

## Statistical assessment of different rice (*Oryza sativa*) varieties-based crop sequences\*

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Different crops are needed to suit the specific needs of a particular agroecosystem. Sequences with different crops for maximum production and profitability are to be identified. To identify the appropriate crop sequences with high productivity to suit the specific needs of different agro-ecosystems is the main objective of the on-station research. Diversification or intensification in the existing crop sequences through alternate crops or varieties of different characteristics is taking place to identify the most productive crop sequences for a particular agro-ecosystem.

An experiment was conducted to test the performance of different rice (*Oryza sativa* L.) varieties based crop sequences for determining their production potential along with optimum cultural practices at Cropping Systems Research Centre Raghbir Singh Pura (Jammu and Kashmir) during 2001–2002. Diversification and intensification was done in the existing predominant crop sequence [rice–wheat (*Triticum aestivum* L. emend. Fiori & Paol.)] firstly through the other important crops, viz maize (*Zea mays* L.), pulses, etc. of that area and secondly through 4 varieties of rice crop with different fertilizer requirements. In all 16 crop sequences were tried. The experimental area was divided in 6 replications each consisting of 16 experimental plots. These 16 plots were grouped into 4 blocks each with 4 experimental plots. Finally the 4 varietal groups A, B, C and D were assigned to the 4 blocks and 4 crop sequences within each group to experimental plots randomly. Group A included the sequences rice (*Oryza sativa* L.)–potato (*Solanum tuberosum* L.)–late wheat (*Triticum aestivum* L. emend. Fiori & Paol.), rice–toria [*Brassica rapa* (L.) Thell. emend. Metzger]–late wheat, rice–berseem (*Trifolium alexandrinum* L.) and rice–cauliflower [*Brassica oleracea* L. var *botrytis* L. subvar *cauliflora* DC.]–late wheat; Group B included rice–wheat–fodder, rice–Indian mustard [*B. juncea* (L.) Czernj. & Cosson]–greengram [*Vigna radiata* (L.) R. Wilczek], rice–potato–rajmah (*Phaseolus vulgaris* L.) and rice–pea (*Pisum sativum* L.)–maize for cob (*Zea mays* L.); Group

C had rice–wheat ; rice–wheat–green manure; rice–chickpea (*Cicer arietinum* L.)–fodder and rice–radish (*Raphanus sativus* L.)–sunflower (*Helianthus annuus* L.); and rice–wheat, rice–wheat–green manure, rice–potato–sunflower and rice–onion (*Allium cepa* L.)–fodder were the sequences in group D. For comparison among the groups and crop sequences within each group, data were analysed as per the design adopted. Before analysis, the yield was converted on univariate basis in terms of monetary returns taking the prices given in Table 2, as the sequences included a number of crops whose agronomic productivity cannot be directly aggregated. Table 1 shows the crop sequences with their fertilizer (N, P and K) requirement

Based on monetary returns, the analysis exhibited highly significant differences among all the 4 groups and 4 crop sequences within each group. The maximum returns (Table 2) was observed from group B, comprising the sequences, rice ‘PC19’–wheat–fodder, rice ‘PC19’–Indian mustard–greengram, rice ‘PC 19’–potato–rajmah and rice ‘PC19’–pea–maize (cob), and the last sequence contributed the highest compared to other 3 sequences. The order of performance of groups was Group B > Group A > Group C > Group D. The order of performance of crop sequences within 4 groups was 1>3>4>2; 4>3>1>2; 3>2>1>4 and 4>3>1>2. Monetary returns from rainy season crop only indicated that rice variety, ‘Basmati’ sown in group D gave the minimum returns and variety ‘IET 1410’ sown in group A also gave the low returns compared to varieties ‘PC 19’ and ‘Jaya’ grown in groups B and C which were almost at par.

The results in general indicate that by intensifying the predominant rice–wheat sequence with potato between 2 crops enhanced the profitability and diversifying by growing peas in place of wheat and maize (cob) after pea enhanced the profitability to the maximum extent. Rice varieties ‘PC 19’ and ‘Jaya’ proved to be more profitable than ‘IET 1410’ and ‘Basmati’.

