Short Communication

STUDIES ON VARIETAL RESISTANCE IN SOYBEAN AGAINST ROOT ROT AND COLLAR ROT DISEASES

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ABSTRACT
Root rot caused by *Macrophomina phaseolina* and collar rot caused by *Sclerotium rolfsii* are the major threat for the successful production of soybean in India. Use of resistant varieties is considered as an economical and durable method of controlling these diseases. Therefore, fifteen soybean cultivars were evaluated by pot culture under epiphytotic conditions. Study of varietal resistance revealed that, among 15 varieties tested, none of the cultivar was found immune as well as moderately resistant or tolerant to both the diseases. Five cultivars (JS-93-05, TAMS-98-21, AMS-99-24, NRC-64, JS-335) were reported moderately susceptible and ten (JS-71-05, AMS-99-16, AMS-92-32, TAMS-38, NRC-67, AMS-99-3, AMS-47, Bragg, AMS-353, AMS-56) were found highly susceptible to root rot and collar rot diseases.

INTRODUCTION

Soybean (*Glycine max* L. Merril) belongs to family leguminoceae. India stands fifth in the production of soybean. Root rot caused by *Macrophomina phaseolina* and collar rot caused by *Sclerotium rolfsii* are the severe menace in soybean cultivation particularly in Maharashtra state. Yield reductions from post emergence death of seedlings, weakening of plants, root rot, collar rot as well as premature death of infected plants. Being seed and soil borne polyphagus pathogen, it is difficult to manage in field (Chavan and Gupta, 2005). Management of these diseases are more efficient when integrated approaches adopted involving cultural practices, application of organic amendments, seed treatments with bio-agents and chemicals and use of immune or resistant cultivars (Vyas, 1994; Gupta and Sharma, 2009). Use of immune or resistant cultivars is a long term solution to manage any disease. Therefore, the study was initiated to screen soybean cultivars against root rot and collar rot diseases.

MATERIAL AND METHODS

For the studies on varietal resistance in soybean against root rot caused by *Macrophomina phaseolina*and collar rot caused by *Sclerotium rolfsii*, 15 soybean cultivars were received from Regional Research Station, Amravati, Maharashtra and screened for their resistance by pot culture under epiphytotic conditions. Inoculums of *Macrophomina phaseolina* and *Sclerotium rolfsii* isolated from soybean plant were prepared separately by growing on sterilized sorghum sand medium for soil infestation. Experiment was conducted in pots at Department of Plant Pathology, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra. Soil was sterilized by 10 per cent formalin solution. Sterilized soil was filled in pots (9" diameter) of 3 kg capacity. Potted soil was inoculated with combine inoculum level of both the fungi. Thirty seeds of each variety in each pot were sown after seven days of incubation of soil. Before sowing seed was surface sterilized with 4 per cent sodium hypochloride solution and three subsequent washing with sterilized distilled water was given. Observations on per cent mortality due to root and collar rot were recorded at 40th day after sowing and analyzed statistically.

Scale used for screening different soybean cultivars (Nene *et al.,* 1981) is as follows.

Disease Scale	Disease Reaction
0	Immune (I)
<10%	Moderately Resistant (MR)
11-20%	Tolerant (T)
21-50%	Moderately Susceptible (MS)
>50%	Highly Susceptible (HS)

RESULT AND DISCUSSION

To ascertain the resistance/ tolerance in soybean against root rot + collar rot, the experiment was conducted in pot culture under epiphytotic conditions.

Among the fifteen varieties screened, none of the cultivar was found immune, moderately resistant or tolerant to both the diseases (Table 1.). Five cultivars (JS-93-05, TAMS-98-21, AMS-99-24, NRC-64, JS-335) were reported moderately susceptible and ten (JS-71-05, AMS-99-16, AMS-92-32, TAMS-38, NRC-67, AMS-99-3, AMS-47, Bragg, AMS-353, AMS-56) were showed highly susceptible to root rot and collar rot diseases.

Table 1. Reaction of soybean cultivars to *Macrophomina phaseolina* + *Sclerotium rolfsii* infection in pot experiment

Sl. no.	Cultivars	Per cent mortality	Disease reaction
1	NRC-64	49.29 (44.57)	MS
2	AMS-92-32	59.67 (50.69)	HS
3	TAMS-38	61.86 (51.93)	HS
4	AMS-99-16	56.56 (48.81)	HS
5	AMS-56	74.35 (61.11)	HS
6	NRC-67	64.95 (53.77)	HS
7	Bragg	71.36 (57.74)	HS
8	AMS-99-24	35.48 (36.55)	MS
9	TAMS-98-21	47.39 (43.49)	MS
10	AMS-47	70.64 (57.31)	HS
11	JS-335	49.73 (44.84)	MS
12	AMS-99-3	70.03 (56.83)	HS
13	JS-71-05	53.99 (47.31)	HS
14	AMS-353	74.26 (64.39)	HS
15	JS-93-05	31.53 (34.02)	MS

*Figures in parenthesis are arc sin values

Among fifteen cultivars of soybean studied for varietal resistance against *Macrophomina phaseolina +Sclerotium rolfsii*, none of the cultivar was found as immune, moderately resistant or tolerant. All the cultivars showed moderately susceptible and highly susceptible disease reaction in pot culture under epiphytotic conditions. This shows a high level of aggressiveness of the pathogen or relatively narrow diversification of genetic material under study. Similar results were reported by Pancheshwar *et al.* (2016)

while screening 77 soybean cultivars against root rot and collar rot. Sugha *et al.* (1991) evaluated 210 chickpea cultivars from different sources and none of these were found resistant or even moderately resistant while Hussain *et al*. (2005) screened 57 soybean cultivars and found only one genotype highly resistant. Abida Akram *et al*. (2008) screened 98 genotypes of chickpea against collar rot and reported only 5 genotypes exhibited highly resistant response while 9 genotypes displayed resistant reaction. Zhang *et al.* (2010) tested 57 soybean cultivars against root rot caused by *Fusarium* sp. and six, nine, eleven and seven cultivars were consistently rated as the most resistant to *F. avenaceum, F. graminearum, F. oxysporum* and *F. trinctum*, respectively.

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