



SCREENING OF PROMISING GENOTYPES UNDER GLASSHOUSE AND FIELD CONDITIONS AGAINST BACTERIAL PUSTULE OF SOYBEAN CAUSED BY *XANTHOMONAS AXONOPODIS* pv. *GLYCINES* (NAKANO) DYE

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Abstract

Resistance genotypes are tools to combat the pathogens. This can be used as one of the strategies for the management of disease simultaneously. In the present investigation, an attempt was made to identify the resistant sources against the bacterial pustule of soybean. Totally 10 genotypes of soybean collected from MARS Dharwad soybean centre, UAS Dharwad were screened in glass house conditions at Department of Plant Pathology, College of Agriculture, Dharwad during 2014-15. Results of the present investigation (table 1) depicted that the entries DSb 12, DSb 24, DSb 25, DSb 26, DSb 23-2 and JS 335 recorded a disease grade of 3 showing moderately resistant reaction for bacterial pustule of soybean. Among the exotic lines screened EC 1028, EC 118420, EC 15966, EC 457286 showed absolute resistant reaction for bacterial pustule these lines can be further used in developing resistant sources against bacterial pustule infection.

Key words : Bacterial pustule, genotypes, resistance, DSb series and EC lines.

Introduction

Soybean [*Glycine max* (L.) Merrill] is a protein rich oilseed crop. It is considered as a golden bean, miracle bean and wonder crop of the 21st century because of its characters and usage. Soybean evolved from *Glycine ursuriensis*, a wild legume native to china, which has been used in china since eleventh century B. C.

Though, soybean is a legume crop but, it is widely used as oilseed due to its poor cooking ability on account of inherent presence of trypsin inhibitor that limits its usage as pulse crop. In India, it has been grown for centuries in the low hills of Kumaun and Garhwal region of Himalaya. Cultivation of soybean in India was negligible till 1970, but production rapidly increased crossing over 6 million tonnes in 2004. At present in India, it occupies an area of 10.02 million ha with a production of 11.64 million tonnes and productivity of 1062 kg per ha (Anonymous, 2015).

The major states which cultivate soybean are Madhya Pradesh, Bihar, Gujrat, Himachal Pradesh, Maharashtra, Karnataka, Rajasthan and Uttar Pradesh.

Soybean crop can be attacked by more than 100 pathogens. In India, annual yield losses due to various diseases was estimated to an extent of 12 per cent of total production. Over hundred pathogens were known to affect soybean, of which 66 fungi, six bacteria and eight viruses had been reported to be associated with soybean seeds (Sinclair, 1978). Climatic conditions and seasonal differences in the tropics vary mainly due to rainfall patterns, which influence severity of diseases.

Materials and Methods

A laboratory experiment was conducted to evaluate the 10 soybean genotypes for its resistance against *X. axonopodis* pv. *glycines* during 2014-15 under glass house conditions at Department of Plant Pathology, College of Agriculture Dharwad. All ten soybean genotypes were sown in pots containing the sterilized soil and watered at regular intervals to keep optimum soil moisture. 45 days after sowing inoculation was done by pin prick method. Simultaneously, inoculum of the bacteria was multiplied in 500 ml conical flasks containing nutrient both. For inoculation, 48 hrs old culture of the bacterium

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was spotted by pin prick method and after that it was covered with cotton. During and after inoculation, the pots were sprayed with heavy water to maintain the moisture and also they were covered with plastic cover to create the humidity. After seven days of inoculation first bacterial pustule symptom was observed on pin pricked leaf and observations for disease development were taken by following the scale given by Mayee and Datar (1986).

In the field experiment, 142 exotic germplasm lines along 12 advanced stabilized lines were screened under

natural epiphytotic conditions. The 154 lines were sown in three lines, nonreplicated design of five mt length. The observation of bacterial pustule severity was recorded by using 0-9 scale (Mayee and Datar, 1986).

Results and Discussion

In order to find out the disease resistant sources against bacterial pustule disease in soybean. Totally, ten soybean genotypes used, which were collected from AICRP (Soybean) MARS, Dharwad center were evaluated during 2014 under artificial condition by

Table 1 : Screening of different genotypes against *Xanthomonas axonopodis* pv. *glycines* under glasshouse condition.

