

RESEARCH ARTICLE

An Analysis of Knowledge and Adoption of Critical Crop Interventions in Rice Cultivation by Tenant Farmers in A.P.**P. Revathi Nagamani¹, V. Jyothi² and P.V. Satya Gopal³**

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ABSTRACT

Agriculture is dependent on nature but appropriate interventions at critical stages of crop can yield good harvest. The study was conducted in East Godavari district of Andhra Pradesh state. Three mandals viz., Kirlampudi, Peddapuram, Kajuluru were selected using simple random sampling procedure. A total sample of 135 were selected for the study. Knowledge and adoption of critical interventions in rice cultivation by the tenant farmers, owners cum tenant farmers and owner farmers was studied. Majority of the tenant farmers had low (80.00%) knowledge on critical interventions in rice cultivation, followed by medium (15.56%) and high (4.44%) knowledge. More than two-third of the owner cum tenant farmers had medium (66.67%) knowledge on critical interventions in cultivation, followed by high (17.78%) and low (15.56%) knowledge. More than three-fourth of the owner farmers had high (75.56%) knowledge on critical interventions in cultivation, followed by medium (15.56%) and low (8.89%) knowledge. Friedman test statistic and chi-square value for the knowledge levels of the respondents inferred that there is a significant difference in knowledge levels between different groups. Adoption is based on the knowledge level. Friedman test statistic and chi-square value inferred that there is a significant difference in adoption levels between different groups.

Key words: Tenant farmer; Owner cum tenant farmer; Owner farmer; Knowledge; Adoption.

The proportion of the population depending on agriculture for employment opportunities is more in India than any other sector. As high as 70 per cent of the rural households in India depend primarily on agriculture for their livelihood. To boost this sector GOI has undertaken a number of measures ranging from knowledge support, credit support, price support, crop insurance to agriculture marketing reforms. These measures were introduced to benefit the persons who are actually cultivating the land. In field situation, it is observed that there are three types of people who are cultivating the land. They include the people who don't have any own land but practice cultivation on leased lands called as tenant farmers. The second group consists of the people practicing farming on own land as well as on leased land called as owner cum tenant farmers. The third group of farmers consists of the people practicing farming on own land called owner farmers. It is observed that there is an increase in the number of tenant farmers and owner cum tenant farmers in the recent past. This increase is many a times off the

record. Agriculture is considered as the backbone of Indian economy. Every farmer is important to make this backbone strong and so the tenant farmers also.

As Indian economy is becoming mature and inclusive, tenancy is likely to increase in future. Urbanization and rural migration to cities and towns further added to increased tenancy. The form of cultivating crops on rented lands is termed as tenant farming. The study was planned considering the three groups of farmers namely tenant farmers, owner cum tenant farmers and owner farmers.

METHODOLOGY

An Ex-post facto research design was used for carrying out the study. Based on the highest number of tenant farmers among the districts in Andhra Pradesh, East Godavari was selected for the study. Three mandals viz., Kirlampudi, Peddapuram, Kajuluru were selected using simple random sampling procedure. A sample of 45 tenant farmers, 45 owners cum tenant farmers and 45 owner farmers cultivating rice thus

accounting to a total sample of 135 were selected for the study. Knowledge and adoption of critical crop interventions in rice cultivation by the tenant farmers, owners cum tenant farmers and owner farmers were studied.

For the purpose of the study knowledge was operationally defined as the behaviour to recall the information, facts, data, ideas, methods, approaches, etc on critical crop interventions in rice cultivation. Adoption was operationalized as the decision to make full use of an innovation. The knowledge was measured using structured test prepared through discussion with the experts and the Zonal Research and Extension Advisory Council (ZREAC) recommendations. Adoption for the test items was studied on a three-point continuum *viz.*, fully adopted, partially adopted and not adopted. Based on the responses considering mean and SD the respondents were grouped into three knowledge categories and adoption categories as low (Mean –S.D. and below); medium (Mean \pm S.D) and high (Mean + S.D and above). Frequency and percentage were calculated. Friedman test was used to know the difference in knowledge and adoption among the three groups.

