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Study on the Efficient Use of Water for Rice Under L. B. P. Command Area

BY

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ABSTRACT

Lower Bhavani Project has developed an irrigation system of its own. It needs a closer investigation as to the scheduling of irrigation in the two seasons taking into account the rainfalls. The investigations suggest different schedules for *kharif* and *rabi*. For IR. 20 irrigation once every 96 hours to recoup to five cms is good in *kharif* season while submergence recouping to 5 cms during flowering stage and maintaining drained surface during tillering and maturity stages will do for *rabi* season.

INTRODUCTION

The Agricultural Research Station, Bhavanisagar is representative of the Lower Bhavani Project command area in respect of soil, climate, irrigation facility etc. The project commands about 81,000 ha. The project was initialiy designed for garden-land crops on more than 80 per cent and only the rest of the command area i. e. seepage affected and valley area was proposed for rice cultivation. However, the actual practice following the advent of the project completely upset the designed pattern of cultivation, because the cultivators would only grow rice. Therefore the only thing that could be done was to introduce staggered zonal supply of irrigation water, in which water is released to alternate zones each season.

In respect of irrigation frequency obtaining in the project, it varies from daily irrigation, through once every two days to once every 4½ days This variation is not based on any factual understanding of the water requirement of rice here; rather, it is influenced largely by the availability of water from additional sources such as seepage water, wells, etc., to many farmers within the command area.

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The objective of the study was to assess the water requirement of rice in the project command area and to come out with recommendation for all the farmers to follow irrespective of the availability or otherwise of additional water resources; so that this could result in an assured water supply to all the farmers including the project tail end farmers.

MATERIALS AND METHODS

The soil type of this area is red gravelly loam with the bulk density of 1.49 gms/cc, the infiltration rate of 5.8 cm/hr, the field capacity of 20 per cent and the wilting point of 8.5 per cent.

The physical properties are furnished in Table 1. The field was puddled thoroughly. Seedlings were transplanted at 20 × 10 cm spacing at two numbers per hill. The crop had common manurial doses and was given common agronomic practices. The variety tried was IR. 20.

This article includes results of six crops of rice namely *kharifs* and *rabis* of 70—71, 71—72 and 72—73. The irrigation treatments given were wide ranging from near maintenance of five cm (by giving 5 cm in the morning and making good the loss in the evening) as in *rabi* 1971—72 to application of 5 cm once every six days as in 1972—73 *kharif* and including saturation levels of moisture maintenance as in 1972—73 *rabi*. During 1972—73 *kharif* simple randomised block design with three levels of irrigation (treatments) (1) Irrigation to recoup 5 cm level once in 48 hours; (2) Irrigation to recoup 5 cm level once in 96 hours and (3) Irrigation to recoup 5 cm level once in 144 hours were followed and replicated eight times. The plot size of 3.5 × 3.5 m was common for all the years.

In *rabi* 1973, the design adopted was randomised block with six treatments as levels of irrigation replicated four times (1) Saturation till tillering followed by shallow submergence 5 ± 2 cm; (2) Submergence 5 ± 2 cm till tillering and saturation till harvest; (3) Submergence 5 ± 2 cm till flowering and saturation till harvest; (4) Submergence 5±2 cm throughout; (5) saturation till tillering, submergence 5±2 cm till flowering and saturation till harvest and (6) continuous saturation. The crop growth stages were also varied for assessing the interaction effect. Thus the three stages of rice plant's growth were taken into account namely, (1) planting to tillering (S_1), (2) tillering to flowering (S_2) and (3) flowering to maturiry (S_3).

RESULTS AND DISCUSSION

As per the results of studies conducted (1) irrigation to restore five cm standing water once every 48 hours was better than once every 24 hours from water saving point of view, both giving par value of grain yield respectively of 7397 kg/ha and 4111 kg/ha (70—71 *kharif* and *rabi*); (2) 5 cm application once every 72 hours bettered the results of once every 48 hours as well as once every 24 hours, during 1971—72 *Kharif* the yield being 7321 kg/ha and (3) best result was obtained

TABLE 1. Yield and irrigation requirement *kharif* 1972 – 73.

Treatments		Yield (kg/ha)	Irrigation (mm)
Irrigation once every 48 hours (2 day)	...	6653	1148
Irrigation once every 96 hours (4 day)	...	6598	1018
Irrigation once every 144 hours (6 day)	...	4947	1085
Significant by 'F' test	Yes		
S. E.	98		
C. D. (P=0.05)	327		

TABLE 2. Yield and irrigation requirement (*rabi* 1973)

Treatments	Yield (kg/ha)	Irrigation (mm)
Saturation till tillering followed by shallow submergence 5 ± 2 cm	7898	1123
Submergence 5 ± 2 cm till tillering and saturation till harvest	6634	731
Submergence 5 ± 2 cm till flowering and saturation till harvest	7843	875
Submergence 5 ± 2 cm throughout	7959	1079
Saturation till tillering, submergence 5 ± 2 cm till flowering and saturation till harvest	7502	1132
Continuous saturation	6114	838
Significant by 'F' test	Yes	
S. E.	207	
C. D. (P=0.05)	625	

in 1972–73 *kharif* and *rabi* (better than the previous two years results) with submergence irrigations in flowering stage and saturation (drained surface) irrigations in the preceding tillering phase as well as in the following maturity phase for *Rabi* season giving an yield of 7502 kg/ha and with five cm depth restoration irrigation once every 96 hours throughout crop period for *kharif* season which gave an yield of 6598 kg/ha.

The relevant water use and yield particulars of 1972—73 seasons (which bettered the previous years results, from the stand point of water use efficiency) are furnished in Table 1 and 2.

It may be seen from table 1 that the treatment irrigation to restore five cm once every 96 hours stood on par with the treatment, once in 48 hour irrigation yet has resulted in a considerable saving in water. The rainfall received during the season was 499 mm.Therefore this treatment of once in 96 hour irrigation not only derives the benefit from rainfall during the crop period but it also suits the pattern of water release from the system (it being once every 4½ days to the farmers).

In the case of *rabi* 1972 73, the drained surface irrigation in tillering and maturity phases and submergence irrigation in flowering phase gave the par yield with whole-season-submergence irrigation.

Such wide ranges of irrigation water depths applied consistent with good rice crop performance have been reported by research works in our country as well as in other countries. For example between 10 cm and 5 cm depths of irrigation there was little difference in crop performance according to Pande and Mitra (1970). There was no influence on rice growth from water level above soil surface or between saturation and submergence regime (on yield), (Halms, 1967), while depth of submergence had little effect on growth and yield, (Bulande *et al.*, 1957). It is therefore apparent that substantial water could be saved by reducing the quantity of irrigation water either by cutting down the depths applied or by wide spacing the frequency of irrigation.

In Lower Bhavani ayacut area IR,20 rice can be best irrigated by scheduling a practice of (1) irrigation to restore 5 cm once every 96 hours in *kharif* season and (2) giving submergence (5 cm) irrigation during flowering phase and saturation or drained surface irrigation during tillering as well as maturity phases, in *rabi* seasons.

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