S. no.	Genotypes	Disease grade	No. of pustules per cm ²	Shape of pustule	Type of pustule	Disease reaction
1.	DSb 12	3	10	Circular	Light black	MR
2.	DSb 23-2	3	12	Circular	Medium black	MR
3.	DSb 24	3	11	Irregular	Light brown	MR
4.	DSb 25	3	13	Circular	Medium black	MR
5.	DSb 26	7	19	Circular	Dark black	S
6.	DSb 27	3	12	Circular	Light black	MR
7.	DSb 28-3	5	15	Irregular	Medium black	MS
8.	DSb 30-2	5	14	Circular	Medium black	MS
9.	DSb 21 (C)	5	15	Irregular	Light yellow	MS
10.	JS 335 ©	3	9	Circular	Light yellow	MR

0 - Absolute resistant

1 - Highly resistant

3 - Moderately resistant

5 - Moderately susceptible

7 - Susceptible

9 - Highly susceptible

Table 2 : Screening of germplasm lines and advanced rust resistant material against bacterial pustule of soybean under field condition during *kharif* 2014.

Disease grade	No. of entries	Bacterial pustule (BP)
0	4	EC 1028, EC 118420, EC 15966, EC 457286
1	14	EC 39491, EC 14476, EC 685250, EC 4574198, EC 221329, EC 241766, EC 685246, EC 251456, EC 30832, EC 42081, EC 100772, EC 100772, EC 107406, EC 125730
3	13	EC 457406, EC 175529, DSb 12, DSb 23-2, DSb 25, DSb 27, JS 335, EC 116343, EC 457161, EC 177744, EC 245985, EC 34092, EC 389151
5	24	EC 1028, EC 172607, EC 245989, EC 49393, EC 251501, EC 94625, DSb 28-3, DSb 30-2, DSb 21, DSb 24, EC 232019, EC 95815, EC 65772, EC 39536, EC 333868, EC 34078, EC 394839, EC 241309, EC 338597, EC 245984, EC 457286, EC 333881, EC 340924, EC 396053
7	31	EC 118443, EC 333934, EC 685255, EC 39516, EC 380322, EC 251329, EC 309512, EC 274755, EC 14476, EC 315213, EC 685256, EC 34500, DSb 26, EC 250619, EC 287754, EC 309598, EC 325102, EC 333920, EC 33940, EC 36816, EC 114573, EC 14426, EC 242018, EC 250578, EC 251409, EC 25269, EC 241761, EC 333886, EC 33917, EC 251341, EC 377552,
9	66	EC 114520, EC 16738, EC 19923, EC 242038, EC 250608, EC 251358, EC 308334, EC 309545, EC 251334, EC 333891, EC 125730, EC 376065, EC 251516, EC 390981, EC 392580, EC 14426, EC 396052, EC 333891, EC 457175, EC 16119, EC 250607, EC 685252, EC 329158, EC 7048, EC 251411, EC 4435, EC 242104, EC 251762, EC 242091, EC 251478, EC 114854, EC 377698, EC 685524, EC 39219, EC 225114, EC 250588, EC 251401, EC 391158, EC 325092, EC 325101, EC 33875, EC 34079, EC 37937, EC 389148, EC 391346, EC 39362, EC 34057, EC 383165, EC 4435, EC 33922, EC 49393, EC 2388, EC 251409, EC 392532, EC 333875, EC 14573, EC 397158, EC 149988, EC 14573, EC 685251, EC 18745, EC 685258, EC 2388, EC 184337, EC 396053, EC 682551, EC 391158

following the standard procedure as mentioned in Materials and Methods.

The results on *in vitro* screening of available genotypes against *Xanthomonas axonopodis* pv. *glycines* are presented in table 1. Out of 10 genotypes screened DSb 12, DSb 23-2, DSb 24, DSb 25, DSb 27 and JS 335 recorded disease grade of 3 with moderately resistant type of infection. However, DSb 28-3, DSb 30-2 and DSb 21 showed moderately susceptible reaction with a disease grade of 5. The no. of lesions were minimum in JS 335 (9) followed by 10, 11, 12 and 13 in DSb 12, DSb 24, DSb 27 and DSb 25, respectively.

The maximum no. of lesions (19) per leaf was recorded in DSb 26 in the susceptible reaction (7 grade). There was not much variation with respect to shape of pustule ranging from circular to irregular. However, the colour of pustule varied significantly. In moderately resistant genotypes the colour of pustule was light brown to light black while in susceptible cultivar, it was dark black in colour.

Among 142 germplasm lines screened for bacterial pustule and 10 rust resistant during *khariif* 2015 are presented in table 2. EC 391336 and EC 389178, entries showed highly resistant reaction (1 grade) for bacterial pustule and followed by EC 3251 and EC 242104. Where as fourteen lines have fallen in category of highly resistant, thirteen lines fallen under moderately resistant and 24 lines moderately susceptible, 31 lines under susceptible and 66 lines fallen under highly susceptible reaction for bacterial pustule.

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