RESULTS AND DISCUSSION

The overall results of the knowledge of the respondents on critical crop interventions in rice cultivation as presented in Table 1 revealed that majority of the tenant farmers had low (80.00%) knowledge on critical interventions in rice cultivation, followed by medium (15.56%) and high (4.44%) knowledge. The results are in conformity with that reported by *Karamjit et al. (2017)*, *Hema and Ashokan (2019)*, *Rajneesh et al. (2020)* and *Revathi Nagamani et al. (2020)*. More than two-third of the owner cum tenant farmers had medium (66.67%) knowledge on critical interventions in cultivation, followed by high (17.78%) and low (15.56%) knowledge. The results are in conformity with that reported by *Mithun et al. (2020)*. More than three-fourth of the owner farmers had high (75.56%) knowledge on critical interventions in cultivation, followed by medium (15.56%) and low (8.89%) knowledge. The results are in conformity with that reported by *Dhodiya et al. (2016)*, *Vijayabhinandana et al. (2019)*, and *Gurjar et al. (2020)*, *Swami and Verma (2022)*.

It could be inferred from the above results that greater proportion of the tenant farmers had low

Table 1. Distribution of respondents according to knowledge

Category	Tenants		Owner cum tenants		Owners	
	No.	%	No.	%	No.	%
Low	36	80.00	7	15.56	4	8.89
Medium	7	15.56	30	66.67	7	15.56
High	2	4.44	8	17.78	34	75.56
Total	45	100.00	45	100.00	45	100.00
	Mean=36.89		Mean=37.00		Mean=37.18	
	SD=2.27		SD=1.82		SD=4.51	
Mean rank	1.68 C		2.06 B		2.27 A	
Friedman test statistics						
χ^2 (Critical)	$\chi^2 = 9.013 *$		df = 2		P= 0.011	
	= 5.991					

knowledge, while in case of owner cum tenant farmers greater proportion of them had medium knowledge and among owner farmers greater proportion of them had high knowledge. The results could be accounted for the training received, scientific orientation, extension contact and social participation. As the respondents participated in a greater number of training programmes related to agriculture organized by State Department of Agriculture, KVKs, DAATT centres, NGOs and various other public and private organisations along with their increased scientific orientation, extension contact and social contacts might have paved way to acquire knowledge on critical interventions in cultivation. Non-parametric Friedman test was used to find whether any difference lies between knowledge levels of different groups of the respondents.

The mean rank of owners (2.27) is higher than that of owner cum tenants (2.06) and tenant (1.68) farmers as presented in Friedman test statistic chi-square value for the knowledge levels of the respondents is higher than the critical value (5.991) with $df=2$ at 5% level of significance. The test statistic value recorded was 9.013. As the p (0.011) value is less than the significant level, it can be inferred that there is a significant difference in knowledge levels between different groups.

The item wise responses on adoption of critical interventions in rice cultivation by tenant farmers, owner cum tenant farmers and owner farmers is given in Table 2. The item wise adoption of critical interventions in cultivation by tenant farmers, owner cum tenant farmers and owner farmers is discussed below.

Summer deep ploughing : Majority of the tenant farmers fully adopted (86.67%) summer deep

ploughing, followed by partially adopted (8.89%) and not adopted (4.44%). More than half of the owner cum tenant farmers fully adopted (55.33%), followed by not adopted (37.78%) and partially adopted (8.89%). More than half of the owner farmers did not adopt (53.33%) the critical intervention, followed by fully adopted (35.56%) and partially adopted (11.11%).

Sowing small seeded crops at 3-5 cm depth : Cent per cent of the tenant farmers and owner cum tenant farmers did not adopt the optimum sowing depth of 3-5 cm for small seeded crops. Great majority of the owner farmers did not adopt (97.77%) the critical intervention, while the remaining fully adopted (2.22%).

Short duration seed varieties are sown when monsoons are delayed by one month in kharif : More than half of the tenant farmers partially adopted (51.11%) the critical intervention, followed by fully adopted (42.22%) and not adopted (6.67%). Less than half of the owner cum tenant farmers partially adopted (46.67%), followed by fully adopted (44.44%) and not adopted (8.89%). Less than two-third of the owner farmers partially adopted (62.22%), followed by fully adopted (33.33%) and not adopted (4.44%).

Seed rate is increased with reduced crop duration : Less than half of the tenant farmers partially adopted (48.89%) the critical intervention, followed by fully adopted (44.44%) and not adopted (6.67%). Less than two-third of the owner cum tenant farmers partially adopted (64.44%), followed by fully adopted (26.67%) and not adopted (8.89%). Less than three-fourth of the owner farmers partially adopted (73.33%) the critical intervention, followed by not adopted (15.56%) and fully adopted (11.11%).

