to this disease (Wang *et al*, 1998; Windels *et al*., 1998). Warm wet conditions are favorable for *Cercospora* leaf diseases (Barbetti, 1985). Epidemiological conditions for the production of conidia require 90-100percentage relative humidity and 20-26oC temperature. For germination and to cause the infection the ideal temperature recorded is 25-30oC. If the temperature is below than 10OC then no conidia are formed (Windels *et al*., 1998).

Most Important Genotype of Mungbean

Table 1: Different Genotype Showed the Different Response against *Cercospora* Leaf Spot Disease Of Mungbean. (NARC, 2003)

Disease grade	Disease reaction	No. of genotypes	Genotypes
1	Highly resistant	12	NM-98, 98-cmg-003, C2/94-4-42, NM-1, NM-2, 98cmg-018, BRM-188, CO-3, Basanti, PDM-11, BARIMung-2, VC3960-88
2	Resistant	15	ML-267, NCM 255-2, NCM 257-6, NCM 259-2, NCM 251-1, NCM 251-13, NCM 257-2, NCM 251-12, NM-92, NCM 257-10, NCM-209, VC-3960-A88, C1/94-4-19, VC3960-A89, Mung-6
3	Moderately resistant	17	Mung-1, NM-98, Pusa-9072, VC-6173-B, Chakwal Mung-97, NCM 254-7, NCM 254-1, NCM 258-7, NCM 257-5, NCM 252-10, NCM 251-8, NCM 255-3, NCM 255-4, NCM 252-5, SM-1, NM-92, BRM-195
4	Susceptible	6	98cmg-016, SML-134, SML-32, PGM-54, NCM 254-3, NCM 251-16
5	Highly susceptible	8	NCM 255-8, NCM 253-1, NCM 252-1, NCM 258-1, NCM 257-8, LIP5/5/89, BRM-202, NCM 251-4

Management

To control *Cercospora* leaf spot of Mungbean different techniques and methodologies including use of chemical fungicides (Singh and Singh, 1978) spray of different botanicals and use of resistant variety are being practiced. Evaluation of some systemic fungicides against *Cercospora canescens* was reported by J.P. Khunti (2005), in Gujrat, India. For the evaluation, a field trial was conducted and ten different fungicides namely hexaconazole, penconazole, tridemorph, Sulphur, triadimephon, propiconazole, dinocap, thiophanate methyl, carbendazim and mancozeb against *Cercospora* leaf spot caused by *Cercospora canescens* in Mungbean. The minimum disease intensity and highest yield was reported by the application of hexaconazole closely followed by penconazole and tridemorph.

M.N. Uddin (2013), reported the evaluation of some botanical extracts to control leaf spot disease of Mungbean. Different concentrations of plant extracts were evaluated for disease control. Six domestic plant species; *Neem* leaves extract, Garlic cloves extract, Biskatali leaves extract, Alamanda leaves extract, Arjun leaves extract and Debdaru leaves extract were used in this experiment. Neem leaves extract showed the best results in minimization of *Cercospora* leaf spot of Mungbean. The disease index was only 7.33 percentage on the plants treated with *Neem* leaves extract. Yield was 1.26 tons per hectare and other yield effecting factors were also in better condition in the same treatment. The best of the all techniques is to apply suitable cultural practices before and during the cultivation of the crop and the use of non-host crops in crop rotation. Destruction of the plant debris is also an important recommendation to avoid the disease incidence.

Conclusion

Mungbean is an important pulse crop grown over a large area in Pakistan, India and many other countries. *Cercospora* leaf spot is a major fungal disease of Mungbean which causes a great loss of yield due to poor cultural practices and wrong choice of crop rotation system. The disease can be managed by the

application of fungicides and botanicals, but the most appropriate recommendation is the use of resistant varieties of Mungbean. A lot of work is being done in this respect but the introduction of new strains of *Cercospora* is a hurdle in the control of the disease.

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