Short Communication Oryza Vol. 47. No.1, 2010 (62-65)

Yield potential and insect pest reaction of promising rice cultures at Cuttack, Orissa

P. C. Rath* and R. C. Dani

**Division of Crop Protection, Central Rice Research Institute, Cuttack-753006, Orissa, India*

ABSTRACT

Field trials were conducted during wet season of 2007 and dry season of 2008 at Central Rice Research Institute, Cuttack to evaluate promising rice cultures for their yield potential and insect pest reaction. During wet season of 2007, five promising cultures viz., JGL-3855, BG-380-2, DJP-1998-11-1-1-1, WGL-31996 and SKL-7-61-9-10-12 were tested with the check varieties Jaya and Naveen under need based protection and no protection situation. During dry season 2008, seven promising cultures viz., IET 10890, IET 11689, IET 17850, IET 17774, IET 11768, IET 9691 and IET 9976, were tested with check varieties Jaya and Krishna Hansa under need based protection and no protection situation. The insecticide carbofuran 1kg a.i. ha^{-1} was applied at 27 days after transplanting (DAT) during 2007 and 30 DAT during 2008. The result of the trial (2007) revealed that BG-380-2 performed well (2.28 t ha^{-1}) followed by SKL-7-61-9-10-12 (2.24 t ha^{-1}) as compared to other promising culture including Jaya(1.73 t ha^{-1}) and Naveen (1.47 t ha^{-1}) and During 2008, IET 10890 gave the highest grain yield (6.40 t ha^{-1}) followed by IET 11689(5.07 t ha^{-1}), Krishna Hansa (5.29 t ha^{-1}) and Jaya (5.25 t ha^{-1}) under protected condition.

Key words: *rice, promising culture, insect pest*

One of the major constraints of rice production in India is the occurrence of insect pests at various stages of crop growth. The yellow stem borer (YSB), *Scirpophaga incertulas* (Walker) is the most predominant insect pest in rice growing tracts of India, Bangladesh and South East Asian countries causing serious damage (Islam, 1996). It attacks the rice plants from seedling to maturity almost in all ecosystems and in boro rice also (Misra *et al.,* 2005). Planthoppers (BPH and WBPH) are one of the major biotic stresses limiting rice production (Gururaj Katti *et al.,* 2004). Several resistant varieties have been developed and grown against plant hoppers in different parts of India (Mathur *et al.,* 1999 and Krishnaiah *et al.,* 1999). The Asian rice gall midge, *Orseolia oryzae* is an important pest of paddy (Herdt,1991). Since gall midge is an internal feeder and not amenable for chemical control, host plant resistance is the best alternative approach available for its management. However, development of virulent biotypes in response to wide spread cultivation of resistant varieties (Pasalu and Huang, 2000) calls for identification and development of other ecologically compatible approaches in pest management. So attempt has been madein the present investigation insect pest reaction to evaluate promising rice cultures for and their yield potential under need based and no protection conditions at Cuttack.

Field trials were conducted during wet season of 2007 and dry season of 2008 at the experimental farm of Central Rice Research Institute, Cuttack. The field layout was split plot design with four replications. The normal recommended dose of fertilizer i.e.60:30:30 kg N,P_2O_5 and K_2O ha^{-1} was applied at recommended time (50% basal, 25% at panicle initiation stage. Two seedlings hill^{-1} were transplanted at a spacing of 20 x 15 cm. Individual plots were separated by bunds and channels to regulate water flow and prevent water movement from one plot to other. The treatments in main plots were need based protection and no protection. Need based protection included protection of nursery from insect pests by applying carbofuran 1kg a.i. ha^{-1}. Survey of insect populations in susceptible variety at 10 days intervals was done to decide the time of insecticide application. Carbofuran 1 kg a.i.

PDF created with pdfFactory Pro trial version www.pdffactory.com

ha^{-1} was applied in all the varieties as soon as the insect populations/damage reached economic threshold level in susceptible variety. Insecticide was not applied either in nursery or in main field under no protection treatment.

During wet season of 2007, five promising cultures viz., JGL-3855, BG-380-2, DJP-1998-11-1-1-1, WGL-31996 and SKL-7-61-9-10-12 were tested with check varieties Jaya and Naveen. The insecticide carbofuran 1kg a.i. ha^{-1} was applied at 27DAT. During dry season 2008, seven promising cultures viz., IET 10890, IET 11689, IET 17850, IET 17774, IET 11768, IET 9691 and IET 9976, were tested with check varieties Jaya and Krishna Hansa under need based protection and no protection situation. Carbofuran 1kg a.i. ha^{-1} was applied at 30 DAT.

Silver shoot and dead heart counts were recorded on 20 random plants along with total tillers at each observations. Same procedure was followed for recording white ears heads along with panicle bearing tillers. Record of plant hoppers population was made on 10 random hills at each observation. Data recorded during both the seasons were statistically analyzed after necessary transformation.

