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Evaluation of Some Rice Cultures for its Reaction to Pests and Yield Performance

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ABSTRACT

Rice cultures evaluated for its resistance to insect pests and yield performance at Main Rice Research Station, Gujarat Agricultural University, Nawagam (Gujarat) since 1993-94, through 1995-96, revealed that the cultures Mo-1, Co-29 and IET-10750 with stand against incidence of major insect pests (white backed plant hopper, leaf folder and stem borer) of rice and designated as multiple resistant cultures. These cultures yielded 17.54 to 17.94% higher grain yields over presently recommended high yielding varieties like Masuri and Narmada. Breeders can utilize these promising cultures as donor for developing high yielding and pest resistant variety of rice.

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INTRODUCTION

Rice (*Oryza sativa* L.), is an important food grain crop of Gujarat, attacked by various insect pests during its different growth period resulting into greater yield losses. Use of resistant/tolerant variety is prima facie to minimize the yield losses by pests. Use of resistant cultivars virtually does not involve any skill or cash investment in pest control. It can be considered as a principal component of pest management besides cultural, biological and chemical means. For development of resistant variety, use of appropriate donor parents is of almost importance. There is no single variety in the state recongnised as totally resistant to all the insect pests of rice. Hence, there was an urgent need to identify cultures resistance to major insect pests of rice alongwith its yield performance to use in breeding programme for development of variety resistant/tolerant to insect pests. In this context some of the promising cultures/entries selected from various screening trials were evaluated alongwith recommended varieties. The results obtained are summarized here under :

MATERIALS AND METHODS

The field experiment was carried out for three successive kharif seasons from 1993-94, through 1995-96, at Main Rice Research Station, Gujarat Agricultural University, Nawagam (Gujarat). The experiment was laid out in Randomized Block Design with fourteen cultures replicated twice. The gross and net plot size was 6.9 x 3.0 m²

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TABLE 1

Incidence of insect pests in some of the promising cultures/varieties of rice under study.

Sr. No.	*Culture/ Variety*	*Av. No. WBPH/hill*			*% leaves damaged by LF*				*% tillers damaged by SB*		
		1993-94	*1994-95*	*Pooled*	*1993-94*	*1994-95*	*1995-96*	*Pooled*	*1993-94*	*1994-95*	*Pooled*
(1)	HBC-19	5.45	10.20	7.83 ab	6.53	11.41	3.05	7.00 bcd	4.75* (12.57)	25.09 (30.02)	14.92 (21.30) def
(2)	IET-10750	5.00	18.05	11.53 cde	4.13	11.53	3.97	6.54 abc	9.95 (18.37)	14.86 (22.62)	12.41 (20.49) de
(3)	Mo-1	3.60	8.15	5.88 a	4.44	7.54	3.13	5.04 a	5.59 (13.65)	33.39 (35.29)	19.49 (24.47) fgh
(4)	Co-29	9.65	9.90	9.78 bc	5.89	9.76	6.61	7.42 bcdef	4.77 (12.59)	32.52 (34.77)	18.65 (23.68) efg
(5)	Narmada	7.05	11.75	9.40 bc	4.60	11.70	4.53	6.94 bcd	0.84 (5.26)	8.46 (16.88)	4.65 (11.08) b
(6)	Masuri	7.80	10.90	9.35 abc	4.52	8.83	5.01	6.12 ab	0.84 (5.24)	2.43 (8.87)	1.64 (7.06) a
(7)	IR-66	13.95	14.25	14.10 de	8.56	11.71	5.25	8.51 defg	4.04 (11.42)	27.48 (31.56)	15.76 (21.50) def
(8)	P-203-2	11.35	15.25	13.30 de	6.35	16.67	4.04	9.02 fg	5.15 (12.91)	65.27 (53.90)	35.21 (33.41)i
(9)	P-203-3	13.55	18.25	15.90 efg	8.76	14.72	4.22	8.93 efg	8.52 (16.78)	63.01 (52.59)	35.77 (34.69) i
(10)	GR-11 x Te-tap/ 1-6-8	15.65	20.40	18.03 g	7.12	14.82	5.83	9.25 g	4.54 (12.29)	44.66 (41.93)	24.60 (27.11) h
(11)	GR-101	11.90	16.45	14.18 def	5.18	11.29	7.21	7.89 cdefg	4.24 (11.80)	11.69 (19.98)	7.97 (15.89) c
(12)	GR-12	14.95	14.10	14.53 def	7.38	9.44	5.03	7.29 bcde	2.73 (9.51)	28.91 (32.49)	15.82 (21.00) de
(13)	GR-11 (check)	17.95	18.60	18.28 g	6.99	13.23	6.55	8.92 efg	5.07 (13.01)	39.92 (39.15)	22.50 (26.08)gh
(14)	Vikas (check)	19.55	15.70	17.63 fg	9.44	13.49	10.54	11.16 h	3.70 (11.09)	23.47 (28.97)	13.59 (20.03) d
S. Em. ±		1.64	1.36	1.14	—	1.28	0.68	0.55	1.24	1.85	1.10
C. D. at 5%		5.02	4.17	3.48	NS	3.90	2.08	1.69	3.85	5.72	3.41
C. V. (%)		20.67	13.38	12.57	—	15.21	18.04	9.94	14.78	8.14	7.08

* Arcsin transformed values.

