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A study on status of drum seeder technology in rice among the farmers of Nalgonda district Telangana state

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Abstract

The present study was conducted to know the status of Rice drum seeder technology in terms of knowledge, adoption and problems faced by farmers across the selected villages of Nalgonda district where large number of demonstrations on rice drum seeder technology were organized by Krishi Vignan Kendra, Kampasagar. The study was conducted in Nalgonda district as it is one of the leading rice producing districts in Telangana state. A total of twelve villages were selected, from each village, 10 farmers were selected randomly, thus a total of 120 beneficiaries practicing drum seeder technology were selected for the study. The data was analysed with statistical technique frequency, percentage etc. KVK, Kampasagar promoted drum seeding technology in selected villages of Nalgonda district through On-farm trials, Frontline demonstrations, Training programmes, Method demonstrations, Result demonstrations, Field days and Exposure visits since the introduction of the technology. The results revealed that farmers had high knowledge (59.16%), adoption (51.67%) on recommended package of practices of the technology and weed management (81.7%) is the major problem faced by the farmers.

Keywords: Rice, drum seeder technology, knowledge, adoption, rice growers

Introduction

Rice is the major staple food more than half of the global population. It is the dominant crop of the country as it is grown in almost all the states of the country. In Telangana rice is the major food crop grown in an area of 25.75 lakh ha with production of 93.44 lakh tonnes and an average productivity of 3630 kg ha^{-1} (Upag, DA&FW, 2024) Rice is the predominant monocropped occupying the major area in Nalgonda District of Telangana State.

Nalgonda district, Majority of the farmers follow conventional method of cultivating rice *i.e.,* manual transplanting of rice under tanks and canals as source of irrigation. receipt of water under canals and tanks is seen in the second week of August or much later due to on set of monsoon, as a result farmers face water shortage, delayed and limited release of irrigation water from canals is observed. Most of the farmers take up nurseries from June last week in anticipation of rain water and as rains are delayed over-aged seedlings are transplanted due to late release of canal water, on receipt of water and there is high demand for labour during transplantings and other agricultural operations. The rice farmers practicing transplanting are facing problem of shortage of labour during peak time, high labour charges, small and fragmented land holdings, lack of technical knowledge, non-availability of sufficient water and other inputs. To tackle all these problems direct seeding of rice has been found most appropriate alternative to manual transplanting. It not only avoids seedbed preparation, nursery raising and transplanting but also gives better yield than existing manual transplanting. To address these issues and to provide an alternate option to traditional system of rice cultivation, the Krishi Vigyan Kendra, Kampasagar demonstrated drum seeder technology in rice by conducting different extension activities *viz.*, on-farm trials, Frontline demonstrations, Training programmes, Method demonstrations, Result demonstrations, Field days and Exposure visits etc in the Nalgonda district since 2018.

Methodology

Ex-post facto research design was selected for present study. The study was conducted in Nalgonda district of Telangana state. It was purposively selected as it is one of the major rice producing districts of Telangana state. There are thirty one mandals in Nalgonda district, among these four mandals were purposively selected, from each mandal three villages were selected based on the area under Drum seeder technology i.e., a total of twelve villages were selected. From each selected village, 10 farmers were selected randomly, thus a total of 120 beneficiaries practicing drum seeder technology were selected for the study. The data from the respondents was collected with the help of

structured schedules and personal interviews.
The collected data was analyzed and statistical technique frequency, percentage were used. The Primary data was collected from the farmers through personal interview with the help of well-prepared pre-tested schedules and questionnaire.

Results and Discussion

Table 1: Profile characteristics of the respondents

S. No.	Independent variable	Category	Frequency (No.)
1.	Age	Young (23-34)	38
		Middle (34-45)	54
		Old (45-56)	28
2.	Education	Illiterate	13
		Primary school	15
		Middle school	25
		High school	24
		Diploma	11
		Intermediate	28
		Graduation	4
3.	Farm size	Small farmer (<2.5ha)	63
		Medium farmer (2.5ha-5.0ha)	39
		Medium farmer (>5.0ha)	18
4.	Farming Experience	Low (5-14 years)	17
		Medium (14-23years)	62
		High (23-32 years)	41
5.	Training Undergone	Low (5-6)	22
		Medium (6-7)	37
		High (7-8)	61
6.	Extension Contact	Low (10-16)	17
		Medium (16-22)	29
		High (22-28)	74
7.	Mass media exposure	Low (12-17)	22
		Medium (17-22)	68
		High (22-27)	30
8.	Information seeking behavior	Low (13-18)	21
		Medium (18-23)	55
		High (23-28)	50
9.	Risk orientation	Low (11-13)	35
		Medium (13-15)	54
		High (15-17)	31

The results revealed that majority of the respondents were middle aged (54.00%), intermediate school education (28.00%), most of the farmers are small farmers having less than 2.5 ha of land (63.00%), medium farming experience (62.00%), high training undergone (61.00%), high extension contact (74.00%), medium mass media exposure (68.00%), information seeking behavior (55.00%) and risk orientation (54.00%) (Table 1).

