



Adoption Status of Direct Seeding Rice using Drum Seeder

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Abstract

The study was conducted in Vizianagaram district, Andhra Pradesh during 2010-11 to study the adoption status of direct sowing paddy using drum seeder in puddle fields by District Agricultural Advisory and Transfer of Technology Centre in five villages consists of 10 Frontline demonstrations and non FLD farmers for enhanced resource use efficiency and reducing the cost of paddy cultivation. DAATT Centre promoted direct sowing paddy technology through 34 on-farm trials, 36 frontline demonstrations, 18 farmers training programmes, 6 field days and 18 exposure visits during the period from 2007 to 2010. Majority of FLD farmers (54%) had high extension contact and medium farm holding (40%), where as majority of non FLD farmers had (50%) medium extension contact and small farm holding (44%). Forty percent of FLD farmers had high adoption level followed by medium (36%) and low (24%) level adoption. Comprehensive and holistic efforts of DAATT Centre and its technical support to the department of agriculture in promoting direct sowing paddy through large scale demonstrations has created significant change at farmers level in paddy cultivation.

Keywords: Paddy, direct sowing, puddle condition, drum seeder

Introduction

Conventional paddy cultivation involves transplanting of seedlings in puddle fields performed by labours predominantly by women labours. Transplanting method involves seedbed preparation, nursery growing, care of seedlings in nursery, uprooting of seedlings, hauling and transplanting operations. The preparation of seedbed and sowing are done 30 days before planting. The rice farmers practicing transplanting are facing problems like shortage of labour during peak time, hike in labour charges, small and fragmented land holdings etc. In Vizianagaram district, Andhra Pradesh, the major area of rice cultivation depends on rainfall and seedlings are used for planting due to delayed monsoon. The rice farmers practicing transplanting are facing problems like over aged seedlings, delayed planting, lack of water and shortage of labour during the season. In this contest, DAATT Centre, vizianagaram endeavoured to develop direct seeding of rice using drum seeder. The present study was conducted in farmers fields to findout the sustainability of the direct seeding rice in puddled conditions using drum seeder in comparison with traditional methods of paddy cultivation.

Materials and Methods

The study was conducted in vizianagaram district of Andhra Pradesh to evaluate the adoption of direct seeding rice using drum seeder by the paddy farmers. Thirty six frontline demonstrations and 34 on-farm trials

were conducted during 2007 to 2010 through farmer's participatory approach in farmer's fields for large scale implementation of direct seeding rice. The study was conducted during 2010-11 in five villages consists of ten FLD and 10 non FLD farmers selected randomly to serve as respondents for the study.

Results and Discussion

The data on knowledge and adoption of direct sowing paddy using drum seeder was presented in table 1 & 2. The results revealed that majority of FLD farmers have high knowledge on field preparation (60%); seed germination (56%); sowing method (58%); water management (52%); increased tillering and yield in direct seeding (52%). Majority of FLD farmers are interested in replacement of conventional transplanting into direct seeding rice using drum seeder in future (60%). Majority farmers (54%) knew about direct sowing technology through the awareness created by DAATT centre scientists along with department of agriculture and NGO. Forty six per cent farmers expressed that they opted direct sowing paddy due to saving of 2-3 irrigations compared to conventional transplanting followed by forty per cent farmers expected higher yields and net profit and another sixteen per cent farmers opted due to labour scarcity. Majority of farmers (84%) expressed ease in operating drum seeder. It is clear that sixty eight per cent farmers told that direct seeding rice using drum seeder saves costly seed than conventional transplanting.

These knowledge levels reveal that the FLD's, on farm trials, training programmes, field days and exposure visits organised by DAATT centre has created impact in terms of knowledge levels of FLD farmers compared to non FLD farmers.

Majority of FLD farmers were adopting water management (38%); use of drum seeder by one person (40%); saving irrigations (46%). Majority of FLD farmers are interested in adopting direct sowing paddy due to increased yield (40%); higher net profit (40%); and adopting replacement of conventional transplanting into direct seeding using drum seeder (42%). This might be due to the fact that majority of FLD farmers belonged to middle age group having high farming experience with medium farm holding and high extension contact for technical advice.