BG-380-2 performed better (2.28 t ha^{-1}) followed by SKL-7-61-9-10-12(2.24 t ha^{-1}) (Table 1). In general during wet season yield level was low in all the varieties. The highest BPH incidence of 45.5 $hill^{-1}$ was recorded on DJP-1998-11-1-1-1 under no protection situation and lowest BPH (17.5) was observed on BG-380-2 under need based protection situation. Least incidence of dead heart (2.6%) and (2.87%) at 30 and 50 days after transplanting (DAT), respectively, least incidence of of silver shoot 3.02% and 2.40% at 30 and 50 DAT respectively and lowest incidence white ear head 1.42% was recorded in variety BG-380-2. None of the varieties found resistant against stem borer during 2007.

IET 10890 performed better (6.40 t ha^{-1}) followed by IET 11689 (5.07 t ha^{-1}). BPH incidence was highest (31.00) $hill^{-1}$ in Krishna Hansa and least (10.50) $hill^{-1}$ in IET 10890. The WBPH incidence was highest (16.00 $hill^{-1}$) in IET 9691 and least (5.50 $hill^{-1}$) in IET 10890 at 50 DAT. Least incidence of DH (4.47%) and WEH (3.50%) were recorded on IET 10890 follwed by IET11689. None of the variety was found resistant against stem borer.

The overall results of the trial , wet season 2007 revealed that the average grain yield irrespective of promising cultures are low i.e. less than 2.5 t ha^{-1}. It

Table 1. Insect pest incidence on promising rice cultures wet season 2007

Variety	NBP/NP	% DH 30 DAT	% DH 50 DAT	% SS 30 DAT	% SS 50 DAT	% WEH	BPH $hill^{-1}$ 30DAT	Yield t ha^{-1}
JGL-3855	NBP	4.02(11.54)	3.90(11.33)	4.60(12.34)	3.55(10.84)	4.65(12.43)	26.25	2.01
	NP	9.00(18.15)	8.97(17.40)	9.52(17.97)	9.52(16.65)	7.27(15.62)	42.50	1.50
BG-380-2	NBP	2.60(9.22)	2.87(9.71)	3.02(9.84)	2.40(8.87)	1.42(6.74)	17.50	2.28
	NP	11.77(20.06)	7.25(15.61)	11.59(19.90)	8.57(16.99)	8.22(16.60)	38.50	1.26
DJP-1998-11-1-1-1	NBP	4.32(11.97)	3.65(10.99)	5.10(13.03)	3.07(10.08)	3.20(10.24)	27.75	2.01
	NP	10.05(18.45)	7.20(15.54)	8.67(17.11)	6.40(14.63)	6.27(14.47)	45.50	1.62
WGL-31996	NBP	6.20(14.40)	5.45(13.48)	7.07(15.41)	4.90(12.77)	3.67(11.01)	20.75	1.51
	NP	7.62(15.98)	5.62(13.70)	7.15(15.46)	6.65(14.93)	6.42(14.63)	43.00	1.04
SKL-7-61-9-10-12	NBP	4.1(11.66)	3.42(10.57)	4.32(11.95)	3.87(11.28)	2.70(9.43)	29.50	2.24
	NP	10.7(19.06)	9.37(17.81)	9.90(18.32)	8.77(17.21)	7.17(15.50)	41.00	1.54
Jaya	NBP	4.95(12.84)	3.75(11.10)	5.90(13.99)	4.47(12.18)	4.45(12.14)	27.00	1.73
	NP	8.82(17.20)	7.92(16.25)	8.62(17.07)	9.25(17.54)	7.52(15.89)	47.25	1.60
Naveen	NBP	9.60(17.89)	5.42(13.43)	8.92(17.27)	5.65(13.67)	4.50(12.19)	25.25	1.47
	NP	9.92(18.30)	8.42(16.79)	9.42(17.86)	7.07(15.39)	8.47(16.88)	44.75	1.16
CD at 5% for treatment 0.40			1.45	1.29	1.25	1. 31	1.29	4.02
CD at 5% for treatment		0.77	0.69	0.66	0.70	0.69	2.14	0.21
CD at 5% for variety x practice		2.05	1.83	1.76	1.86	1.83	5.68	0.57

Data in the parenthesis are arc sine transformed values, NBP-Need based protection, NP- No protection