Table 2: Perceived attributes of respondents regarding Drum seeder technology in rice

I. Rice drum seeder technology is "Relatively advantageous" over conventional method in terms of				
S. No.	**Particulars**	**Agree**	**undecided**	**Disagree**
1.	Less cost of cultivation	94	10	16
2.	More net profits	73	29	18
3.	Saving of time	97	9	14
4.	Reduced labour cost	89	21	10
5.	Less seed rate	112	5	3
	Average	93	14.8	12.2
II. Rice drum seeder technology is "Compatible" with existing cultivation practices in terms of				
1.	Less initial cost	81	21	18
2.	Feasible in present situation	112	5	3
3.	Independent of existing practices	14	19	87
4.	Recognition in the society	89	20	11
5.	Cultural acceptance	98	16	6
	Average	78.8	16.2	25
III. Rice drum seeder technology is "Complex" when compared to conventional method in terms of				
1.	Knowledge of Technology	43	21	56
2.	Operation and maintenance	39	22	59
3.	Resource abundancy	48	18	54

4.	Weed management	82	13	25
5.	Irrigation management	78	19	23
	Average	58	18.6	43.4
IV. Rice drum seeder technology is "Trilable" in the field in terms of				
1.	Manual drawn	97	12	11
2.	Easily operated	109	8	3
3.	Can be operated in small and large as per requirement	105	11	4
4.	Low cost	93	17	10
5.	Easily availability	84	23	13
	Average	97.6	14.2	8.2
V. Rice drum seeder technology is "observable" in the field in terms of				
1.	Less Seed rate	112	6	2
2.	Water saving	109	3	8
3.	Good No. tillers	97	14	9
4.	Reduced Pest and disease attack	89	19	12
5.	Good Yield	85	21	14
	Average	98.4	12.6	9
	Average of all attributes	85.16	15.28	19.56

From table 02, it was observed that majority of the farmers with respective to "Relative Advantage" agreed that drum seeding technology in rice requires less seed rate per acre (112.00%), this technology avoids rising of nursery and transplanting of seedling hence majority of the respondents agreed that it saves time (97.00%). Drum seeder technology in Rice reduces cost of cultivation (94.00%) by minimizing seed cost, labor cost, reduced number of sprayings etc. There is peak demand for labor during the transplanting season, this technology helps in reducing the labor cost (89.00%). Thus, less seed rate, reduced labor cost and cost of cultivation resulted in more net profits (73.00%).

Majority of the respondents with respective to "Compatibility" agreed that the technology is feasible in present situation (112.00%) to overcome the labor shortage and farmers can carry out timely sowing without any delay and simple technical skill was enough to run the drum seeder successfully. Cultural acceptance (98.00%) respondents perceived that rice drum seeder technology was compatible with already existing cultural ideas, belief, values and interest of the society. Recognition in the society (89.00%) technology adoption definitely raises prestige and recognition in the society due to frequent visit made by extension officials, agricultural scientists and practices like sowing with drum seeder and avoiding nursery raising. less initial cost (81.00%) initial cost of rice drum seeder is very less (Rs.5000) as compared to conventional method of transplanting and machine transplanting method.

With regards to "Complexity" of rice drum seeder technology majority agreed to weed management (82.00%) as they feel that it is difficult to control weeds in drum seeder technology, also timely irrigation management (78.00%) is crucial for obtaining good yields. Some of farmers disagreed to operation and maintenance (59.00%) as it requires little maintenance, Knowledge of Technology (56.00%), Resource abundancy (54.00%) because it is simple in technology, application, resource abundancy and labour efficiency is more in rice drum seeder technology.

With regards to "Trilability" in drum seeding technology in rice majority agreed that it can be easily operated (109.00%) with simple technical skills. As most of the lands are fragmented it can be operated in small and large areas as per the requirement (105.00%), manual drawn (97.00%), low cost (93.00%) and easily available (84.00%) in every village.

With respective to "Observability" drum seeding technology requires less seed rate (112.00%), it consumes less water thus helps in water saving (109.00%), drum seeding technology helps in good crop growth and establishment and thus produces good Number of tillers (97.00%), with reduced pest and disease attack (89.00%), and ultimately obtains good yields (85.00%)

Finally, it can be concluded that majority of the respondents (85.16%) had favorable perception towards rice drum seeder technology and 19.56 percent had unfavorable perception where as 15.28 percent were undecided. These findings were in line with results of Nirmala (2012) [6].