Most of the non-FLD farmers were moderately (38-40%) interested in using drum seeder in paddy cultivation. This might be due to the reason that it is easy, convenient to use involves less cost on seed, less labour requirement, water saving, higher yield and more net profit in direct sowing paddy using drum seeder than conventional transplanting.

Majority of non-FLD farmers were partially adopting field puddling, levelling and draining standing water before

sowing; settling of puddled soil before sowing; seed soaking and incubation for germination; use of weedicide; keeping thin layer of irrigation water after sowing for seed germination (32-36%). This might be due to medium contact of farmers with DAATT centre scientists and also medium farming experience.

It was clearly evident from the study that 32 per cent farmers did not adopt proper puddling and levelling operations which is otherwise an important operation in direct sowing paddy that avoids water logging condition. The present finding shows that lot of awareness is to be created on the importance of levelling.

Similarly, majority of farmers (58%) did not operate power weeders for weeding because the existing conoweeder creates drudgery in operation ; did not follow timely application of weedicides due to lack of knowledge on weedicides. Hence, there is a need to modify conoweeder for easy operation.

From the study it was very interesting to find that 82 per cent FLD farmers are interested to continue direct sowing paddy in the coming seasons. This may be due to less dependence on labour, less cost of cultivation and higher yields.

Table 1: Profile characteristics of respondents

S. No.	Profile characteristics	FLD farmers (50)	Non-FLD farmers (50)
1	Age:		
	Young : 25-36	12(24)	10(20)
	Middle : 37-46	30(60)	19(38)
2	Old : 47-60	8(16)	21(42)
	Farming experience :		
	Low : 0-10	15(30)	8(16)
3	Medium : 11-22	11(22)	22(44)
	High : 23-34	16(32)	20(40)
	Farm holding :		
4	Marginal : upto 2.5 acre	10(20)	14(28)
	Small : 2.6-5.0	14(28)	22(44)
	Medium : 5.1-10	20(40)	10(20)
	Large : >10	6(12)	4(8)
5	Extension contact :		
	Low : 0-10	4(8)	16(32)
	Medium : 11-22	19(38)	25(50)
6	High : 23-34	27(54)	9(18)
	Knowledge :		
	Low : 0-6	7(14)	10(20)
7	Medium : 7-13	16(32)	22(44)
	High : 14-20	27(54)	20(40)
	Adoption :		
8	Low : 0-6	12(24)	14(28)
	Medium : 7-13	18(36)	20(40)
	High : 14-20	20(40)	16(32)



Table 2: Knowledge and adoption of Direct sowing technology practices by paddy farmers

S. No.	Direct sowing technology practices	Knowledge				Adoption			
		FLD farmers (50)		Non-FLD farmers (50)		FLD farmers (50)		Non-FLD farmers (50)	
		Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
1	Direct sowing paddy using drum seeder require fields in well puddled and levelled condition	30	60%	24	48%	18	36%	16	32%
2	Pre germinated paddy seed are sown with drum seeder after draining standing water	29	58%	21	42%	18	36%	16	32%
3	If there is more standing water in the field, leave the field for 1-2 days for settling of puddled soil	26	52%	20	40%	18	36%	17	34%
4	Seeds are soaked in water for 24 hours and incubation in gunny bags for 24-48 hours	21	42%	18	36%	19	38%	16	32%
5	Germination length of seeds should not be more than 1-2mm to avoid mechanical injury of pregerminated seeds and to ensure flow of seeds with the drum seeder	28	56%	24	48%	15	30%	13	26%
6	Sowing of sprouted seed using drum seeder in 8 rows with row to row spacing of 20 cm facilitates good tillering	26	52%	20	40%	19	38%	18	36%
7	Weedicide is a must in direct sowing using drum seeder in puddle fields	23	46%	20	40%	18	36%	16	32%
8	Thin layer of irrigation water is to be maintained till the seeds germinate	26	52%	19	38%	19	38%	18	36%
9	Operating conoweeder between the rows in direct seeding incorporates weeds and improves tillering.	22	44%	18	36%	15	30%	14	28%
1	Intermittant irrigation at every 2-3 days upto panicle initiation stage enhances good tillering	26	52%	18	36%	14	28%	12	24%
11	Use of drum seeder is easy to operate and 3-4 acres sowing can be done in one day by one man labour	21	42%	13	26%	18	36%	17	34%
12	Drum seeder is a drudgery reducing tool. Use of drum seeder is easy, convenient by one person resulted in shift of work of women to men	21	42%	21	42%	20	40%	20	40%
13	Sowing by drum seeder saves costly seeds	20	40%	14	28%	14	28%	13	26%
14	Drum seeder reduces labour requirement in paddy cultivation	9	18%	7	14%	8	16%	7	14%
15	Direct sowing in puddle fields using drum seeder, saving 2-3 irrigations compared to transplanting	26	52%	20	40%	23	46%	20	40%
16	Use of drum seeder helps in timely sowing of crop resulting in more yields	7	14%	6	12%	6	12%	6	12%
17	Crop matures one week early in direct sowing compared to transplanting	24	48%	18	36%	21	42%	20	40%
18	Use of direct sowing increased paddy yield compared to transplanting	26	52%	20	40%	20	40%	19	38%
19	Net profit is more in direct sowing using drum seeder than transplanting	26	52%	22	44%	20	40%	20	40%
20	Farmers are interested in replacement of transplanting into direct sowing paddy using drum seeder in future.	30	60%	26	52%	21	42%	20	40%

