

# Knowledge Levels of Rice Farmers Regarding Mechanization: An Item-Wise Analysis in the North Coastal Zone of Andhra Pradesh, India

## Abstract

The present investigation aimed to study the knowledge level of rice farmers regarding various farm machinery and implements used in rice cultivation in the North Coastal Zone of Andhra Pradesh. The study was conducted in Srikakulam and Vizianagaram districts, purposively selected based on their large areas under rice cultivation. The study covered six mandals: Jalumuru, Nandigam, and Santhabommali from Srikakulam, and Bobbili, Gantiyada, and Santhakaviti from Vizianagaram. Data were collected from 120 respondents using a pre-tested interview schedule. Statistical methods such as arithmetic mean, standard deviation, frequencies, and percentages were employed for analysis. The data collection focused on understanding the farmers' knowledge of different farm machinery and implements used in rice cultivation. The knowledge levels of the respondents were categorized into three groups: low, medium, and high using mean and standard deviation. An item-wise response analysis was carried out to assess the detailed knowledge on mechanization. The findings revealed that more than half (60.00%) of the respondents had a medium level of knowledge, while 20.83% had a high level, and 19.17% had a low level of knowledge on various machinery and implements. The respondents showed high knowledge about tools like the puddler, mould board plough, rotavator, harrow, combine harvester, and paddy drum seeder. The results imply that there is a need for targeted extension programs to enhance the knowledge of farmers, especially those with medium and low knowledge, regarding advanced farm machinery. Efforts should also focus on improving accessibility to affordable machinery and providing necessary training to facilitate broader adoption, which could lead to increased productivity in rice cultivation.

**Keywords:** Knowledge, rice farmers, item analysis, farm machinery and implements

## Introduction

Agriculture is the 'art and science of growing plants and the raising of animals for food, other human need, or economic gain'. Indian economy is basically agrarian in nature. Agriculture has retained its pride place of being the backbone of the Indian economy. Mahatma Gandhi said, "India lives in villages and agriculture is the soul of Indian economy". Nearly two-thirds of its population depends directly on agriculture for its livelihood and sustenance. Rice is the major food grain crop in India. It is often refer to as the dominant crop of the country. India is one of the leading producers of rice crop accounting for 20 per cent of all world rice production. Rice is the staple food of the people of the eastern and southern parts of the country. The production of rice was the highest with over 135.54 million tons in fiscal year 2023 across India among the other food grains. (Source: United States Department of Agriculture, India: Country summary for rice,2023). It is the most important grain with regard to human nutrition and calorific intake, providing more than one fifth of the calories consumed by human worldwide. Andhra Pradesh ranking 3<sup>rd</sup> position in production and produces 128.95 lakh tons of rice in India. It is a leading rice producer with a production of 12% of total rice produced in the country. Rice is the

Principal food crop cultivated throughout the state providing food for its growing population, fodder to the cattle and employment to the rural masses. In Andhra Pradesh rice is the major crop cultivated in more than 22 lakh hectares of land during Kharif and Rabi seasons. In Andhra Pradesh, the study area, Srikakulam and Vizianagaram districts are famous for its paddy fields and are the highest area under rice cultivation in North Coastal Zone. (Source: Andhra Pradesh State Seeds Development Corporation Limited,2023)

Agricultural mechanization which entails the use of machines to perform several activities on the farm in order to save time, money spent on hiring of labour and most importantly increases the level of production which will automatically lead to a simultaneous increase in the farmer's income. Knowledge is an essential component for adoption of any innovation because it helps farmers to fully comprehend and appreciate the mechanization practices in rice cultivation. As a result, it is critical to assess farmers' level of knowledge on mechanization in rice cultivation. The main aim of this study was to identify the knowledge level of rice farmers about various farm machinery and implements used in rice cultivation.

## Material and Methods

The study was conducted in Srikakulam and Vizianagaram districts of Andhra Pradesh during the year 2022-2023 cropping season. In the present study, knowledge had been operationalized as the body of information understood and possessed by the respondents on mechanization in rice cultivation. A sample of 120 rice farmers was chosen using a simple random sampling method. An interview schedule was employed to gather primary data and statistical methods such as Arithmetic mean, Standard deviation, Frequencies, and Percentage were applied for analysis. The overall knowledge level and response analysis of machinery and implements knowledge by the rice farmers were studied and the findings were presented. The level of knowledge was measured by using 42 items derived from knowledge test developed for the study.