TABLE 2

Grain and fodder yield performence of some of the promising cultures/varieties of rice under study.

Sr. No.	Culture/ Variety	Grain (kg/ha)				Fodder (kg/ha)			
		1993-94	1994-95	1995-96	Pooled	1993-94	1994-95	1995-96	Pooled
(1)	HBC-19	2052	1852	1097	1667 cde	3759	4630	3421	3937 a
(2)	IET-10750	3133	1340	1579	2018 efg	4543	6092	3597	4744 bc
(3)	Mo-1	2538	1657	2018	2071 fg	4386	6336	5264	5329 cd
(4)	Co-29	1880	2193	2281	2118 g	2851	7067	4474	4797 bc
(5)	Narmada	2600	1413	1119	1711 cdef	4856	7067	6667	6197 ef
(6)	Masuri	2444	1560	1404	1802 defg	4543	8285	7939	6921 g
(7)	IR-66	1567	1803	1075	1481 bcd	3384	4398	3421	3852 a
(8)	P-203-2	1974	415	1097	1162 ab	3634	3948	5351	4311 ab
(9)	P-203-3	1833	488	1294	1205 ab	3759	4630	6974	5121 bc
(10)	GR-11 x Te-tap/1-6-8	1598	415	830	948 a	3916	3655	4474	4015 a
(11)	GR-101	2444	731	1031	1402 bc	4543	6579	6536	5886 de
(12)	GR-102	2632	951	943	1509 bcd	5076	7310	7237	6541 fg
(13)	GR-11 (Check)	1645	1048	1075	1256 ab	3290	5848	4079	4406 ab
(14)	Vikas (Check)	1488	804	592	962 a	3697	5605	3728	4343 ab
S. Em. ±		185.78	181.06	142.06	123.03	279.79	274.37	399.0	213.28
C. D. at 5%		575.37	560.75	439.99	381.04	866.54	849.75	1235.73	660.56
C. V. (%)		12.33	21.51	16.14	11.43	9.85	6.67	10.80	6.00

and 5.7 x 2.0 m^2, respectively. The seedling of 25-30 days age of all the cultures were transplanted at a distance of 20 x 15 cm during all the years on 4-9-93, 26-8-94 and 12-8-95. The crop was fertilized with 100 kg N and 30 kg P_2O_5 per hectare. All other recommended agronomic practices, except plant protections were followed for raising the healthy crop.

Incidence of white backed plant hopper (WBPH), *Sogatella furcifera* (Horv) leaf folder (LF), *Cnaphalocrocis medinalis* Guen. and stem borer (SB), *Scirpophaga incertulas* (Walker) was recorded when the activity of the pests was at peak level. For the purpose, 10 hills selected at random from each net plot area were observed for pest incidence. Number of WBPH present on 1 hills were recorded. Similarly, total number of leaves and tillers and leaves damaged by LF and tillers damaged by SB were recorded to assess the damage casused by LF and SB, respectively, incidence of WBPH and SB was not to a desired level in experimental area during third year (1995-96) of experimentation. Pest incidence data recorded were thus subjected to statistical analysis and presented in Table 1.

The crop was harvested during second fortnight of November to first fortnight of December. Grain and fodder yields were recorded separately from each net plot. Data obtained were statistically analysed and presented in Table 2.

RESULTS AND DISCUSSION

Analysis of results (Table 1) revealed that amongst 14 cultivars, the population of WBPH was significantly low (5.88 to 11.53 WBPH/hill) in Mo-1, HBC-19, Co-29 and IET-10750 and were at par with the resistant cultivars like Masuri and Narmada, than rest of the cultures. These three cultures performed equally resistance to WBPH like Masuri and Narmada. Reports of Anonymous (1991, 1992, 1994 and 1996 a) showed moderate to high level of resistance in culture Mo-1, against WBPH supports the present findings. Similarly, Anonymous (1996b) is isolated IET-10750 as WBPH resistant culture and released as 'Gurjari' for cultivation in Gujarat State. The above listed promising cultures have also registered low (5 to 7%) incidence of LF and the damage level was more or less same as found in case of resistant varieties (Masuri, Narmada and GR-102). HBC-19 (Karnal local) found tolerant to LF and WBPH as reported by Anonymous (1992). The cross GR-11 x Te-tap/1-6-8 was found susceptible to WBPH and LF incidence. Though the cultures HBC-19 and IET-10750 found promising against WBPH and LF, it recorded significantly high 12.41 to 14.92% incidence of SB than the recorded significantly high 12.41 to 14.92% incidence of SB than the recommended cultivars (Masuri, Narmada and GR-101). However, these promising cultivars exhibited significantly low incidence of the pest than the susceptible check (GR-11).

So far grain yield is concerned, the cultures Co-29, Mo-1 and IET-10750 differed significantly from rest of the cultures evaluated, except Masuri and Narmada. These, three promising entries yielded 17.54 to 17.94% higher (2018 to 2118 kg/ha) grain yield over the presently available high yielding cultivars like Masuri and Narmada. Further, these promising cultures yielded 4744 to 5329 kg/ha of fodder yield and hence were intermediate.

Based on the above discussion it can be concluded that the cultures Mo-1, Co-29

and IET-10750 withstand against incidence of major insect pests of rice and yielded higher grain yields, hence designated as multiple resistant strains. These cultures could be useful to breeders for developing high yielding and pest resistant variety.

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