PDF created with pdfFactory Pro trial version www.pdffactory.com

Table 2. Insect pest incidence on promsing rice cultivars, dry season 2008

Variety	NBP/NP	% DH 50 DAT	WBPH hill^{-1}50 DAT	BPH hill^{-1}50 DAT	%WEH	Yield t ha^{-1}
IET 10890	NBP	4.47(12.21)	5.50	10.50	3.50(10.76)	6.40
	NP	6.70(15.00)	9.50	14.50	5.52(13.59)	5.07
IET11689	NBP	5.42(13.46)	7.75	17.25	4.25(11.89)	5.81
	NP	6.85(15.17)	12.25	22.00	6.10(14.29)	4.89
IET 17850	NBP	5.47(13.53)	8.00	17.75	4.27(11.93)	5.76
	NP	7.02(15.36)	13.25	25.75	6.17(14.38)	4.56
IET 17774	NBP	5.57(13.65)	8.50	16.75	4.45(12.17)	5.70
	NP	7.05(15.39)	14.00	28.25	6.12(14.32)	4.22
IET 11768	NBP	5.75(13.87)	8.75	19.75	4.50(12.24)	5.70
	NP	7.05(15.39)	15.25	32.75	6.42(14.68)	4.94
Krishna Hansa	NBP	6.12(14.32)	10.50	20.25	4.72(12.55)	5.29
	NP	7.22(15.59)	14.25	31.00	6.62(14.91)	4.64
Jaya	NBP	6.22(14.44)	11.00	20.50	4.90(12.78)	5.25
	NP	7.22(15.59)	14.75	28.50	6.77(15.08)	4.40
IET 9691	NBP	6.42(14.68)	11.25	21.50	4.85(12.72)	5.24
	NP	7.37(15.75)	16.00	26.50	6.60(14.88)	4.42
IET 9976	NBP	6.52(14.79)	12.00	22.00	5.12(13.08)	5.17
	NP	7.45(15.83)	15.75	32.25	6.67(14.97)	4.60
CD at 5% for variety		0.25	1.45	7.06	0.38	0.48
CD at 5% for practice		0.12	0.68	3.32	0.18	0.22
CD at 5% for variety x practice		0.36	2.05	9.98	0.54	0.68

Data in the parenthesis are arc sine transformed values, NBP-Need based protection, NP- No protection

may be due to moisture stress during critical growth stage i.e. panicle initiation stage. BG-380-2 performed better (2.28 t ha^{-1}) followed by SKL-7-61-9-10-12 (2.24 t ha^{-1}) as compared to other promising culture including Jaya (1.73 t ha^{-1}) and Naveen (1.47 t ha^{-1}). The average grain yield was high i.e. more than 4.0 t ha^{-1}, in all the cultures irrespective of protection or no protection during dry season of2008, IET 10890 perform better (6.40 t ha^{-1}) followed by IET 11689 than others including Jaya (5.25 t ha^{-1}) and Krishna Hansa (5.29 t ha^{-1}) under protected condition. These cultures viz.,BG-380-2 ,SKL-7-61-9-10-12, IET 10890 and IET 11689 responded well for chemical control of insect pest by carbofuran.Under no protection condition, DJP-1998-11-1-1-1 recorded highest grain yield (1.62 t ha^{-1}) followed by Jaya (1.60t ha^{-1}) during 2007 and IET 10890 (5.07 t ha^{-1}) followed by IET11689 (4.89 t ha^{-1}) during dry season.

The insecticide, carbofuran is most effective against yellow stem borer and application of carbofuran increased the grain yield results were also obtain by Sinhababu and Rajamani (2000). Similar to our findings in all the varieties. Carbofuran applied at 30DAT @1 kg a.i. ha^{-1} had significant effect on reduction of stem borer damage (Panda *et al.,* 2004) agreed with the present observation in all most all promosing varieties in both the years.

REFERENCES

Islam Z 1996. yellow stem borer, a threat to boro rice in coastal belt of Bangladesh. J Ento. 6 (1&2): 45-52

Misra AK, Singh SPN and Parwez A 2005. Incidence of yellow stem borer(*Scirpophaga incertulas* Walker) in different cultivars of boro rice(*Oryza sativa* L.) at different crop stage.Oryza,42(4): 329-332

Gururaj Katti, Pasalu IC, Rao PRM, Verma NRG and Krishnaiah K 2004. Farmers perceptions,knowledge and practices related to riceIPM- A case studypp195-206.In: Proc.II" Integrated Pest Management in Indian Agriculture"(eds. Pratap S. Birthal and O.P. Sharma), National Centre for Agric Econ & Policy Res.(NCAP), New Delhi,India and National Centre for Integrated Pest Management (NCIPM), New Delhi,India p 265

Mathur KC, Reddy PR, Rajamani S and Moorthy BTS 1999. Integrated pest management in rice to improve productivity and sustainability. Oryza 36(3): 195-207

Krishnaiah K, Reddy APK, Krishnaiah NV and Pasalu IC 1999. Current problems and future needs in plant

PDF created with pdfFactory Pro trial version www.pdffactory.com

protection in rice. Indian J. Plant Prot. 27(1&2): 47-64

Pasalu IC and Huang b 2000. Current status of biotypes in India and China. In Proceedings of the International workshop on New approaches to gallmidge resistance in rice, 22-24 November, Hyderabad, India.

Herdt RW 1991. Research priorities for rice biotechnology. pp 19-54. In Khus GS and Toennisen GH (eds). Rice Biotechnology. Common Wealth Agricultural Bureau. Walling Ford U.K. and International Rice Research Institute, Manila, Philippines.

Sinhababu DP and Rajamani S 2000. Efficacy of insecticides and feasibility of their use in rainfed lowland rice fish seed system,Oryza 37(2): 129-132

Panda SK, Nayak SK and Behera UK 2004.Bio-efficay of fipronil 0.4G against insect pest of rice. *Oryza* 41(1&2):32-34

PDF created with pdfFactory Pro trial version www.pdffactory.com