The data in Table 3 depicts the comparison on various parameters for conventional method of transplanting paddy and seeding of pregerminated seeds using drum seeder. The seed requirement in direct sowing paddy (30-37.5 kg/ ha) is reduced by 60% as compared to conventional transplanting (75 kg/ha). The labour requirement in sowing by drum seeder (5 /ha) is reduced by 90% as compared to manual transplanting (50 /ha). The transplanting of rice seedlings which is a highly labour-intensive and expensive operation can be replaced by direct seeding that can reduce labour needs by more than 20 per cent in terms of working hours required (Pradhan, 1969; Santhi *et al.*, 1998.). Days to transplant elucidates that nursery has to be sown about one month in advance than direct sowing.

The Table 4 delineates that the cost cultivation by direct sowing paddy using drum seeder was Rs. 16,500/- per ha as compared to Rs.21,167/- per ha in conventional method. The cost of paddy cultivation is reduced by 22% as compared to conventional transplanting. Grain yield was 7.58 t/ha for direct sowing paddy and 5.23 t/ha for transplanted paddy. The benefit cost ratio of paddy is 3.59 in direct sowing paddy as compared to 1.88 in conventional transplanting. Shekar and Singh (1991) have stated that direct seeding of sprouted seeds under puddled condition results in significant improvement in yield attributes like number of effective tillers and grain yield. The higher benefit cost ratio achieved among majority of farmers in direct sowing paddy may be due to not only higher yields obtained but also due to less cost involved in cultivation, reduced crop duration and water saving.

With regard to yield 78 per cent farmers realized higher yield over normal, thus expressed satisfaction with direct sowing technology. Higher yield, less cost of cultivation, net profit, higher benefit cost ratio and reduced crop duration was realized by 80 per cent farmers. Majority of farmers observed water saving (86 %) in direct sowing paddy over conventional transplanting. The reduced crop duration and water saving has got advantage in present situation of severe water scarcity and poor power supply which adds to the advantages of direct sowing paddy using drum seeder. Similar trend of reduction in crop duration and water saving was also reported by Wang and Sun (1990). Direct sowing paddy using drum seeder helps to reduce water requirement and facilitates to avoid water stress specially for rice grown in tail end areas, under wells and tube wells.

Adoption of direct sowing paddy using drum seeder resulted in increase in the rice yield from 5.23 to 7.58 tonnes/ha in Vizianagaram district during *kharif*, 2007, 2008 and 2009. The cost of paddy cultivation is reduced by 22% as compared to conventional transplanting. The benefit - cost ratio of rice is 3.59 in direct sowing paddy as compared to 1.88 in conventional transplanting. The higher benefit cost ratio achieved among majority of farmers in direct sowing paddy may be due to not only higher yields obtained but also due to less cost involved in cultivation, reduced crop duration and water saving.

