The Andhra Agric. J 61(1):13-15, 2014

Evaluation of Rotational system of Irrigation Vis-à-Vis Flood Irrigation in Rice (*Oryza sativa L.*) at Mudimanikyam Major of Nagarjuna Sagar Project Left Canal of Nalgonda District, Andhra Pradesh

Md Latheef Pasha, L Krishna, R B M Naik and D Bhadru
Agricultural Research Station, Kampasagar, Nalgonda-508207 Andhra Pradesh, India

ABSTRACT

Onfarm demonstrations on rotational system of irrigation were studied in the farmers field pertaining to rice at upper reach of mudimanikyam major of Nagarjuna Sagar Project left canal of Nalgonda district of Andhra Pradesh during *kharif* & *rabi* seasons, 2008- 09. The upper reach farmers followed the rotational system of irrigation both in *kharif* and *rabi* seasons. The rotational system of irrigation registered 5.1% higher yield (5945 kg ha^{-1}) with 34% saving in water (952 mm) than the traditional system of flood irrigation (5650 kg ha^{-1} and 1450 mm) during *kharif* 2008 season. Where as in *rabi* rotational system of irrigation registered 4.5% higher yield (6270 kg ha^{-1}) with 28% saving in water (1042 mm) than the traditional system of flood irrigation (6000 kg ha^{-1} and 1450 mm). Total system economics for both *kharif* and *rabi* seasons, rotational system of irrigation earned Rs 64,600 net returns and 1.12 rupee benefit per rupee investment where as in traditional system of flood irrigation, the net returns and BC ratio were Rs 57500 and 1.02.

Key words : Flood irrigation, Rotational system of irrigation, Upper reach, Water saving.

Agriculture is the largest water user in most river basins where irrigated rice forms the main activity. In many irrigation projects the competition for water is increasing day by day. Hence, the intensive water use in traditional wet rice cultivation comes into question. Under this scarce water situation, water saving irrigation technologies such as rotational system of irrigation, semi-dry rice and system of rice intensification (SRI) are receiving greater attention by the individuals and Government. These technologies reduce water input with similar or slightly higher yields and there by becoming popular among farmers in some parts of Asia who confronts scarcity of water or high cost of water.

Nagarjuna sagar left canal supplies irrigation water for 4 lakh ha. Rice-Rice mono crop is in vogue for last 30 years and faulty irrigation method of flood irrigation is being practiced. Due to Poor drainage, lands are becoming alkaline in nature, less tillers are produced which leads to low yields with low water use efficiency. To over come this problem upper reach area farmer should use limited water or implement water saving techniques in rice during *kharif* and *rabi*. Hence, the present study was conducted to evaluate the rotational system of irrigation in comparison with traditional system of flood irrigation under Nagarjuna Sagar Project left canal command of Nalgonda district of Andhra Pradesh.

MATERIAL AND METHODS

The thirteen number of demonstrations were conducted in the farmers fields at Thummadam village of Nidamanoor mandal of Nalgonda district, Andhra Pradesh during *kharif and rabi season* of 2008 -09 to evaluate the rotational system of irrigation in comparison with flood irrigation. The demonstration fields are situated in upper reach of Mudimanikyam major of Nagarjuna sagar left canal. The soils were sandy clay loam in texture with a P^H range of 7-7.6. Low to medium in nitrogen, medium to high in available P_2O_5 and high in available K_2O. The treatments include T_1- Rotational system of Irrigation and T_2- farmers practice of flood irrigation. BPT 5204 was the test variety in all the demonstrations and transplanting was done during 2nd fortnight of August . The plot size for each treatment was 4000 m^2.

Table 1. Grain yield and Water Use Efficiency of rice under rotational method of irrigation during *kharif* and *rabi* seasons of 2008-09.

S.No	Farmer name and address	Grain yield (kg ha^{-1})		Water use (mm)		Water Use Efficiency (kg ha mm^{-1})	
		kharif	*rabi*	*kharif*	*rabi*	*kharif*	*rabi*
1	Paduri Satyanarayana, Thummadam	6025	6380	900	1000	6.69	6.38
2.	Yedlapalli narayana rao, Thummadam	5700	6450	948	1040	6.01	6.20
3.	Kondreddy, Thummadam	5650	6560	1050	1150	5.38	5.70
4.	Kanchugatta Saidaiah, Thummadam	6250	6700	960	1020	6.51	6.56
5.	Chintamalla. Sanjeeva Thummadam	6000	6000	905	985	6.62	6.09
6.	Yedlapalli Ramprasad Thummadam	5800	6200	868	970	6.68	6.39
7.	Pagilla. Ramaiah, Thummadam	5960	5960	895	995	6.65	5.98
8.	Pagilla. Narsaiah, Thummadam	6050	6050	965	1050	6.26	5.76
9.	Surri. Musalaiah, Thummadam	6150	6850	1000	1120	6.15	6.11
10.	Yedlapalli Prasad, Thummadam	6250	6225	955	995	6.54	6.25
11.	Yedlapalli Suryanarayana Thummadam	6450	5680	935	1045	6.89	5.43
12.	Yedlapalli Suribabu, Thummadam	5550	6050	1020	1100	5.44	5.5
13.	Muthyala Gangaraju, Thummadam	5450	6450	980	1080	5.56	5.97
	Mean of rotational system of irrigation	5945	6270	952	1042	6.24	6.01
	Flood irrigation	5650	6000	1450	1450	3.89	4.13
	CV%	1.6	1.8				

Table 2. Economic analysis of rice under rotational and flood irrigation systems.