Table 3: Distribution of farmers on their knowledge level on rice drum seeder technology

S. No.	Level of Knowledge	Frequency	Percentage
1.	Low	10	08.33
2.	Medium	39	32.50
3.	High	71	59.16

From table 03, it was observed that, majority of the respondents (59.16%) had high level of knowledge followed by medium (32.5%) and low (8.33%) (Ganesan and Seethalakshmi 2002) [2].

The reasons for this result might be due to good educational status, high extension contact, high training undergone, and medium information seeking behavior, medium mass media exposure and medium risk orientation. Due to good education levels majority of them were able to gather the information and read information bulletin related to rice drum seeder technology. The agricultural department and extension agencies conduct training programmes, demonstrations, make farmers to visit and interact with progressive farmer's fields and inspire them to have more extension contact and social participation. So farmers will improve their knowledge about recommended package of practices and thus obtained high level of knowledge regarding rice drum seeder technology. The results were in conformation with Thiyagarajan (2011) [9].

Table 4: Knowledge level of farmers on Rice Drum Seeder technology

S. No.	Rice drum seeder technology practices	Knowledge level		
		Frequency	Percentage	Rank
1	Rice drum seeder technology requires less seed rate	83	69.16	12
2	Perfect leveling is required for rice drum seeder technology	103	85.83	6
3	Seed should be filled with 3/4th of the drum	87	72.50	11
4	Pre germinated seed are sown with drum seeder after draining standing water	98	81.67	8
5	If there is more standing water in the field, leave the field for 1-2 days for settling of puddled soil	89	74.16	10
6	Sowing of sprouted seed using drum seeder with row to row spacing of 20cm facilitates good tillering	105	87.50	5
7	Weedicide is a must in direct sowing using drum seeder in puddle fields	112	93.33	3
8	Thin layer of water to be maintained at time of sowing	94	78.33	9
9	Intermittent irrigation at every 2-3days up to P.I.stage enhances tillering	87	72.50	11
10	Use of drum seeder is easy to operate and 3ac can be sown in a day by one man labour	101	84.16	7
11	Drum seeder method optimizes the water usage	115	95.83	2
12	Drum seeder is easy to use	104	86.67	5
13	Use of drum seeder helps in timely sowing of crop	117	97.50	1
14	Sowing by drum seeder saves time and reduces the crop period by 7days	109	90.83	4
15	Drum seeder reduces labour requirement	114	95.00	3

Use of drum seeder helps in timely sowing of crop (97.5%), helps in optimum utilization of water (95.83%), reduces labour requirement (95.00%), sowing by drum seeder saves time and reduces the crop period by 7days (90.83%) and it is easy to use (86.67%) respectively. The above results shows that farmers have good knowledge on drum seeding technology in rice due to medium age group having good education levels, with medium farm size, farming experience, mass media exposure, information seeking behavior, risk orientation, but has high extension contact and training undergone for obtaining technical advice (Table 4).

Table 5: Extent of Adoption of farmers on Rice Drum Seeder technology

S. No	Category	Class Interval	Frequency	Percentage
1	Low Extent of Adoption	24-32	16	13.33
2	Medium Extent of Adoption	32-40	42	35.00
3	High Extent of Adoption	40-48	62	51.67

From table 5 it can be inferred that, majority if the farmers have (51.67%) high level of adoption followed by medium (35.00%) and low (13.33%) Thiyagarajan (2011) [9]. The reasons for high level of adoption is due to good educational status, high extension contact, high training undergone, and medium information seeking behavior, medium mass media exposure and medium risk orientation. It indicates that most of the farmers adopted the whole package of practices of the drum seeder technology as per the recommendations of the scientists of KVK and Department of agriculture. High rate of adoption is with reference to the component practices of the technology adopted by the farmers and low rates of adoption referrers to the partial adoption of the technology. It also reveals that FLDs, training programmes, field days etc organized by KVK helped in gaining the required knowledge on the technology and thus increased the adoption rate among the farmers. (Chinnam Naidu *et al.*, 2018) [1].