Seed treatment : More than half of the tenant farmers fully adopted (53.33%) the critical intervention, followed by not adopted (44.44%) and partially adopted (2.22%). More than half of the owner cum tenant farmers had not adopted (53.33%), followed by fully adopted (37.78%) and partially adopted (8.89%). More than half of the owner farmers did not adopt (57.78%), followed by partially adopted (40.00%) and fully adopted (2.22%).

Application of farm yard manure : More than half of the tenant farmers fully adopted (53.33%) the critical intervention, followed by not adopted (44.44%) and partially adopted (2.22%). Less than three-fourth of the owner cum tenant farmers did not adopt (71.11%), followed by fully adopted (17.78%) and partially

Table 2. Adoption of critical crop interventions in rice cultivation by tenants, owner cum tenants and owner farmers

Statement/Respondent		Fully adopted (3)		Partially adopted (2)		Not adopted (1)	
		No.	%	No.	%	No.	%
		Summer deep ploughing	T	39	86.67	4	8.89
	OT	24	53.33	4	8.89	17	37.78
	O	16	35.56	5	11.11	24	53.33
Sowing	T	--	--	--	--	45	100.00
	OT	--	--	--	--	45	100.00
	O	1	2.22	--	--	44	97.78
Short duration varieties during delayed monsoons	T	19	42.22	23	51.11	3	6.67
	OT	20	44.44	21	46.67	4	8.89
	O	15	33.33	28	62.22	2	4.44
Increased seed rate with reduced crop duration	T	20	44.44	22	48.89	3	6.67
	OT	12	26.67	29	64.44	4	8.89
	O	5	11.11	33	73.33	7	15.56
Seed treatment	T	24	53.33	1	2.22	20	44.44
	OT	17	37.78	4	8.89	24	53.33
	O	18	40.00	1	2.22	26	57.78
Application of FYM	T	24	53.33	1	2.22	20	44.44
	OT	8	17.78	5	11.11	32	71.11
	O	12	26.67	15	33.33	18	40.00
Soil test-based fertilizer application	T	43	95.56	--	--	2	4.44
	OT	43	95.56	1	2.22	1	2.22
	O	43	95.56	1	2.22	1	2.22
Basal application of phosphorous fertilizers	T	--	--	--	--	45	100.00
	OT	--	--	1	2.22	44	97.78
	O	--	--	--	--	45	100.00
Split application of nitrogen fertilizers	T	--	--	--	--	45	100.00
	OT	--	--	1	2.22	44	97.78
	O	--	--	--	--	45	100.00
Foliar application of micronutrients	T	--	--	1	2.22	44	97.78
	OT	--	--	1	2.22	44	97.78
	O	--	--	--	--	45	100.00
Use of potash fertilizers	T	--	--	1	2.22	44	97.78
	OT	--	--	2	4.44	43	95.56
	O	--	--	2	4.44	43	95.56
Use of yellow sticky traps	T	43	95.56	2	4.44	--	--
	OT	41	91.11	3	6.67	1	2.22
	O	44	97.78	1	2.22	--	--
Pre emergence herbicide application	T	--	--	3	6.67	42	93.33
	OT	1	2.22	1	2.22	43	95.56
	O	2	4.44	1	2.22	42	93.33
Post emergence herbicide application	T	--	--	2	4.44	43	95.56
	OT	--	--	--	--	45	100.00
	O	1	2.22	1	2.22	43	95.56
Field crop rotated with pulse s	T	40	88.89	1	2.22	4	8.89
	OT	37	82.22	3	6.67	5	11.11
	O	34	75.56	5	11.11	6	13.33
Irrigation based on soil type	T	--	--	--	--	45	100.00
	OT	--	--	--	--	45	100.00
	O	--	--	--	--	45	100.00
Alkali soil reclamation	T	40	88.89	4	8.89	1	2.22
	OT	35	77.78	3	6.67	7	15.56
	O	34	75.56	6	13.33	5	11.11
Correcting zinc deficiency	T	1	2.22	16	35.56	28	62.22
	OT	2	4.44	8	17.78	35	77.78
	O	1	2.22	10	22.22	34	75.56
Use of bio fertilizers	T	--	--	--	--	45	100.00
	OT	--	--	2	4.44	43	95.56
	O	2	4.44	1	2.22	42	93.33
Basal application of potash	T	--	--	--	--	45	100.00
	OT	--	--	1	2.22	44	97.78
	O	--	--	--	--	45	100.00
Basal application of zinc in rabi	T	1	2.22	26	57.78	18	40.00
	OT	3	6.67	23	51.11	19	42.22
	O	2	4.44	21	46.67	22	48.89

T=Tenants; OT=Owner cum tenants; O=Owner

adopted (11.11%). More than two-third of the owner farmers did not adopt (40.00%), followed by partially adopted (33.33%) and fully adopted (26.67%).

