



Performance of different Rice Varieties along with Various Nutrient Levels under Direct Seeded Method of Cultivation on Coastal Saline Soil Condition of North Konkan

D.K. BORSE*, K.D. PATIL, L.S CHAVAN, S.A CHAVAN and U.V MAHADAKAR

Khar Land Research Station Panvel - 410 206, Raigad, Maharashtra

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An experiment was conducted during *kharif* season of 2012, 2013 & 2014 at Pargoan farm of Khar Land Research Station Panvel. Eight rice varieties (Panvel-1, Panvel-2, Panvel-3, Karjat-3, Karjat-5, Karjat-6, Karjat-7 and Karjat-184) with three different nutrient levels (50 % RDF, 100 % RDF and 150 % RDF) were studied under direct seeded practice. In case of varieties, Panvel-3 recorded higher grain yield (44.76 q ha^{-1}) and found to be statistically at par with Karjat-7 (42.83 q ha^{-1}) and Panvel-1 (40.94 q ha^{-1}). In case of nutrient levels, the RDF @150% resulted higher grain yield (42.71 q ha^{-1}) which was superior over rest ones. Interaction revealed variety Panvel-3 with 150% RDF recorded higher grain yield (48.78 q ha^{-1}) and found to be at par with Panvel-3 with 100% RDF. Panvel-3 variety with 100% RDF showed higher C: B ratio i.e 1:2.35 hence, the Panvel -3 rice variety with 100 % RDF is recommended under direct seeded practice in North Konkan coastal saline soil conditions.

(**Key words:** Direct seeded method, Recommended dose of fertilisers, Rice varieties)

The total area of saline soils in five districts of Konkan is estimated to be 65,465 ha. These Coastal saline soils are mostly mono cropped i.e. only rice is grown during *kharif* season (Anonymous, 1981). Salinity level in the soil and water decreases progressively during the monsoon season and reaches ground level during June-sept (Ismail and Tuong, 2009). Rice is one of the most widely grown crops in coastal areas inundated with sea water during high tidal period, the effect on yield and economic returns of salinity tolerant rice varieties and good farming practices suggests strategies for food production to adapt salinity intrusion in the coastal areas. Study on the response of rice to salinity stress may be helpful in breeding salt tolerant cultivars by identifying physiological features. The aim of the present investigation is to provide information on the effect of salinity on seed germination, growth, yield components and yield of different rice varieties. It is necessary to identify the sensitive and tolerant level of varieties at early seedling stages for successful crop production in saline environment. Hence with adoption of improved packages of practices over conventional methods, the efforts has been made to conduct the trial on performance of different rice varieties with various nutrient levels, under direct seeded rice practice at coastal salt affected saline soils.

MATERIALS AND METHODS

The experiment was laid out in a split plot design with 3 replications. The treatment comprised 8 rice varieties (Panvel-1, Panvel-2, Panvel-3, Karjat-3, Karjat-5, Karjat-6, Karjat-7, and Karjat-184) as main plot treatments and 3 fertilizer levels (50% RDF, 100% RDF and 150 % RDF) as sub plot treatments. The applied recommended dose of fertilizer was 100 kg N ha^{-1} , $50 \text{ kg P}_2\text{O}_5 \text{ ha}^{-1}$ and $50 \text{ kg K}_2\text{O ha}^{-1}$, has complete dose of phosphorus and potassium were applied as a basal dose at the time of sowing. The nitrogen fertilizer applied in split doses at time of sowing (40%), at tillering stage (40%), and at panicle initiation (20%), as per the doses given in treatments. Periodical salinity was recorded from trial plot at seedling stage, panicle initiation stage and flowering stage. The nitrogen, phosphorus and potassium were applied through urea, single super phosphate and muriate of potash respectively. Under direct seeded practice the seeds of rice varieties were sown before onset of monsoon.

