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Screening of some jute (*Corchorus* spp.) germplasms against stem rot caused by *Macrophomina phaseolina* (Tassi) Goid

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Field reaction of fifteen *olitorius* and *capsularis* jute germplasms were evaluated against stem rot, caused by *Macrophomina phaseolina* (Tassi) Goid. during 2012 and 2013 cropping season. Among the *olitorius* germplasms, OIN-431 was found to be tolerant with 1.61 % and 3.49 % during peak disease incidence of 110 DAS and 145 DAS respectively in 2013 cropping season. The germplasms, OIJ-63, OIJ-192, OIM-36, OIM-470, OIJ-192, OIM-36, OIN-470, OIJ-192, OEX-002 and OIN-250 were found to be moderately resistant with minimum incidence of stem rot in both the cropping season. The germplasm, OIN-507 was found to be more susceptible with 19.38 % and 17.19 % respectively during 2012 and 2013 cropping season. On the otherhand the *capsularis* germplasms were found to be moderately resistant to stem rot with disease incidence ranging from 10.67 % in CIN-211 to 73.67 % plant damage in CIN-065 at 145 DAS. None of the *capsularis* germplasms showed more resistance to stem rot during the peak incidence period of the crop. Hence mechanism of resistance should be elucidated in less susceptible germplasm before using in resistance breeding programme.

Key words: Germplasm, *Corchorus olitorius*, *Corchorus capsularis*, stem rot, screening

INTRODUCTION

Jute is one of the most important fibre crops next to cotton. Amongst various species only two species namely, *Corchorus olitorius* and *Corchorus capsularis* are cultivated for the fibre (Biswas, 2000). It suffers from various diseases resulting in the loss of yield and fibre quality. The diseases compel crop to suffer from seedling blight, stem rot, leaf blight, root rot, anthracnose and leaf mosaic. Among the diseases complex of jute, stem rot caused by *Macrophomina phaseolina* is considered as one of the most major disease. The chemical and other control measures do not always give desired results due to different environmental variables. The management of this disease in the field is not an easy task (Srivastava *et al.*, 2011). Though a good number of varieties under the species are developed but very few are gaining popularity among the farmers. The inherent varietal characteristics renders resistance/tolerant or susceptibility against particular disease. Several experiments have been conducted to evaluate jute germplasms against major diseases. But so far no resistance/tolerant varieties are available in jute in either of the two species,even at least at the cultivars level (Mandal *et al.*, 2000; Mahapatra *et al.*, 1994; Kar *et al.*, 2009). Pathogenic variability of *M. phaseolina* has also been studied by various workers (Ahmed and Ahmed 2005; Ghosh and Sen 1973). However in the changing scenario of disease management programme, there is a need to evaluate the resistant/ tolerant germplasm against prevailing diseases. Considering the fact, fifteen germplasms from the both *capsularis* and *olitorius* spp, along with cultivated varieties were subjected to screen out for their resistant/ tolerance against

stem rot under natural field conditions.

MATERIALS AND METHODS

The 15 germplasms of both *olitorius* and *capsularis* seeds including the cultivated varieties were collected from Central Research Institute for Jute and Allied Fibres (CRIJAF) gene bank. The experiment was conducted in *Kharif* (March- August), 2012 and 2013 cropping season. Each entry was sown in seven rows of 1 m length in 2.5x2 m plot size with 30x10 cm spacing replicated thrice in Randomized Block Design (RBD) following recommended package of practices for evaluation against stem rot in the research farm of CRIJAF, Barrackpore. The crop was kept fungicide free to encourage natural incidence of stem rot. The observation was made on the whole plot basis at the time of peak disease incidence *viz.*110 DAS and 145 DAS in both the cropping season. Based on the total number of plants per plot, per cent plant incidence was calculated. Data obtained on the disease incidence were subjected for one way ANOVA analysis.