Soil test-based fertilizer application : Great majority of the tenant farmers fully adopted (95.56%) the critical intervention, while the remaining did not adopt (4.44%). Great majority of the owner cum tenant farmers fully adopted (95.56%), followed by partially adopted (2.22%) and not adopted (2.22%). Great majority of the owner farmers fully adopted (95.56%), followed by partially adopted (2.22%) and not adopted (2.22%).

Phosphorous containing fertilizers applied basally only : Cent per cent of the tenant farmers and owner farmers did not adopt the critical intervention. Great majority of the owner cum tenant farmers did not adopt (97.78%), while the remaining partially adopted (2.22%).

Split application of nitrogenous fertilizers : Cent per cent of the tenant farmers and did not adopt the critical intervention. Great majority of the owner cum tenant farmers did not adopt (97.78%), followed by partially adopted (2.22%).

Foliar application of micronutrients to correct nutrient deficiencies: Great majority of the tenant farmers did not adopt (97.78%) the critical intervention, while the remaining partially adopted (2.22%). Great majority of the owner cum tenant farmers did not adopt (97.78%) the critical intervention, while the remaining partially adopted (2.22%). Cent per cent of the owner farmers did not adopt the critical intervention.

Application of potash containing fertilizers to provide resistance to the plants against pests & diseases and improves quality of the produce : Great majority of the tenant farmers did not adopt (97.78%) the critical intervention, while the remaining partially adopted (2.22%). Great majority of the owner cum tenant farmers did not adopt (95.56%) the critical intervention, while the remaining partially adopted (4.44%). Great majority of the owner farmers did not adopt (95.56%) the critical intervention, while the remaining partially adopted (4.44%).

Use of yellow sticky traps acre of crop to monitor sucking pest : Great majority of the tenant farmers fully adopted (95.56%) the critical intervention, while the remaining partially adopted (4.44%). Great majority of the owner cum tenant farmers fully adopted (91.11%) the critical intervention, followed by partially adopted (6.67%) and not adopted (2.22%). Great majority of the owner

farmers fully adopted (97.78%) the critical intervention, while the remaining partially adopted (2.22%).

Pre emergence herbicide application for weed control : Great majority of the tenant farmers did not adopt (93.33%) the critical intervention, while the remaining partially adopted (6.67%). Great majority of the owner cum tenant farmers did not adopt (95.56%), followed by partially adopted (2.22%) and fully adopted (2.22%). Great majority of the owner farmers did not adopt (93.33%), followed by fully adopted (4.44%) and partially adopted (2.22%).

Post emergence herbicide application for weed control : Great majority of the tenant farmers did not adopt (95.56%) the critical intervention, while the remaining partially adopted (4.44%). Cent per cent of the owner cum tenant farmers did not adopt the critical intervention. Great majority of the owner farmers did not adopt (95.56%), followed by fully adopted (2.22%) and partially adopted (2.22%).

Field crop rotated with pulse crop for nitrogen replenishment : Majority of the tenant farmers fully adopted (88.89%) the critical intervention, followed by not adopted (8.89%) and partially adopted (2.22%). Majority of the owner cum tenant farmers fully adopted (82.22%), followed by not adopted (11.11%) and partially adopted (6.67%). Three-fourth of the owner farmers fully adopted (75.56%), followed by not adopted (13.33%) and partially adopted (11.11%).

Irrigation based on soil type- heavy soils- less number of irrigations, light soils - more number of irrigations : Cent per cent of the tenant farmers, owner cum tenant farmers and owner farmers did not adopt irrigation based on soil type.

Alkali soil reclamation using gypsum : Majority of the tenant farmers fully adopted (88.89%) the critical intervention, followed by partially adopted (8.89%) and not adopted (2.22%). More than three-fourth of the owner cum tenant farmers fully adopted (77.78%), followed by not adopted (15.56%) and partially adopted (6.67%). Three-fourth of the owner farmers fully adopted (75.56%), followed by partially adopted (13.33%) and not adopted (11.11%).