RESULTS AND DISCUSSIONS

Effect on yield attributing characters

The different rice varieties and fertilizer levels significantly influenced the yield attributing characters like number of panicles m^{-2} , number of tillers m^{-2} . In case

*Corresponding Author : Email: deepakborse124@gmail.com

Table 1. Effect on yield attributing characters of different rice varieties along with different nutrient levels under direct seeded practice

Varieties	Panicles per m ² Fertilizer doses (kg ha ⁻¹)				Varieties	Tillers per m ² Fertilizer doses (kg ha ⁻¹)				Varieties	Filled grains per panicle Fertilizer doses (kg ha ⁻¹)			
	F ₅₀	F ₁₀₀	F ₁₅₀	Mean		F ₅₀	F ₁₀₀	F ₁₅₀	Mean		F ₅₀	F ₁₀₀	F ₁₅₀	Mean
Panvel-1	350	370	399	373	Panvel-1	360	384	407	384	Panvel-1	181.11	218.00	227.89	209.00
Panvel-2	292	330	332	318	Panvel-2	304	341	343	329	Panvel-2	162.44	193.67	215.11	190.41
Panvel-3	389	432	412	411	Panvel-3	404	441	423	423	Panvel-3	195.33	233.00	247.89	225.40
Karijat-3	383	384	427	398	Karijat-3	397	394	440	410	Karijat-3	179.11	217.00	225.56	207.22
Karijat -5	345	367	329	347	Karijat -5	364	374	336	358	Karijat -5	180.22	185.67	206.44	190.77
Karijat -6	330	363	380	358	Karijat -6	340	374	392	369	Karijat -6	170.00	188.44	196.33	184.92
Karijat -7	337	390	424	384	Karijat -7	348	398	430	392	Karijat -7	193.89	224.22	232.11	216.74
Karijat -184	262	310	319	297	Karijat -184	274	317	327	306	Karijat -184	159.67	181	193.67	178.11
Mean	336	368	378		Mean	349	378	387		Mean	177.72	205.13	218.13	200.32
SE for varieties – 14.99					SE for varieties – 15.49					SE for varieties – 8.73				
CD (0.05) – 45.48					CD (0.05) – 46.99					CD (0.05) – 26.47				
SE for fertilizer levels – 4.29					SE for fertilizer levels – 4.39					SE for fertilizer levels – 3.01				
CD (0.05) – 12.36					CD (0.05) – 12.36					CD (0.05) – 8.68				
SE for interaction – 2.84					SE for interaction – 0.24					SE for interaction – 2.37				
CD (0.05) – 8.29					CD (0.05) – NS					CD (0.05) – 6.90				

Table 2. Effect on yield and economics on different rice varieties along with different nutrient levels under direct seeded practice

Varieties	Grain yield (q ha ⁻¹) Fertilizer doses (kg ha ⁻¹)				Varieties	Straw yield (q ha ⁻¹) Fertilizer doses (kg ha ⁻¹)				Varieties	C:B ratio Fertilizer doses		
	F ₅₀	F ₁₀₀	F ₁₅₀	Mean		F ₅₀	F ₁₀₀	F ₁₅₀	Mean		F ₅₀	F ₁₀₀	F ₁₅₀
Panvel-1	35.49	42.43	44.61	40.94	Panvel-1	37.99	49.64	51.75	46.46	Panvel-1	1:2.05	1:2.12	1:1.92
Panvel-2	32.15	37.93	41.83	37.30	Panvel-2	33.31	39.77	46.00	39.69	Panvel-2	1:2.06	1:2.03	1:2.04
Panvel-3	39.30	46.21	48.78	44.76	Panvel-3	42.52	50.72	56.33	50.46	Panvel-3	1:2.24	1:2.35	1:2.15
Karjat-3	34.99	42.44	44.10	40.51	Karjat-3	37.31	45.64	47.26	43.40	Karjat-3	1:2.04	1:2.08	1:1.85
Karjat -5	33.62	36.32	40.26	36.73	Karjat -5	38.24	40.52	45.51	41.42	Karjat -5	1:2.05	1:1.83	1:1.75
Karjat -6	33.49	36.83	38.62	36.31	Karjat -6	35.43	39.69	42.08	39.07	Karjat -6	1:1.91	1:1.78	1:1.63
Karjat -7	38.36	44.28	45.84	42.83	Karjat -7	41.53	47.35	49.88	45.57	Karjat -7	1:2.18	1:2.10	1:1.89
Karjat -184	31.85	35.56	37.61	35.01	Karjat-184	36.73	40.80	42.63	40.05	Karjat -184	1:1.85	1:1.72	1:1.56
Mean	34.91	40.29	42.71		Mean	37.88	44.27	47.68					
SE for varieties – 1.65					SE for varieties – 2.34								
CD (0.05) - 5.02					CD (0.05) - 7.11								
SE for fertilizer levels – 0.55					SE for fertilizer levels – 0.80								
CD (0.05) - 1.59					CD (0.05) - NS								
SE for interaction – 1.00					SE for interaction – 0.24								
CD (0.05) - NS					CD (0.05) - NS								