## Results and Discussion

In order to assess the overall knowledge level on the mechanization by the rice farmers, necessary data were collected and the respondents were segregated into three groups viz., low, medium and high by using mean and standard deviation and the results were illustrated in the table 1.

**Table 1: Distribution of rice farmers according to their overall level of knowledge on farm mechanization in rice**

(n=120)

S. No.	Category	Frequency	Percentage
1	Low level of knowledge	23	19.17
2	Medium level of knowledge	72	60.00

3	High level of knowledge	25	20.83
	<b>Total</b>	<b>120</b>	<b>100.00</b>
Mean: 27.63; SD: 7.10			

It is evident from **table 1**, more than half (60.00 %) of the respondents had medium level of knowledge followed by 20.83 and 19.17 per cent of respondents with high and low levels of knowledge respectively.

Majority of the rice farmers were found to have medium to high level of knowledge on various farm machinery and implements used in rice cultivation. **The reasons for the trend might be probably** due to their experience in farming and paddy being labour intensive crop demands more labour which forced them to look for other alternatives.

Majority of rice farmers had an education level ranging from intermediate to graduate. This education level **enable** farmers to access mass media and ICT tools, which in turn allowed them to gain knowledge about various farm mechanization implements such as mould board plough, harrow, cage wheels, puddler, rotavator, paddy drum seeder, seed drill, paddy transplanter, cono weeder, knapsack sprayer, combine harvester, paddy reaper, straw baler etc;

**Furthermore, these types of implements** were also available in custom hiring centers of the **study area, hence,** the above trend of medium to high level of knowledge possessed by the majority of rice farmers on mechanization in rice cultivation.

### Response analysis of **knowledge level** by the rice framers on mechanization in rice cultivation

To know the detailed and comprehensive idea on the knowledge level of rice framers on mechanization, an item wise response analysis was carried out and the results were presented in the table 2.

**Table 2: Response analysis of knowledge level by the rice farmers on mechanization**

S.No.	Item	Rice farmers (n=120)	
		Frequency	Percentage
1.	Whether animal drawn MB plough or tractor drawn is more used in the farmer's field? a) Only animal drawn MB b) Only tractor drawn MB	115	95.83



13.	Why puddler is used? a) To stir the soil <b>b) To make favourable condition for Paddy</b> c) To increase water holding capacity d) Don't Know	117	97.50
14.	What are the advantages of Rotavator? a) Used for ploughing b) Used for loosening of soils c) Used for crushing of crop residues <b>d) Both b&amp;c</b>	114	95.00
15.	Which of the following operations is absent in Paddy drum seeder? a) Weeding b) Fertilizer application <b>c) Land Preparation</b> d) Nursery	101	84.17
16.	The cost of cultivation of Paddy Drum seeder is less than the cost of cultivation (Yes/No)	118	98.33
17.	What are the functions of seed drill? a) To carry the seeds <b>b) To open furrows at uniform rates</b> <b>c) To meter the seeds</b> d) To cover the seeds	91	75.83
18.	How many trays are required for one acre of transplantation in Paddy transplanter? a) 80 <b>b) 100</b> c) 120 d) Don't Know	72	60.00
19.	Have you seen Cono weeder? a) Don't know about that <b>b) Yes, seen in paddy fields</b> c) Seen in university/TV d) Don't Know	80	66.67
20.	What is the tank capacity of Knapsack sprayer? <b>a) 9-22.5 liter</b> b) 10-15 liter c) 15-30 liter d) None	95	79.17
21.	What is the function of Combine harvester? a) Only threshing can be done <b>b) Both harvesting and threshing can be done</b> c) Only used for harvesting d) Don't Know	102	85.00
22.	Which is the first function of Combine harvester? <b>a) Harvesting</b> b) Threshing c) Winnowing d) Don't Know	100	83.33
23.	What is the purpose of Paddy reaper? a) Sowing <b>b) Grain Harvesting</b> c) Spraying d) None	60	50.00
24.	What type of crops can be threshed by olpad type thresher? a) Gram b) Wheat <b>c) Both a&amp;b</b> d) None	67	55.83
25.	How tractor operated thresher works? a) It takes power from draw box b) It takes power for hydraulic <b>c) It takes power from PTO</b>	72	60.00