Table 6: Adoption level of farmers on Rice Drum Seeder technology

S. No.	Recommended practices	Level of adoption					
		Fully adopted		Partially adopted		Not adopted	
		F	%	F	%	F	%
i.	**Field Preparation**						
1	Perfect leveling of field before sowing	99	82.50	16	13.33	05	04.17
2	Field should be well puddled compared to normal transplanting method	78	65.00	23	19.17	19	15.83
3	Draining out excess water before sowing	85	70.83	22	18.33	13	10.83
4	Leave the field for 1-2 days for settling of puddled soil	49	40.83	52	43.33	19	15.83
ii.	**Sowing**						
1	Seed rate 10-15 kg/acre	93	77.50	17	14.17	10	08.33
2	Seed treatment	72	60.00	13	10.83	35	29.17
3	Pre germinated seed used for sowing with drum seeder	89	74.17	19	15.83	12	10.00
4	Germinated seed is filled 3/4th of the drum	87	72.50	23	19.17	10	08.33
iii.	**Weeding**						
1	Application of pre-emergence herbicide	49	40.83	18	15	53	44.17
2	Herbicide application 3-5 days after sowing	78	65.00	27	22.50	15	12.5
3	Application of post emergence 20-25 days after sowing	87	72.50	21	17.50	12	10
4	Weeding with cono weeder or power weeder	32	26.67	24	20	64	53.33
iv.	**Water management**						
1	A thin film of water i.e., 1cm over the field was maintained at the time of sowing operation.	49	40.83	54	45	17	14.17
2	Water should be flooded at the field after every three days of germination upto to 12 days	51	42.50	48	40	21	17.50
3	Water level about 2-3 cm should be maintained upto tillering stage	83	69.17	22	18.33	15	12.50
4	Recommended water level should be maintained from panicle initiation stage to harvesting stage	79	65.83	32	26.67	09	7.50

It can be inferred that, majority of the farmers (82.50%) practices perfect leveling of field before sowing, draining out excess water before sowing (70.83%) as farmers feel that it is most important for establishment of good crop growth, majority of farmers uses less/recommended seed rate (77.50%), pre germinated seed used for sowing with drum seeder (74.17%), application of post emergence 20-25 days after sowing (72.50%), majority of the farmers (53.33%) found difficult weeding with cono weeder in fields, maintains water level about 2-3 cm upto tillering stage (69.17%) respectively adopted the recommended package of practices thus shows high level of adoption among the farmers (table 6).

Table 7: Relative importance of recommended practices under drum seeder technology in rice as perceived by the farmers

S. No.	Practices	Frequency	Percentage	Rank
1	land Leveling & Field preparation	109	90.8	1
2	Seed treatment	34	28.3	10
3	Sowing of sprouted seed ¾ of the drum	89	74.2	5
4	Pre emergence application of herbicide	107	89.2	2
5	Running cono weeder at 20 DAS and 35 DAS	34	28.3	9
6	Post emergence application of herbicides at 20-25 DAS	104	86.7	3
7	Gap filling at 20 DAS	38	31.7	8
8	Water management up to 20 days	94	78.3	4
9	Water management throughout crop growth	81	67.5	6
10	Plant protection	67	55.8	7

The recommended practices of drum seeding technology in rice the practices were rank ordered as per the relative importance as felt by the farmers. Among the practices, land leveling and field preparation was rated important by 90.8% of the farmers followed by preemergence application of herbicide (89.2%), post emergence application of herbicide (86.7%), water management up to 20 days (78.3%) and sowing of sprouted seed ¾ of the drum (74.2%) respectively (Table 7) perceived by the farmers that these practices contributed for higher yields. (Chinnam Naidu *et al.*, 2018) [1].

Table 8: Problems experienced by the farmers

S. No.	Problems	Frequency	Percentage
1	Immediate rains after sowing in Kharif	72	60.0
2	Difficulty in running the drum seeder in saline soils	82	68.3
3	Availability of drum seeders	25	20.8
4	Lack of information on tech. Know-how	21	17.5
5	Field preparation and leveling	32	26.7
6	Damage due to birds at germination stage	38	31.7
7	Poor crop growth due to uneven leveling	78	65.0
8	Weed Management	98	81.7
9	Difficulty in use of cono weeder for large area.	89	74.2
10	Water management	35	29.2
11	Poor germination in saline soils	74	61.7
12	Gap filling is difficult	28	23.3

Major problems expressed by the farmers *viz*., Weed Management (81.7%) farmers expressed that weed management is the major problem and timely management is required for obtaining good yields, farmers feel difficulty in operating cono weeder (74.2%), difficulty in running the drum seeder in saline soils (68.3%), uneven leveling may leads to poor crop growth (65.0%) respectively were the major constrains faced by the farmers in adoption of drum seeding technology in rice (Table 8).

Conclusion

It can be concluded from these findings, farmers has high level of knowledge and adoption of recommended practices under rice drum seeder technology in Nalgonda district. Farmers accepted this technology as seeing is believing. It involves less cost of cultivation than traditional method. Mainly it reduces labour during peak periods i.e. transplanting time. It is technically viable and economically feasible that could be adopted by even small and marginal farmers also. KVK extension activities played very important role in popularization of the technology, which includes training, demonstrations, field days in farmer field.

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