The findings indicated that majority (60%) of the FLD farmers belonged to middle age while majority (42%) of the non-FLD farmers belonged to old age. The middle and young aged farmers are motivated towards adoption of innovations and able to adopt the direct sowing paddy in puddle field using drum seeder. Majority of the FLD farmers had high farming experience (42%) while majority of the non-FLD farmers had high level of farming experience (44%). Farming experience correlated with the age of the farmers as old farmers had more years of farming experience than the young farmers. Majority of FLD farmers (54%) had high extension contact and majority of non-FLD farmers had (50%) medium extension contact. Majority of FLD farmers (40%) having medium farm holding and majority of non-FLD (44%) were small farmers. Fifty four per cent of the FLD farmers possessed high knowledge level and remaining farmers possessed medium (32%) and low (16%) level knowledge regarding direct sowing paddy. This might be due to the fact that majority of the farmers were educated and frequently contacted different extension functionaries on technical matters. It is evident from the findings that the improvement in these characters would positively enhance knowledge and adoption levels and was supported by the findings of Raji *et al.*, (1996), Parthasarathi (1997) and Ramesh and Govind (2008).

Whereas forty four percent of non-FLD farmers possessed medium level of knowledge followed by high (40%) and low (20%) level of knowledge on direct sowing paddy. Forty percent of FLD farmers had high adoption level followed by medium (36%) and low (24%) level adoption. Forty per cent of non-FLD farmers had medium adoption level of direct sowing paddy practices followed by high (32%) and low (28%) adoption.



Table 3: Comparison on various parameters for conventional method of transplanting paddy and direct sowing using drum seeder

S. No.	Particulars	Direct sowing paddy	Conventional transplanting
1.	Seed rate	30-37.5 kg/ ha	75 kg/ha
2.	Days to transplant	0 days	30-40 days
3.	Seed placement	Seed on the surface	Seedling under the soil
4.	Cost of nursery raising	Rs.0/-	Rs. 3000/-
5.	Labour required for transplanting/seed operation	5 / ha	50 /ha

Table 4: Comparison on economic parameters for conventional method of transplanting paddy and direct sowing using drum seeder

S. No.	Particulars	Direct sowing paddy	Conventional transplanting
1.	Cost of sowing /transplanting (Rs./ha)	800	3000
2.	Cost of weeding (Rs./ha)	700	1500
3.	Cost of irrigation (Rs./ha)	5600	4800
4.	Average cost of cultivation (Rs./ha)	16500	21167
5.	Grain yield (t/ha)	7.58	5.33
6.	Gross returns (Rs./ha)	53197	37428
7.	Net profit (Rs./ha)	36697	16261
8.	Benefit cost ratio	3.59	1.88

Conclusion

Comprehensive and holistic efforts of DAATT Centre and its technical support to the department of agriculture in promoting direct sowing paddy through front line demonstrations has created significant change at farmers level in paddy cultivation. The present study had clearly indicated the superiority of direct sowing paddy using drum seeder as a sustainable method of rice cultivation.

The present finding shows that lot of awareness is to be created on the advantages of ploughing, levelling, seed germination, sowing, water and weed management in direct seeding rice using drum seeder in puddle field.

Future thrust to upscale adoption of direct seeding rice is : large scale supply of drum seeders, conoweeder, organising training programmes involving department of agriculture and NGO's in promotional activities.

References

Parthasarathi S. 1997. A study on the impact of rice farmers field schools among trained and untrained farmers. M.Sc(Ag) thesis. Annamalai university, Annamalai Nagar.

Pradhan SN. 1969. Mechanization of rice cultivation. *Oryza* 6: 67-71

Raji RJ, Muthiah M and Arunachalam R 1996. Relationship between knowledge and adoption behaviour of trained and untrained farmers with their socio-personal characteristics. *Journal of extension education* 7: 1304-1306.

Ramesh P and Govind S. 2008. Extent of adoption and relationship between the characteristics of organic farmers and their adoption level. *Mysore Journal of Agricultural sciences* 42(3): 526-529.

Santhi P, Ponnuswamy K and Chetty NK. 1998. Effect of seeding methods and efficient nitrogen management practices on the growth of lowland rice. *Journal of Ecobiology* 10(2): 123-132.

Shekar J and Singh CM.1991. Influence of methods and dates of stand establishment on growth and yield of rice. *Oryza* 28:45-48.

Wang HY and Sun TS. 1990. The characteristics of machine direct-sown rice following wheat and the corresponding techniques. *Acta Agricultural Universities Jiangxiensis* 12: 34-39.