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Increasing Income of Resource Poor Farmers in Eastern Uttar Pradesh Through Improved Planting Techniques

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Abstract

The experiments were conducted at farmers field in eastern UP on different tillage and planting techniques. The results indicated that the mechanical transplanting of rice by self propelled transplanted resulted in highest net return and BCR of Rs 25,799 per hectare and 2.25 respectively. Saving in fuel consumption and time was considerably high whereas equivalent energy was low in zero till drill sown and mechanically transplanted rice followed by drum seeder and hand transplanted rice. In wheat, sowing by zero till gave grain yield comparable to strip and roto till drill. However, the difference in net return was non significant in all the planting methods. The ridge-furrow planting of pigeonpea on ridges and rice in furrows produced a rice equivalent yield of 8,866 kg/ha (2,200 kg/ha of rice and 2,000 kg/ha of pigeonpea) compared to farmers practices of sole planting of rice (3,500 kg/ha) and sole planting of pigeonpea (5,944 kg/ha) under flat planting. Sowing by power tiller operated till planting machine followed by one manual weeding helped in saving Rs 2,500/ha. It resulted in 19.0 and 17.6% extra chickpea and lentil yield respectively.

Key words : Income, Resource, Farmers, Planting techniques.

Eastern Up falls under two agroclimatic zones viz., Indo-Gangetic plain zone and Vindhyan zone. The Indo-Gangetic plain zone is having fertile alluvial land with good availability of surface and ground water resources whereas Vindhyan zone, having undulated topography, has poor soil and water availability. Most of the rain in this region flows as surface runoff from upstream lands of Vindhyan zone to downstream rivers and reservoirs of Indo-Gangetic plain zone. This severely erodes the uplands and makes them water scarce and creates siltation of downstream reservoirs and rivers. The socio-economic conditions of thetwo regions show vast variability due to difference in the leves of productivity. Indo-Gangetic areas mainly practice rice-wheat cropping system whereas Vindyan zone predominates low water demanding cropping system which can survive under variable moisture stress conditions. Interventions of selective mechanization and soil and water management practices have significantly affected the productivity of the region.

Methods

Experiments were conducted at the agricultural research farm, BHU, Varanasi in the Indo-Gangetic plain zone and farmers field in the Vindyan zone on planting techniques. In Indo-Gangetic plain zone experiments were conducted on different planting techniques under rice-wheat cropping system. In rice the different methods of planting viz., zero till drill, drum seeder, mechanical transplanter and conventional planting were tried whereas in wheat the planting methods viz., zero till drill, strip till drill, roto till drill and conventional practices were tested.

In dryland areas of Vindyan zone having low

Table 1. Grain and straw yield of rice as influenced by different methods of sowing/planting.

Treatments	Grain yield (kg/ha)	Straw yield (kg/ha)
Direct seeding of dry seed by Zero till drill	4203	3655
Direct seeding of sprouted seeds by drum seeder	5311	5252
Hand transplanting	5934	5703
Mechanical transplanting	6099	6046
SE ±	140	133
CD 5%	486	461
CV (%)	9.03	8.94

Table 2. Grain and straw yield of wheat as influenced by different methods of sowing/planting.

Treatments	Grain yield (kg/ha)	Straw yield (kg/ha)
Zero till drill	4220	4360
Strip till drill	3980	6040
Roto till drill	3890	5900
Conventional sowing	4340	6730
SE ±	62	105
CD 5%	214	364
CV (%)	522	6.33
Interaction	NS	NS

water retention and scarcity of water experiments were conducted on ridge furrow planting of pigeonpea on ridges and rice in furrows. The trials were also conducted on power tiller operated till planting machine + one manual weeding, till plant machine + 2 weeding and till plant machine + no weeding and manual sowing + 2 manual weeding to study the effect on yield of chickpea and lentil and the cost of cultivation.

Results and Discussion

Experiments conducted in Indo-Gangetic plain zone on different planting techniques under rice - wheat cropping system revealed that various methods of crop establishments markedly influenced the grain and straw yield of rice. The mechanical transplanting of rice by self propelled transplanter resulted in highest grain and straw yields of 6,099 and 6,046 kg/ha respectively (Table 1) which was at par with hand transplanting. These treatments produced significantly higher grain yield than drum seeding and zero till drill sown rice. Mechanical transplanting, hand transplanting and drum seeding respectively recorded 45.1, 41.2 and 26.4% higher grain yield over zero till sown rice (1).