S.No	Cropping system	Average yield (kg ha^{-1}) *kharif*	*rabi*	Gross returns (Rs ha^{-1})	Cost of cultivation (Rs ha^{-1})	Net returns (Rs ha^{-1})	BC Ratio
1.	Rice – Rice	5945	6270	122150	57550	64600	1.12
	(Rotational system of irrigation)	5650	6000	116500	59000	57500	1.02
2.	Rice – Rice (Flood irrigation)						

In rotational system of irrigation and farmers practice of flooding, seed was sown @ 50 kg ha^{-1}. 30 days old seedlings were transplanted at a spacing of 20X15 cm. The main field was prepared by ploughing twice followed by thorough puddling. The farm yard manure @ 15 t ha^{-1} was applied during first pudding in the main field. The fertilizers of N, P_2O_5 and K_2O applied at the rate of 180:60:40 kg ha^{-1}. The entire phosphorous and half of the recommended potassium was applied as basal dose during transplanting and another half of recommended potassium was applied during panicle initiation stage. Nitrogen was applied in 3 equal splits at transplanting, active tillering and panicle initiation stage.

In Rotational system of irrigation, irrigation was provided once in 2-3 days after disappearance of 5cm depth of water. Whereas in farmers practice of flood irrigation, 2 cm standing water was maintained up to vegetative stage, after that 5cm standing water was maintained till 10 days before the physiological crop maturity. Irrigation water was measured by parshall flumes.

Pre emergence herbicide 'Oxadiargyl' @ 90 g ha^{-1} was applied with sand mixture immediately 3 days after transplanting. In addition to this one manual weeding was done at 30 days after transplanting in all the treatments. Plant protection was done as per the requirement.

Data on crop yield, rainfall and depth of water given through parshall flume during crop growth period were recorded. Finally water use efficiency and benefit cost ratio were calculated.

RESULTS AND DISCUSSION

Results are presented in table 1&2. During *kharif* season, the grain yields under rotational system of irrigation ranged from 5450 kg ha^{-1} to 6450 kg ha^{-1} . The water use ranged from 868 mm to 850 mm. the water Use Efficiency also ranged from 5.38 kg ha mm^{-1} to 6.89 kg ha mm^{-1}. When compared to traditional system of flood irrigation, rotational system of irrigation registered the 5.1% higher yield (5945 kg ha^{-1}) and 34% saving in water (952 mm) than the traditional system of flood irrigation (5650 kg ha^{-1} and 1450 mm) during *kharif* season. The water Use efficiency was 6.24 kg ha mm^{-1} as compared to traditional system of flood irrigation (3.89 kg ha mm^{-1}).

In *rabi* season, grain yield varies from 5680 kg ha^{-1} to 6850 kg ha^{-1}. The water use varies from 970 mm to 1150 mm. the water use efficiency was registered with rotational system of irrigation was ranged from 5.43 kg ha mm^{-1} to 6.56 kg ha mm^{-1}. Rotational system of irrigation registered 4.5% higher yield (6270 kg ha^{-1}) and 28% saving in water (1042 mm) than the traditional system of flood irrigation (6000 kg ha^{-1} and 1450 mm). Subbarao *et al* (2009) reported 30% water saving in rotational irrigation than farmers practice. Water saving of 40% with moisture level at field saturation point was reported by Bhagat *et al*. (1999) when compared to continuous shallow ponding with similar yields.

Rotational system of irrigation registered Rs 1,22,150/- and Rs 64,600/- total system gross and net returns with 1.12 BC ratio during *kharif* and *rabi* 2008-09. Where as in traditional system of flood irrigation, the total system gross and net returns and BC ratio were Rs. 1,16,500/-, Rs 57,500/- and 1.02, respectively

From this study it can be concluded that in upper reach of canal commands rotational system of irrigation is the best alternative to flood irrigation for increasing grain yields with high water use efficiency.

LITERATURE CITED

Bhagat R M, Bhuijan S I and Moody K 1999 Water tillage and weed management options for wet-seeded rice in the Phillippines. Soil and Tillage Research 52:51-58.

Subbarao G, Kalpana D, Srinivas D, Mukunda Rao B, Prasad P R K and Satyanarayana T V 2009 Grain yield and water use efficiencies of rice as influenced b y transitions in rice cultivation in Krishna western delta command area of Andhra Pradesh. The Andhra Agricultural Journal 56(1):1-3.

(Received on 04.04.2012 and revised on 10.12.2012)