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SCREENING OF SOYBEAN GERMPLASMS FOR RESISTANCE AGAINST *COLLETOTRICHUM TRUNCATUM* INFECTION

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One hundred and five soybean germplasms of exotic and national origin were evaluated for their reaction to anthracnose under field condition in Bangladesh. In the field 36 materials were found to be free from infection of *C. truncatum* (highly resistant) while 19, 37, 3, 5 and 5 germplasms were graded as resistant, moderately resistant, moderately susceptible, susceptible and highly susceptible, respectively. Percentage of seed-borne infection by *Colletotrichum truncatum* varied from one germplasm to another. In total 43 germplasms were completely free from seed-borne infection, whereas upto 5% infection was recorded in 25 samples, 6-30% in 32 samples and 31-36% infection was found in five samples.

Key words: Soybean germplasm, *Colletotrichum truncatum*, Resistance, Anthracnose.

Introduction

Soybean (*Glycine max* L.) being the most important source of both protein concentrates and vegetable oils occupies a premier position among leguminous crops (Anonymous 1994). Among various factors which affect successful cultivation of soybean, incidence of diseases play an important role. Many of these diseases are responsible for loss of seedling and plants, reduced leaf area for photosynthesis, damage the pods, as well as the seeds. The poor seed quality hampers soybean cultivation in the country. Johansen *et al* (1994) reported that soybean anthracnose caused by *Colletotrichum truncatum* can lead to serious yield loss. The pathogen has been reported as a seed-borne fungus (Agarwal *et al* 1990; Archavasmit *et al* 1994). The infection of anthracnose varies with soybean cultivars (MCC 1993). For better yield of soybean, resistant germplasm is very important for avoiding *colletotrichum* infection. Experiments were therefore carried out to screen out the soybean germplasms which may show resistance to anthracnose disease *(Colletotrichum truncatum)*.

Materials and Methods

Seeds of 105 soybean germplasms (Table 1) of national and exotic origin were collected from the Mennonite Central Committee (MCC), Maijdi Court, Noakhali, Bangladesh. Field experiment was conducted in Modhupur where the soil (pH: 6.0-6.5) is rich in iron and aluminium with deficiency in nitrogen and phosphorus. The land was high but surrounded by low land. The soil was red pidmont of Modhupur tracts. The soil was used for growing summer vegetables and remained fallow for 3-4 months before this experiment was started. The soil was prepared and N, P and K were applied at the rate of 20, 60 and 20 kg ha^{-1} respectively (Fakir *et al* 1990). Before sowing seeds of each sample were treated with Rhizobium inoculant @ 20 g kg^{-1} of soybean seed. Then seeds of each sample were sown in lines of 5 m long with 50 cm distance between the lines. Thinning was done after 20 days of sowing to ensure suitable plant distance whereas 100 plants were kept in each line.

When the plant attained 80% maturity, data for anthracnose on pods were recorded and reaction was graded following the grade of Fakir *et al* (1990) and ISTA (1993). In grading scale for anthracnose (pod damage), the score used was as follows: 0 = no symptom (HR), 1 = few restricted spots covering less than 1% area (R), 3 = spots covering upto 5% area (MR), 5 = covering upto 115% area (MS), 7 = necrotic lesion covering upto 25% area (S) and 9 = lesion covering more than 25% area including shrivelling of the pod (HS). Plants were harvested at the physiological maturity stage (80% maturity). The harvested seeds were studied using standard blotter method to determine seed-borne infection of *C. truncatum* (Yum and Park 1989).

Results and Discussion

The reaction of 105 soybean germplasms to anthracnose in pod under field conditions was evaluated in Table 2. The severity of anthracnose disease ranged from 0.17 to 8.1. Though the percent plant infection was lower but the degree of disease prevalence (incidence) in terms of pod infection was high. Regarding pod area infection, it was observed that the tested materials showed their variation on the anthracnose reaction among themselves. Out of 105 germplasms, 36 samples were graded as highly resistant (HR), 19 as resistant (R), 37 as moderately resistant (MR), three as moderately susceptible (MS), five as susceptible (S) and five germplasms

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Table 1
List of 105 germplasms/cultivars

