



PERFORMANCE OF AROMATIC RICE VARIETIES AGAINST YELLOW STEM BORER *SCIRPOPHAGA INCERTULAS*

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ABSTRACT

A field experiment was carried out at the Rice Research Farm of Birsa Agricultural University, Ranchi, Jharkhand during kharif, 2018 and 2019 to assess the performance of some aromatic rice varieties against the yellow stem borer (YSB) *Scirpophaga incertulas* (Pyralidae: Lepidoptera) in Jharkhand. The damage caused was measured as deadheart- DH (30 and 45 DAT) and white earhead- WEH (70 and 90 DAT) at the vegetative and reproductive stages, respectively. At vegetative stage seven varieties scored 1 (PS-4, Pusa1176, PS-3, BVS-1, BR-9, BR-10, Assam culture) with 4.62 to 9.53% DH while at reproductive stage only two varieties (BR-10 and Assam Culture) scored 1 with 4.56 and 4.95% WEH. Yield potential of BR-9 (38.50 q/ ha) was significantly superior over other aromatic varieties except BR-10 and followed by Birsamati (34.30 q/ ha) and BVS-1 (33.25 q/ ha).

Key words: *Scirpophaga incertulas*, aromatic rice, deadheart, white earhead, varietal resistance, incidence, grain yield

Rice crop is subjected to attack by > 100 insect pests, and in Jharkhand among these pests, the yellow stem borer, hispa, green leaf hopper, leaf folder, gundhi bug and case worm account for 20-35% yield loss (Krishnaiah et al., 2008). In a particular area extent of damage by insect pest in non-aromatic rice is more which may be due to aromatic nature (Singh et al., 2010). The yellow stem borer *Scirpophaga incertulas* Walker (Pyralidae: Lepidoptera) is a monophagous pest and solely causes 2-20% damage (Satpathi et al., 2012). The management of larvae which cause damage is slightly difficult because it remains concealed inside the stem (Abro et al., 2013). Use of pest resistance and tolerant crop varieties is of immense value for raising the crop with no use or minimum use of insecticides, especially for farmers of state of Jharkhand who have poor socio-economic background. This study evaluates some aromatic rice varieties for their resistance to *S. incertulas*.

MATERIALS AND METHODS

A field experiment was conducted during kharif 2018 and 2019 at the Rice Research Farm of Birsa Agricultural University, Kanke, Ranchi (23°17'N82°19'E, 625 masl). Sixteen varieties including three checks (aromatic susceptible check, non-aromatic susceptible check and non-aromatic resistance check) were sown in nursery on 5th July and 21 days old seedling transplanted to main field on 26th July. All the locally recommended

package of practices except insecticide application were adopted. Sixteen varieties were arranged in randomized block design in three replications. The damage caused by the yellow stem borer *Scirpophaga incertulas* in terms of deadheart- DH (30 and 45 DAT) and white earhead- WEH (70 and 90 DAT) was recorded by selecting five hills randomly in each replication. The % damage was calculated and converted to D value (Heinrich et al., 1985). After winnowing, grain yield was calculated and converted into q/ ha. Based on the damage grading of varieties was done following IRRRI standard evaluation system.

RESULTS AND DISCUSSION

Pooled data on deadheart (DH) and white earhead (WEH) and yield are presented in Table 1. Among aromatic test varieties the DH values at prereproductive stage varied from 4.62 to 15.87% with minimum incidence 4.62% DH in BR-9 which was at par with Assam Culture (5.40% DH) and followed by BR-10 with 6.43% DH. All the varieties found superior over both the susceptible check variety. Among these test varieties, seven varieties scored 1 (PS-4, Pusa1176, PS-3, BVS-1, BR-9, BR-10, Assam culture) with 4.62 to 9.53 % DH, six varieties scored 3 with 10.89 to 15.87 % DH. Aromatic susceptible check variety Pusa Basmati-1 scored 3 with 18.31 % DH, while non-aromatic susceptible check variety TN-1 scored 5 with