RESULTS AND DISCUSSION

Evaluation of olitorius jute germlasms against M. phaseolina

Field screening of 15 jute germplasms including cultivated varieties were evaluated against the pathogen of stem rot, *M. phaseolina* in 2012 and 2013 cropping season. In 2012 cropping season among the *olitorius* germplasms the highest plant damage was recorded in OIJ-192 (9.57%) and OIJ-150 (22.18%) at 110 DAS and 145 DAS respectively, and on the otherhand the least incidence was seen in OIM-36 (1.23%) and OIJ-63(10.55%) at 110 and 145 DAS respectively (Table1). Similarly during 2013 cropping season the entries OIN-431 was found to be more resistant with least incidence of 1.61% and 3.49% at 110 and 145 DAS respectively, whereas OIN-507 showed more moderate susceptibility reaction at 110 and 145 DAS with incidence of 5.19%and 17.19% respectively. The entry OIN-470 was found to be moderately resistant with disease incidence of 2.30% and 4.60% at 110 and 145 DAS respectively. De and Mandal (2012) reported that, based on PDI value, 8 accessions, viz., OIN-107, OIN-125, OIN-154, OIN-157, OIN-221, OIN-651, OIN-853 and OIJ-084 had been selected for final evaluation. These accessions showed PDI less than 24 and considered tolerant to stem rot. The most ruling varieties JRO-524 and JRO-632 of *C. olitorius* and JRC-212 and JRC-321 of *C. capsularis* showed differential reaction at different places and also at the same place with pathogen isolates obtained from different places (Mandal *et al.,* 1998).

Table 1 : Relative incidence of stem rot in *tossa* jute, *Corchorus olitorius* germplasms

Germplasm	2012		2013	
	110 DAS	145 DAS	110 DAS	145 DAS
OIM-36	1.23 (6.34) *	12.08 (20.34)	3.00 (9.82)	6.22 (14.27)
OIN- 470	6.37 (14.62)	13.45 (21.50)	2.30 (8.69)	4.60 (12.04)
OIJ-192	9.57 (18.01)	10.70 (19.03)	2.88 (9.72)	5.84 (13.93)
OEX-002	5.70 (13.80)	18.48 (25.43)	3.69 (10.66)	6.33 (14.04)
OIN- 507	4.03 (11.54)	19.38 (25.83)	5.19 (12.11)	17.19 (24.34)
OIJ- 63	2.84 (9.69)	10.55 (18.94)	5.07 (12.71)	8.65 (17.04)
OIJ- 150	3.24 (10.31)	22.18 (27.91)	3.80 (11.09)	11.12 (19.34)
OIN- 250	5.64 (13.72)	13.73 (21.71)	3.34 (10.41)	6.40 (14.46)
OIJ- 052	8.66 (17.11)	16.21 (23.66)	3.57 (10.81)	9.99 (18.27)
OIN- 181	3.75 (11.12)	21.52 (27.55)	2.88 (9.25)	13.94 (21.67)
OIN- 202	3.86 (11.29)	13.75 (21.75)	3.46 (10.57)	7.37 (15.60)
OIN- 401	6.15 (14.35)	18.66 (25.58)	2.30 (8.62)	11.05 (19.22)
OIN- 405	4.22 (11.84)	17.10 (24.41)	4.03 (11.49)	11.15 (24.03)
OIN- 402	5.02 (12.91)	17.02 (24.35)	3.34 (10.38)	11.5 (19.86)
OIN- 431	7.62 (16.02)	16.98 (24.29)	1.61 (7.07)	3.49 (10.77)
CD (P=0.05)	1.48	4.29	4.37	5.21

*Figures in the parentheses are arc sine transformed values

Evaluation of C. capsularis germplasms against M. phaseolina

Fifteen newly identified *C. capsularis* germplasms along with standard varieties, JRC-212 and UPC-94 were screened against *M. phaseolina* under natural field conditions. The results indicates that the entries, CIN-512, CIJ-42, CEX-23 and CIN -01 were found to be highly resistant with lowest disease incidence of 1.91%, 1.76%, 1.73% and 1.97% respectively in the cropping season of 2012 as compared to 2.82%, 0.28% in JRC-212 and UPC-94 respectively at 110 DAS during 2011 cropping season (Table 2). In the same cropping season as the crop stage advanced, and during the peak incidence of stem rot, none of the germplasms showed resistant reaction and the lowest incidence was

Table 2 : Relative incidence of stem rot in white jute, *Corchorus capsularis* germplasms