Sl. no.	Germplasms/ cultivars	Sl. no.	Germplasms/ cultivars	Sl. no.	Germplasms/ cultivars
1	G-10102	36	Shilajeet	71	AGS-205
2	G-10180	37	Js-2	72	AGS-227
3	AGS-313	38	Tari-92533	73	AGS-283
4	Pb-1	39	D-75-9207	74	AGS-297
5	PK-262	40	B.B.F	75	AGS-129
6	PK-327	41	NS-1	76	AGS-302
7	PH-416	42	SJ-1	77	AGS-314
8	Gourav	43	SH-2	78	AGS-327
9	Durga	44	SJ-4	79	GC-81021-16-1
10	AGS-160	45	SJ-5	80	GC-82341-7-2
11	G 2120 (m7) 69-1	46	SK-1	81	GC-82341-14-7-2
12	MTD-65	47	Chaingmai-60	82	GC-82345-20-2
13	MTD-13	48	MTD-176	83	GC-84007-9-5-1
14	IAC-12	49	MTD-451	84	KUSL-20004
15	Tgx-814	50	MTD-452	85	PL-25658
16	RP-13 (114)	51	MTD-259	86	NL-14
17	Tgx-814-230	52	MTD-464	87	No-205
18	Leflor	53	MTD-469	88	No-305
19	ISRA/IRAT 26/72	54	MTD-6	89	Koinyou shi Rome
20	KHSB-2	55	MTD-9	90	Orihime
21	Tgx-849-294D	56	MTD-10	91	Koganediazu
22	MACS-57	57	Conson	92	Asome Sume
23	Saoluiz	58	Tonuyem	93	Akiseme taka
24	TGX-573-2080D	59	Ngoc Dong	94	Shih-Shih
25	Santa Rosa R	60	Cantho-3	95	S 2581-11-K1-idt
26	Co-1	61	Dabobong tim	96	Amber
27	IAC-11	62	Minh Hai	97	GC-81056-4-3-1
28	IAC-8	63	AGS-54	98	GC-85037-38-1-2-1
29	Pb-1-O.T	64	AGS-59	99	GC-85040-27-1-1-1
30	Tgx-539-5e	65	AGS-79	100	GC-87023-2-2
31	AGS-272	66	AGS-91	101	GC-27031-3-19
32	AGS-234	67	AGS-95	102	GC-84051-9-1
33	Davis	68	AGS-120	103	AGS-276
34	PR-164-20	69	AGS-154	104	AGS-278
35	PR-142	70	AGS-182	105	Tachinagoha

were graded as highly susceptible (HS) to anthracnose (Table 2). The variation of disease reaction may be due to the variation of genetic constitution (Johansen *et al* 1994), growing location (Roy 1996), soybean cultivars (MCC 1993; Vitti 1993; Goulart 1998), and prevalence of the pathogen during the study period.

The harvested seeds were studied and *C. truncatum* was detected as seed-borne fungi following blotter method Table 3. Among 105 germplasms, seeds of 43 germplasms were found free of *C. truncatum* infection. The highest percent of infection (36%) was recorded in cultivar Asome Sume. The results

Table 2
Reaction of 105 soybean germplasms to anthracnose in pod

Scale	Reaction	Serial no. of soybean germplasms/cultivars
0	HR	3,12,13,16,18,21,24,28,29,31,32,34,36,37, 40,42,46,50,52,53,55,56,61,64,63,65,66, 67,69,71,75,81,84,93,94,96,102.
0.01-10	R	6,7,8,9,15,30,38,47,49,54,79,80,83,85,86, 98,99,100,105.
1.1-2.0	MR	1,2,4,5,10,14,17,20,22,23,27,39,41,43,44, 45,51,57,59,60,62,68,70,72,73,74,76,77, 82,87,88,89,90,91,92,97,103.
2.1-3.0	MS	11,26,104
3.1-6.0	S	25,33,48,78,95.
6.1-9.0	HS	19,35,58,64,101.

HR, Highly resistant; R, resistant; MR, Moderately resistant; MS, Moderately susceptible; S, Susceptible; HS, Highly susceptible.

Table 3
Detection of seed-borne *Colletotrichum truncatum* from the seeds of 105 soybean germplasms (Blotter Method)

Seed infection (%)	Serial no. of soybean germplasms/cultivars
0	5,6,8,9,13,15,16,17,18,19,20,21,23,25,27,28,30,31, 34,35,36,38,47,48,52,54,56,57,59,61,64,65,68,74, 77,82,83,89,90,94,95,97,101.
1-5	1,2,3,4,14,24,32,40,41,42,43,45,50,60,66,67, 69,72,76,78,79,81,86,91,102.
6-30	7,10,11,12,22,26,29,33,37,39,44,46,49,51,53, 55,58,63,70,71,73,75,80,84,93,96,98,99,100,103, 104,105
31-36	62,85,87,88,92.

of the present study are almost alike the previous reports (Archavasmitetal 1994; Roy 1996).

The findings of the present study provide useful infromation to the researchers of soybean who are engaged in developing *Colletotrichum truncatum* resistant soybean materials in the country. The resistant materials can be further studied for varietal improvement as well as for their yield performance in the country.

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