Table 4. Effect of different seeding/planting methods on energy consumption in Rice-wheat cropping system.

Seeding/ planting method	Fuel consumption (liter/ha)	Fuel savings (%)	Time savings (%)	Energy equivalent of fuel consumed (MJ/ha)
Rice				
Zero tillage	11.73	85.83	80.13	660.52
Drum seeder	82.80	Nil	Nil	4662.47
Transplanter	62.54	24.47	13.69	3221.63
Manual	82.8	Nil	Nil	4662.40
Wheat				
Zero till drill	10.50	81.61	74.64	591.20
Strip till drill	25.58	85.21	61.38	1440.40
Roto till drill	28.48	50.13	83.69	1603.70
Conventional	57.11	Nil	Nil	3215.00

Table 3. Economics of rice and wheat as influenced by different methods of sowing/planting.

Seeding/ planting method	Gross return (Rs/ha)	Cost of cultivation (Rs/ha)	Net return (Rs/ha)	Benefit cost ratio (Rs/ha)
Rice				
Direct seeding of dry seed by zero till drill	37552	20539	17013	1.83
Direct seeding of sprouted seeds by drum seeder	47765	20161	27604	2.37
Hand transplanting	53294	22452	30842	2.37
Mechanical transplanting	54852	20221	34631	2.71
SE ±	1248	–	1248	–
CD at 5%	4320	–	4320	–
CV (%)	8.94	–	15.74	–
Wheat				
Zero till drill	50564	14103	36461	3.59
Strip till drill	49293	14203	35090	3.47
Roto till drill	48194	14318	33876	3.37
Conventional sowing	53992	17500	36492	3.09
SE ±	719	–	719	–
CD at 5%	2487	–	2487	–
CV (%)	4.93	–	7.52	–

In wheat the highest yield was obtained by conventional sowing which was at par with zero till drill sown wheat (Table 2). The grain yield in these two treatments were significantly superior to strip till drill and roto till drill sown wheat.

The results indicated that the mechanical transplanting of rice by self propelled transplanter resulted in highest net return and BCR of Rs 25,799 per hectare and 2.25respectively (Table 3). In wheat the differ-

Table 5. Equivalent yield of rice as influenced by rice-pigeonpea intercropping.

	Planting method	Equivalent rice yield (kg/ha)	Remarks
1	Sole rice (farmers practice 1)	3500	–
2	Sole pigeonpea (farmers practice 2)	5994	1800 (kg/ha) pigeonpea
3	Pigeonpea on ridges by ridge planter + rice in furrow (hand transplanting)	8866	2200 kg/ha rice and 2000 kg/ha pigeonpea

ence in net return was non significant in all the planting methods and the BCR's of zero till drill, strip till drill and roto till drill were at par but were significantly superior to conventional methods of sowing behind the plough.

In zero till sown and mechanically transplanted rice saving in fuel consumption and time was considerably high whereas consumption of fuel (in terms of energy) was considerably low followed by drum seeder and hand transplanted rice (Table 4). In wheat zero till drill consumed minimum energy of 591.20 MJ/ha followed by strip till drill (1440.20 MJ/ha) and roto till drill (1603.70 MJ/ha).

The ridge furrow planting of pigeonpea on ridges and rice in furrows helped in runoff modulation, crop diversification, soil fertility build up and risk reduction and disruption of pest cycle. This system of planting produced a rice equivalent yield of 8,866 kg/ha (2,200 kg/ha of rice and 2,000 kg/ha of pigeonpea) as against 3,500 kg/ha of rice with farmers practice of sole rice planting under flat planting (farmer's practice 1) and 2,300 kg/ha of pigeonpea with farmers practice of sole pigeonpea (farmer's practice 2). Further this system also gave 1.6 times higher biomass, reduced cost by 18 and 47% higher income was realized over farmers practice 1 and 48% higher yield over farmers practice 2 (Table 5). Small and Marginal farmers of Mirzapur are greatly benefited through introduction of ridge forming machine (2).

Sowing by power tiller operated till planting machine followed by one manual weeding helped in saving Rs 2,500 /ha (3, 4). It results 19.0 and 17.6% extra chickpea and lentil yield respectively. The BC ratio was 3.12 and 3.35 for chick pea and lentil respectively.

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