Germplasm	2012		2013	
	110 DAS	145 DAS	110 DAS	145 DAS
CIN-512	1.91 (9.82)*	12.37 (20.16)	5.88 (14.02)	17.33 (23.05)
CIN-206	4.93 (8.69)	47.87 (43.66)	4.27 (11.92)	48.33 (44.04)
CIN-001	2.97 (9.72)	23.50 (28.71)	1.84 (7.79)	17.67 (24.21)
CIN-464	6.47 (10.66)	56.97 (49.03)	9.80 (18.24)	48.67 (44.23)
CIN-562	2.80 (12.11)	18.33 (25.08)	2.19 (8.51)	13.33 (21.14)
CIN-065	6.10 (12.71)	54.67 (47.46)	17.01 (24.35)	73.67 (60.24)
CIJ-42	1.76 (11.09)	24.20 (29.24)	1.38 (6.74)	13.33 (21.23)
CIJ-12	7.17 (15.52)	41.37 (39.58)	5.07 (13.01)	29.33 (32.26)
CIN-153	5.23 (11.09)	48.30 (43.79)	2.19 (8.50)	20.33 (26.31)
CEX-23	1.73 (10.41)	19.70 (26.24)	0.23 (2.75)	13.33 (21.37)
CIN-01	1.97 (10.81)	26.10 (30.43)	1.15 (6.15)	22.33 (27.49)
JRC-212	2.82 (8.62)	33.43 (35.02)	1.72 (7.54)	23.00 (28.13)
UPC-94	0.28 (1.49)	14.10 (26.95)	0.17 (2.35)	11.60 (23.44)
CIN-13	8.63 (10.38)	52.97 (47.01)	9.45 (17.90)	47.33 (4304)
CIN-211	2.77 (7.07)	19.80 (26.37)	0.81 (5.15)	10.67 (18.66)
CD (P=0.05)	4.50	14.71	3.08	7.99

*Figures in the parentheses are arc sine transformed values

being,12.37% in CIN-512 as compared to 14.10% in cultivated variety of UPC-94 at 145 DAS. Mandal *et.al* (2000) also reported that only 9 entries, out of 196 confirmed their resistant reaction, those entries were CIM-036, CIM-064, CIN-109, CIN-358, CIN-360, CIN-362, CIN-371, CIN-386 and CIN-439. The entries CIN-464 and CIN-065 were found to be more susceptible with the incidence of 56.97% and 54.67 % respectively during the peak incidence period. In 2013 cropping season CIN-211, CEX-23 were found to be more resistant with incidence of 0.81% and 0.23% respectively. It was noteworthy that none of the national checks (JRC-2012 and UPC-94) were found free from the stem rot. Results of this study corroborate the earlier report of Srivastava *et al.*, (2004). Hence it may be concluded that those germplasm lines, which were resistant to the stem rot can be utilized for further investigation of mechanism of resistance and for developing disease resistant varieties.

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REFERENCES

Ahmed, N and Ahmed, Q A. 2005. Physiologic specialization in *Macrophomina phaseolina* (Maubl.) Ashby, causing stem rot of jute, *Corchorus* species, Jute Research Institute, Dacca, East Pakistan.*Mycopathologia* **39**:129-138.

Biswas S K. 2000. Raw jute production in India: Problems and prospects. Proc. State level workshop cum training on jute/ sunnhemp, NDUAT, Kumargunj, Faizabad, 11-13 May pp 7.

De, Rajib Kumar and Mandal R K. 2012. Identification of resistant sources of jute *(Corchorusolitorius*L.) against stem rot caused by *Macrophomina phaseolina* (Tassi) Goid. *Journal of Mycopathological Research* **50 :** 217-222.

Ghosh S K and Sen C.1973. Comparative physiological studies on four isolates of *Macrophomina phaseolina*. *Indian Phytopathology* **26:** 615-621.

Kar, C S, Kundu, A., Sarkar, D., Sinha M. K. and Mahapatra B S. 2009. Genetic diversity in jute (*Corchorus species*) and its utilization: A review. *Indian Journal of Agricultural Sciences* **79**: 587-91.

Mahapatra A K, Mandal R K, Saha A, Sinha M K, Guha Roy M K, Kumar D and Gupta D. 1994. Field evaluation of white jute (*Corchoruscapsularis* L.) germplasm for major diseases: *Information Bulletin*, Published by the Director, CRIJAF pp 1-31.

Mandal, R K, Sarkar, S and Saha, M N. 2000. Field evaluation of white jute (*Corchoruscapsularis* L.) germplasm against *Macrophomina phaseolina* (Tassi) Goid. *Environment and Ecology* **18:** 814-818.

Mandal, R. K., Sinha, M. K., Guha Ray, M. K. and Chakrabarty, N. K. 1998. Studies on variation in *Macrophomina phaseolina* (Tassi) Goid. causing stem rot of jute *Environment and Ecology* **16:** 424-426.

Srivastava, R. K., Pande, S. K. and Shahi, H.N. 2011. Screening for tolerant *capsularis jute* (*Corchoruscapsularis*) germplasm against major diseases*Indian Phytopathology* **64 :** 199-200.