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\*Short note

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Table 1 Rice varieties-based groups and crop sequences within each group

Group	Sequence/variety/N, P and K (kg/ha)		
	Rainy	Winter	Summer
A	Rice, 'IET 1410'/50-30-20	Potato/120-60-120	Late wheat/100-50-25
	Rice, 'IET 1410'/50-30-20	Toria/30-18-10	Late wheat/100-50-25
	Rice, 'IET 1410'/50-30-20	Berseem(F)/60-40-20	Berseem(seed)
	Rice, 'IET 1410'/50-30-20	Cauliflower/120-6-60	Late wheat/100-50-25
B	Rice, 'PC 19'/100-50-25	Wheat/100-50-25	Fodder/60-40-0
	Rice, 'PC 19'/100-50-25	Indian Mustard/60-40-20	Greengram/20-50-0
	Rice, 'PC 19'/100-50-25	Potato/120-60-120	Rajmah/20-50-0
	Rice, 'PC 19'/100-50-25	Peas/20-50-0	Maize(cob)/60-40-20
C	Rice, 'Jaya'/100-60-30	Wheat/100-50-25	Fallow
	Rice, 'Jaya'/100-60-30	Wheat/100-50-25	Green manure
	Rice, 'Jaya'/100-60-30	Chickpea/20-50-0	Fodder/60-40-0
	Rice, 'Jaya'/100-60-30	Radish/60-30-50	Sunflower/60-40-20
D	Rice, 'Basmati'/30-20-10	Wheat/100-50-25	Fallow
	Rice, 'Basmati'/30-20-10	Wheat/100-50-25	Green manure
	Rice, 'Basmati'/30-20-10	Potato/120-60-120	Sunflower/60-40-20
	Rice, 'Basmati'/30-20-10	Onion/100-50-50	Fodder/60-40-0

Assessment of crop sequences

Table 2 Returns (Rs/ha) from groups, crop sequences and from rainy, winter and summer season crops under each sequence (in parentheses)

Crop sequence	Group A ('IET 1410')	Group B ('PC 19')	Group C ('Jaya')	Group D ('Basmati')
1	99 659 (19 379 + 58 761 + 21 519)	88 081 (32 247 + 28 483 + 27 350)	54 672 (32 324 + 22 349 + -)	38 090 (13 192 + 24 898 + -)
2	41 885 (19 262 + 7 773 + 14 850)	63 203 (33 812 + 21 071 + 8 320)	58 845 (34 204 + 24 641 + -)	36 717 (13 368 + 23 349 + -)
3	68 631 (22 116 + 42 414 + 4 100)	95 241 (35 620 + 41 400 + 18 220)	79 311 (33 564 + 19 358 + 26 389)	67 789 (13 480 + 40 332 + 13 977)
4	47 783 (20 589 + 8 654 + 18 540)	109 297 (31 272 + 51 476 + 26 549)	52 092 (33 087 + 7 948 + 11 056)	76 012 (14 901 + 34 294 + 26 816)
Mean	64 490	88 955	61 230	54 652
SE/CD ( $P=0.05$ ) of differences				
Within groups 1 158 (2 468)				

Among crop sequences within each group 2 187 (4 374)

Prices (Rs/kg): Rice, 5.50; wheat, 6.20; toria, 12.50; mustard, 13.00; sunflower, 11.85; potato, 2.50; cauliflower, 3.00; radish, 0.80; onion, 3.00; greengram, 13.20; rajmah, 12.00; peas, 12.00; chickpea, 12.00; fodder, 0.90; berseem (seed), 20.00

## SUMMARY

An experiment was conducted during the rainy, winter and summer season of 2001–02 to test the performance of 16 crop sequences at Cropping Systems Research Centre, Raghbir Singh Pura (Jammu and Kashmir). The experiment was laid out in group balanced block design by grouping treatments based on some known characteristics of the treatments with 6 replications. Design consisted of 4 groups, viz A, B, C and D, each with 4 rice (*Oryza sativa* L.)-based crop sequences adjusted in 4 blocks in each replication.

Groups were based on 4 varieties, i.e. 'IET 1410', 'PC19', 'Jaya' and 'Scented Basmati', of rice crop sown during rainy season. Analysis based on monetary returns exhibited significant differences among 4 groups and also among 4 crop

sequences within each group. Maximum returns were observed from the group B and the sequence rice-peas-maize(cob) contributed the highest as compared to other 3 sequences.

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