Correction of zinc deficiency : Less than two-third of the tenant farmers did not adopt (62.22%) the critical intervention, followed by partially adopted (35.56%) and fully adopted (2.22%). More than three-fourth of the owner cum tenant farmers did not adopt (77.78%) the critical intervention, followed by partially adopted

(17.78%) and fully adopted (4.44%). Three-fourth of the owner farmers did not adopt (75.56%) the critical intervention, followed by partially adopted (22.22%) and fully adopted (2.22%).

Use of bio fertilizers : Cent per cent of the tenant farmers did not adopt the critical intervention. Great majority of the owner cum tenant farmers did not adopt (95.56%), while the remaining partially adopted (4.44%). Great majority of the owner farmers did not adopt (93.33%), followed by fully adopted (4.44%) and partially adopted (2.22%).

Application of potash containing fertilizers in basal for better root growth : Cent per cent of the tenant farmers and owner farmers did not adopt the critical intervention. Great majority of the owner cum tenant farmers did not adopt (97.78%), while the remaining partially adopted (2.22%).

Basal application of zinc in rabi season : More than half of the tenant farmers partially adopted (57.78%) the critical intervention, followed by not adopted (40.00%) and fully adopted (2.22%). More than half of the owner cum tenant farmers partially adopted (51.11%), followed by not adopted (42.22%) and fully adopted (6.67%). Less than half of the owner farmers did not adopt (48.89%), followed by partially adopted (46.67%) and fully adopted (4.44%).

Based on the responses, as presented in Table 3, it is observed that more than half of the tenant farmers had low (57.78%) adoption of critical interventions in cultivation, followed by high (22.22%) and low (20.00%) adoption. The results are in conformity with that reported by *Vijayabhinandana et al. (2018)*, *Kumar et al. (2019)*, *Sharma et al. (2021)*, *Revathi Nagamani et al. (2022)*; *Gopal et al. (2019)*.

More than three-fourth of the owner cum tenant farmers had high (77.78%) adoption of critical

interventions, followed by 11.11 per cent each of the respondents were observed in the categories of low and medium adoption. Two-third of the owner farmers had medium (66.67%) adoption of critical interventions, followed by high (17.78%) and low (15.56%) adoption. The results are in conformity with that reported by *Singh (2016)*, *Jyothi et al. (20018)*, *Jangir and Badhala (2022)*.

It could be inferred from the results that; adoption is based on the knowledge level. Greater proportion of the tenant farmers were observed in low knowledge category, owner cum tenant farmers were observed in high knowledge category, while larger proportion of the owner farmers were observed in medium knowledge category, hence their adoption.

Non-parametric Friedman test was used to find whether any difference lies between adoption levels of different groups of the respondents. The mean rank of owner cum tenants (2.34) is higher than that of owners (2.06) and tenant (1.60) farmers. Friedman test statistic chi-Square value for the adoption levels of the respondents is higher than the critical value (5.991). The test statistic value recorded was 14.174. As the p (0.001) value is less than the significant level, it can be inferred that there is a significant difference in adoption levels between different groups.

CONCLUSION

Tenancy and sharecropping have become livelihood options in agriculture to supplement income. Although agriculture is dependent on nature, appropriate interventions at critical stages can yield good harvest. Hence knowledge and adoption of critical interventions in cultivation is a pre-requisite for harvesting good yields in any crop and with special reference to rice cultivation in this study. These findings would help the extension organizations to know the training and skill development needs of the various groups of farmers. This would help the government to formulate schemes programmes, policies, facilities exclusively to the tenant farmers.

CONFLICTS OF INTEREST

The authors have no conflicts of interest.

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Table 3. Distribution of respondents according to adoption

Category	Tenants		Owner cum tenants		Owner	
	No.	%	No.	%	No.	%
Low	26	57.78	5	11.11	7	15.56
Medium	9	20.00	5	11.11	30	66.67
High	10	22.22	35	77.78	8	17.78
Total	45	100.00	45	100.00	45	100.00
	Mean=45.60		Mean=49.00		Mean=51.27	
	SD=2.95		SD=4.11		SD=6.00	
Mean Rank	1.60 C		2.34 A		2.06 B	
χ^2 (Critical)=5.991	$\chi^2=14.174^*$		df=2		p=0.001	

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