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Research Article

Identification of resistant sources in mungbean to bacterial leaf spot disease

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Abstract

Fifty eight mungbean genotypes/cultivars of indigenous as well as exotic origin were screened against natural infection of bacterial leaf spot disease under field conditions to at National Agriculture Research Centre, Islamabad during Kharif season of 2012. Four genotypes exhibited resistant reaction, five displayed moderately resistant reaction and 32 were tolerant, while the rest were either susceptible or highly susceptible against the disease. Identified resistant sources may be exploited for the development of high yielding disease resistant cultivars of mungbean by using in hybridization programme.
Key Words: Bacteria, genotypes, mungbean, resistance, *Vigna radiata*.

Introduction

Mungbean [*Vigna radiata* (L.) Wilczek.] is an important grain legume crop of Pakistan but its average yield is very low due to inherent low yield potential of the crop varieties and their susceptibility to disease (Singh, 1987). One of the yield limiting diseases is the bacterial leaf spot of mungbean, caused by *Xanthonomas phaseoli* (Smith) Dowson, which is extensively prevalent in humid mungbean growing areas of Pakistan (Bashir and Zubair, 1985).

The bacterium can infect beans and lentils as well but the infection becomes severe on mungbean (Patel and Jindal, 1972). It is a seed-borne disease, though the percent seed transmission is lower (Shekhawat and Patel, 1977) and generally perpetuates in dead leaves from one growing season to the next (Patel *et al*., 1972). Field sanitation practices, three-year crop rotation and use of disease free healthy seed may reduce disease incidence but the use of genetic resistance of the crop cultivars is the cheapest and effective control measure for the disease. This paper reports on the reaction of 58 mungbean genotypes to natural infection by bacterial leaf spot disease in Pakistan.

Materials and Methods

Fifty eight mungbean genotypes of indigenous as well as exotic origin were screened for identification of resistance sources against natural infection by bacterial leaf spot disease under field conditions at National Agricultural Research Centre, Islamabad during the Kharif seasons of 2012. The test entries were planted during mid July and harvested during the last week of October. Each test entry was planted in a single row subplot of 4 m length in an augmented design with row to row and plant to plant spacing of 30 cm and 10 cm, respectively. One row of susceptible check (NHM-51) was planted after every two test entries and also all around the experiment. Though the natural disease incidence was quite severe during the season due to conditions favourable for the development of the disease, the crop was also inoculated artificially several times with the bacterial suspension isolated in culture from the diseased leaves of mungbean. Disease intensity on each genotype was recorded 50 days after sowing using a 0–5 disease rating scale (Park, 1978), when the susceptible check rows exhibited hundred percent infection.

Results and Discussion

Bacterial leaf spot symptoms appeared 25 days after sowing. Disease intensity gradually increased thereafter and resulted in complete defoliation of susceptible cultivars. Disease intensity reached to its maximum limit during cloudy and rainy days in the months of August and September. Average disease reaction of the genotypes is given in Table 1. Graphical representation of disease reaction for these genotypes is also revealed in Fig. 1. The genotypes varied greatly for their reactions but none was completely free from the disease. However, four genotypes (AZRI-1, NCM 15-11, NCM11-8, 14063) behaved as resistant, five (NCM-21, NCM 258-10, NCM 11-6, NCM 11-3, AZRI-06) exhibited moderately resistant reaction while the rest showed susceptible to highly susceptible reaction. Patel *et al*. (1972) screened 2160 mungbean germplasm lines for resistance to *X*.

phaseoli and reported a few resistant lines. Similarly, 100 mungbean genotypes were screened under field conditions to natural infection and among them, eight were found resistant to the disease (Iqbal *et al.*, 1991). Present investigations also indicated that the prevalence of resistant sources in mungbean germplam against bacterial leaf spot is not uncommon. The determination of genetic basis of these sources and incorporation of their resistant genes into commercial cultivars may help in the development of high yielding disease resistant cultivars.

Table 1: Average reaction of mungbean germplasm against bacterial leaf spot disease under field conditions during Kharif season of 2012 at National Agricultural Research Centre, Islamabad.

Disease rating	Disease reaction	Germplasm accessions
0	Highly resistant	Nil
1	Resistant	AZRI-1, NCM 15-11, NCM11-8, 14063
2	Moderately resistant	NCM-21, NCM 258-10, NCM 11-6, NCM 11-3, AZRI-06
3	Average reaction (tolerant)	C 2-94-4-36, Dera Azri-01, AZ-MH-2, NM-9, NCM 257-2, NCM-209, NCM-23, NCM 281-12, NCM251-16, NCM 251-1, NCM 252-2, NCM 252-3, NCM 252-10, NCM 254-2, NCM 254-7, NCM255-2, NCM 257-10, NM-06, NCM 11-5, NCM 11-9, NCM11-2, NCM 11-4, MSPS-106, 13957, MSPS-109, MSPS-115, MSPS-117, MSPS-119, MSPS-120, MSPS-121, MSPS-122, NM-06
4	Susceptible	AZMH-10, Mung 303-8, NCM-24, NCM 251-4, NCM-254-3, NM-11, NM-4, NCM 11-7, 14132, 13988
5	Highly susceptible	NCM 257-3, 17070, MSPS-197, 14065, 14147, 14072, MSPS-118,

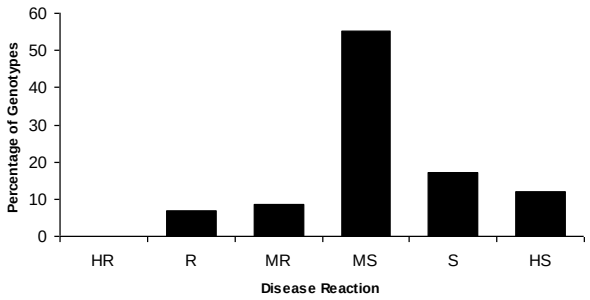

Fig.1: Disease reaction of 58 mungbean cultivars against bacterial leaf spot.

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