RICE VARIETIES SUITED FOR LOW FERTILIZER MANAGEMENT

Most of the modern rice varieties express their yield potential only under high fertility management. But, the farmers invariably apply lower levels of fertilizers so as to reduce cost of production. Further, application of higher levels of nutrients especially nitrogen usually invites pests and disease problems that will entail additional cost. Under such circumstances the varieties that provide fairly good grain yield with moderate levels of fertilizer application will be of much economic importance. Such varieties also would exploit and utilize both soil and fertilizer nutrients with better efficiency. It has been reported that certain modern varieties possess the above mentioned traits.

The relative performance of new promising medium duration rice cultures under low fertilizer levels was studied at the Regional Agricultural Research Station, Pattambi. Another study at the same station indicated that Mahsuri performed equally well under eight fertilizer levels of NPK (KAU, 1985). Sreedevi (1985) studied the potential and differential performance of IR-42 under low and high fertilizer levels. Work done at IRRI has resulted in the isolation of some rice genotypes that support maximum grain production with a minimum input of fertilizer. Hence, a study was undertaken at the Agricultural Research Station, Mannuthy to evaluate the performance of rice varieties under four fertilizer levels viz. N : P_2O_5 : K_2O @ 0 : 0 : 0, 30 : 15 : 15, 60 : 30 : 30 and 90 : 45 : 45 kg ha^{-1}. One hundred cultivars screened from 1500 entries and maintained by the NBPGR Centre, Vellanikkara along with three genotypes collected from IRRI (IR-21912-56-3-1-2-2, IR-15323-78-1-3-1 and IR-18349-135-2-3-1) and Mahsuri as checks were utilized for the study.

Preliminary screening was done during the first crop season (kharif) of 1989 and 20 cultivars which gave comparatively higher yield under the low fertilizer level (30 : 15 : 15 kg ha^{-1}) were selected for initial evaluation trial (IET). Eight cultivars were screened out from the IET during the first crop season of 1990 and these were taken from CYT along with the checks. The experiment was laid out in the split plot design taking fertilizer levels as main plot and varieties as subplots. Pooled analysis of the data regarding two seasons revealed that two cultivars viz. TCR 4328 and TCR 4450 have recorded comparatively higher grain yield at N : P_2O_5 : K_2O levels of 0 : 0 : 0 kg ha^{-1} and 30 : 15 : 15 kg ha^{-1} along with the check variety IR-21912-56-3-1-2-2. This agrees with the findings reported by De Datta at IRRI. Genotypes like IR-21912-56-3-1-2-2 and IR-15323-78-1-3-1 had consistently high

Table 1. Grain yield (kg ha^{-1}) under different fertilizer levels

Treatment notation	Cultivars / varieties	N : P_2O_5 : K_2O kg ha^{-1}				
		0:0:0	30:15:15	60:30:30	90:45:45	Mean
T_1	TCR 2951	1460	1528	1707	1010	1426
T_2	TCR 4462	404	1175	788	495	716
T_3	TCR 3418	2273	1844	2020	2657	2199
T_4	TCR 4450**	3662	5051	4798	5869	4945
T_5	TCR 4453	1876	2293	2404	1515	2022
T_6	TCR 3431	1579	2152	1586	1626	1736
T_7	TCR 3439	210	2657	3040	1828	2434
T_8	TCR 4328*	4861	2566	3818	3990	3809
T_9	Mahsuri	1185	1849	1899	970	1476
T_{10}	IR-18349-135-2-3-2	720	949	759	384	703
T_{11}	IR-21912-56-3-1-2-2	3687	3586	3535	4354	3791
T_{12}	IR-15323-78-1-3-1	1432	758	1040	455	921
	Mean	2112	2201	2283	2097	

CD (0.05) Main plot = N.S; Subplot = 704; T| to T_8 collected from NBPGR Centre, Vellanikkara; T_{10} to T_{12} collected from IRRI, Philippines; *TCR 4328 (IC No. 86456) collected from Shillong; **TCR 4450 (IC No. 86533) collected from Madhya Pradesh

Table 2. Straw yield (kg ha^{-1}) under different fertilizer levels

Treatment notation	Cultivars / varieties	N : P$_2$O$_5$: K$_2$Okg ha^{-1}				
		0:0:0	30:15:15	60:30:30	90:45:45	Mean
T$_1$	TCR 295 1	4546	6950	6758	7929	6546
T$_2$	TCR 4462	3192	4889	4364	5747	4548
T$_3$	TCR 3418	4737	7202	4737	3970	5162
T$_4$	TCR 4450	6758	5939	7202	7263	6791
T$_5$	TCR 4453	4950	7263	7485	6767	6609
T$_6$	TCR 343 1	2657	5424	3394	2768	3561
T$_7$	TCR 3439	2778	6212	4495	3212	4174
T$_8$	TCR 4328	5434	5515	6253	6232	5859
T$_9$	Mahsuri	6697	6990	7646	5051	6596
T$_{10}$	IR-18349-135-2-3-2	3414	3980	4040	3222	3664
T$_{11}$	IR-21912-56-3-1-2-2	4828	5182	3889	5182	4770
T$_{12}$	IR-15323-78-1-3-1	2525	4232	6192	2657	3902
	Mean	4376	5185	5538	4998	

CD (0.05) Main plot = 860; Subplot = 996

rankings with and without fertilizer nitrogen. The same trend was observed in the case of straw yield also (Table 1 and 2). There was no significant difference among the fertilizer treatments regarding grain yield revealing the ability of these varieties to perform better even under low fertilizer levels. Straw yield was found to be increasing with increase in the fertilizer levels up to N : P$_2$O$_5$: K$_2$O @ 60 : 30 : 30. T$_4$ (TCR 4450) and Mahsuri have recorded the maximum straw yields under lower levels of N : P$_2$O$_5$: K$_2$O. The study revealed that it is possible to exploit the yield potential of some rice varieties / cultivars even under low fertilizer levels. Screening and evaluation of such varieties will help to get maximum yield with minimum inputs.

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