of varieties, Panvel-3 recorded higher number of panicles m^{-2} (411) and superior over rest of varieties except Karjat-3 (398), Karjat-7 (384) and Panvel-1 (373) which are at par with it. The fertilizer level RDF 150 % resulted higher panicles m^{-2} (378) and at par with 100 % RDF (368). In interaction, variety Panvel-3 with 100% RDF recorded higher number of panicles m^{-2} (432) and superior over rest ones except Karjat-3 with 150 % RDF (427) and Karjat-7 with 150 % RDF (424) which are at par with it. In case of tillers, Panvel-3 variety recorded higher number of tillers (423) and superior over rest ones except Karjat-3 (410), Karjat-7 (392) and Panvel-1 (384) which are at par with it. The fertilizer level RDF 150% recorded higher number of tillers (387) which was superior over rest ones except RDF 100% (378) which was at par with it. In interaction, Variety Panvel-3 with RDF 100% recorded maximum number of tillers (441), the results are not significant. The different rice varieties and nutrient levels significantly affected on filled grains per panicle in which variety Panvel-3 recorded higher number of filled grains per panicle (225) than rest ones except Karjat-7 (217), Karjat-3 (207) and Panvel-1 (209) which are at par with it. In case of fertiliser levels, 150% RDF recorded higher number of filled number of grains per panicle (218) and superior over rest ones. In interaction effects, Panvel-3 with RDF 150% recorded higher number of filled grains per panicle (248) which was significantly superior over remaining interactions. Ramesh *et al.* (2009) revealed that application of 150 kg N ha^{-1} registered significantly higher number of tillers, panicles, filled grains panicle $^{-1}$ etc. (Table 1).

Grain and Straw yield (qt ha^{-1})

From 3 years pooled data analysis, it was revealed that different rice varieties and fertilizer levels and their interaction significantly influenced the grain and straw yield. In case of varieties, Panvel-3 recorded higher grain yield (44.76 q ha^{-1}) (Patil *et al.*, 2014) and superior over rest ones except Karjat-7 (42.83 q ha^{-1}), Panvel-1 (40.94 q ha^{-1}) Karjat-3 (40.51 q ha^{-1}) and which are at par with it. The fertilizer level RDF 150% resulted higher grain yield (42.71 q ha^{-1}) which was superior over rest ones. These results are in concurrence with the findings of Singh *et al.*, (2007). In interaction, the results are non-significant, in which maximum grain yield was recorded variety Panvel-3 with 150% RDF recorded higher grain yield (48.78 q ha^{-1}) followed by Panvel-1 with 100% RDF

(46.21 q ha^{-1}). In straw yield, it was revealed that, in case of varieties, Panvel-3 recorded higher straw yield (50.46 q ha^{-1}) and superior over rest ones except Panvel-1 (46.46 q ha^{-1}) and karjat-3 (43.40 q ha^{-1}) and Karjat -7 (45.57 q ha^{-1}) which are at par with it. The fertilizer levels are non-significant. In which maximum straw yield recorded from 150% RDF (47.46 q ha^{-1}) followed by 100% RDF (44.04 q ha^{-1}). In interaction, variety Panvel-3 with 150 % RDF recorded higher straw yield (56.33 q ha^{-1}) and superior over rest ones except Panvel-1 with 150% RDF (51.75) which was par with it. The net return obtained from Panvel-3 rice variety with 100% RDF was higher (Rs.39884/-) than rest ones with higher C: B ratio (1:2.35) hence, it was revealed that, Panvel-3 rice variety with RDF 100% is economical (Table 2).

From three years pooled data, it was concluded that, under direct seeded practice in north Konkan coastal saline soil condition, to obtain maximum grain yield and high net profit Panvel-3 rice variety with 100% recommended dose of fertilizer is required.

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