Table 1. Incidence of *S. incertulas* in aromatic rice varieties

Variety	Rice varieties	DH%			WEH%			Yield (q/ ha)
		DH%	D	Score	WEH %	D	Score	
V1	PS4	8.24 (16.64)	42.15	1	10.44 (18.84)	62.14	5	29.15
V2	Pusa1176	9.53 (17.97)	48.75	1	7.89 (16.30)	46.96	3	28.58
V3	PS-3	7.53 (15.92)	38.52	1	7.33 (15.70)	43.63	3	31.65
V4	PS-5	11.13 (19.47)	56.93	3	8.56 (16.99)	50.95	3	30.11
V5	Birsamati	10.89 (19.25)	55.70	3	9.65 (18.07)	57.44	3	34.30
V6	BVS-1	8.87 (17.32)	45.37	1	8.26 (16.70)	49.17	3	33.25
V7	BR-9	4.62 (12.39)	23.63	1	6.24 (14.46)	37.14	3	38.50
V8	BR-10	6.43 (14.68)	32.89	1	4.56 (12.28)	27.14	1	35.90
V9	Katarani	13.09 (21.20)	66.96	3	13.93 (21.90)	82.92	5	22.25
V10	BadshahBhog	10.96 (19.32)	56.06	3	13.09 (21.20)	77.92	5	26.33
V11	Assam Culture	5.40 (13.42)	27.62	1	4.95 (12.81)	29.46	1	29.55
V12	R. Kasturi	14.73 (22.55)	75.35	3	13.83 (21.82)	82.32	5	21.67
V13	R. Subhasani	15.87 (23.46)	81.18	3	13.01 (21.12)	77.44	5	24.35
V14	Pusa Basmati-1(SC)	18.31 (25.32)		3	15.83 (23.43)		7	20.17
V15	Suraksha (RC): Nonaromatic	3.44 (10.67)		1	3.31 (10.45)		1	32.60
V16	TN-1 (SC): Nonaromatic	20.79 (27.11)		5	17.76 (24.92)		7	18.17
	SE m(±)	(0.43)			(0.54)			1.37
	CD(P=0.05)	(1.24)			(1.32)			3.98
	CV (%)	(4.10)			(4.50)			8.34

Figures in parentheses angular transformed values; DH: Deadheart, WEH: white earhead DAT: Days after transplanting

20.79 % DH. The converted D value for test varieties varies from 23.63 to 81.18 %. The descending order of resistance against DH % based on the basis of D value was BR-9(23.63) > Assam Culture (27.62) > BR-10 (32.89) > PS-3 (38.52) > PS-4(42.15) > BVS-1 (45.37) > Pusa 1176 (48.75) > Birsamati (55.70) > Badshah Bhog (56.06) > PS-5 (56.93) > Katarani (66.96) > R. Kasturi (75.35) > R. Subhasani (81.18).

At post reproductive stage incidence of WEH was 4.56 to 13.93 % among test varieties with two varieties viz., BR-10 and Assam Culture scored 1 with 4.56 and 4.95 % WEH, respectively. Six varieties namely Pusa 1176, PS-3, PS-5, Birsamati, BVS-1 and BR-9 scored 3 with 6.24 to 9.65 per WEH, and five varieties viz., PS-4, Katarani, Badshah Bhog, R. Kasturi and R. Subhasani scored 5 with 10.44 to 13.93 % WEH. All the varieties were significantly superior over susceptible check Pusa Basmati-1 which recorded score 7. The converted D value for test varieties varies from 27.14 to 82.32 in the following descending order: BR-10(27.14) > Assam Culture (29.46) > BR-9 (37.14) > PS-3 (43.63) > Pusa 1176 (46.96) > BVS-1 (49.17) > PS-5 (50.95) > Birsamati (57.44) > PS-4 (62.14) > R. Subhasani (77.44), Badshah Bhog (77.92) > R. Kasturi (82.32) > Katarani (82.92).

Singh and Shukla (2007) found that among 86

rice accessions 43 were promising against stem borer whereas 9 were resistance. Khan et al. (2010) reported minimum white earheads (2.35%) in IRRI-6 followed by DR-83 (4.45 %) and KSK-282 (4.97%). Rajaduari and Kumar (2017) reported that the entries Gontra Bidhan 3, XR 99986 and NDR-97 had high level of resistance at both vegetative and reproductive stage. Samritha et al. (2021) evaluated 48 rice accessions against yellow stem borer in which 5 accessions recorded nil deadheart and white earhead. Nyaupane (2022) evaluated rice genotypes against yellow stem borer through sex pheromone trap and found that adoption of rice variety Sarju 52 could safeguard. Among all the test varieties highest yield was recorded in BR-9 (38.50q/ha) which was statistically at par with BR 10 and significantly superior. Maravi et al. (2019) reported that the aromatic rice variety PS-5 produced the highest grain yield (39.1q/ ha) over PS-4 (34.6q/ ha) and PS-3 (29.2q/ ha). It might be due to the differences in the varietal vigour, genetic differences and yield potential among the varieties. Similar type of results was also found by Sridhar et al. (2011) and Khatoun et al (2018).

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AUTHOR CONTRIBUTION STATEMENT

Sudeepa Kumari Jha, Pradeep Kumar Singh and Rabindra Prasad designed and conducted research. Sudeepa Kumari Jha and Md Monobrullah wrote manuscript.

CONFLICT OF INTEREST

No conflict of interest

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