	d) Don't Know		
26.	What is the working capacity of multicrop thresher? a) 1000kg/hr <b>b) 200-2500kg/hr</b> c) 2500kg/hr                      d) <300kg/hr	89	74.17
27.	What is the use of Straw baler? a) Intercultural operations      b) Land protection <b>c) Post harvest operation</b> d) None	67	55.83
28.	Straw baler can reduce the impact of air pollution (Yes/No)	70	58.33
29.	Straw baler adds additional income to the farmer (Yes/No)	89	74.17
30.	Mention any one point that emphasizes the importance of mechanization <b><u>Increased productivity</u></b>	120	100.00
31.	Mention any one company that is worked with agricultural mechanization <b><u>Mahindra &amp; Mahindra</u></b>	120	100.00
32.	Mention any one machinery name that are used in harvesting and post harvesting <b><u>Combine harvester</u></b>	103	85.83
33.	Mention any one disadvantage of agricultural Mechanization <b><u>High Initial Investment Cost</u></b>	120	100.00
34.	Mention any one location where farm machinery and tools are sold <b><u>Authorized Dealerships, Farm Equipment Showrooms</u></b>	120	100.00
35.	State any one major function of diesel engine <b><u>provide the necessary power for efficient operation</u></b>	99	82.50
36.	Custom hiring model of farm implements for rice based farming is useful to the farming community (True/False)	100	83.33
37.	I feel the CHC farmer group concept can effectively solve the problem of farm mechanization (True/False)	100	83.33
38.	Drum seeder/direct sowing method of paddy cultivation can reduce the cost of labour (True/False)	90	75.00
39.	Whether RBK's are useful for farm mechanization (True/False)	116	96.68
40.	Mechanization can lead to increased yields and profitability for farmers (True/False)	95	79.17
41.	Farm mechanization can have negative impact on environment (True/False)	105	87.50
42.	Power operated winnower is better than traditional method of winnowing? (Yes/No)	104	86.67

It is evident from the table 2, farmers possessed high knowledge on puddler, mould board plough, rotavator, harrow, combine harvester and paddy drum seeder. The reason for the above trend might be **because**, the majority of rice farmers held a positive opinion about custom hiring centers and Rythu Barosa Kendras (RBK's), which provide mechanization services to the farming community on a rental basis with reasonable hiring charges. This indicates a favorable perception of such services among farmers, which showcases the potential for increased adoption of farm machinery and implements in the agricultural practices of rice farming.

However, their knowledge on cono weeder, thresher, paddy transplanter, straw baler and paddy reaper appeared to be relatively limited. The reason for the above trend might be **because** some agricultural machinery, such as the cono weeder, cage wheels, thresher, paddy transplanter, straw baler, and paddy reaper might be more intricate and require specialized knowledge to operate effectively and **also** lack of training and experience in handling such machinery was another reason for the above trend.

Further, the rice farmers might not **have** much exposure to these specific types of agricultural equipment. As a result, they might not be familiar with their functions, features and operation. In some cases, certain agricultural equipment might not be commonly used in a particular region. **The lack of experience** could lead to limited understanding and knowledge about these machinery.

The percentages **regarding the** knowledge of the respondents indicated that rice farmers had a limited understanding of the above mentioned agricultural equipment. This observation could have implications for the adoption and effective utilization of these machines in agricultural practices by the rice farmers. Further education, training and awareness-building efforts might be needed to improve their understanding and knowledge level which encourages the adoption of these technologies in their agricultural activities.

**Nearly half of the rice farmers had medium level of extension contact which forced them towards usage of some basic implements.** As the cost of paddy transplanter is very high i.e. about more than 4 lakhs and it is difficult for small farmer to use it. **Therefore**, many farmers were not **aware of** implements like cono-weeder, as majority of rice transplantation **were done** manually where there is no scope for row spacing. Hence, it is not possible to use cono-weeder in these situations with reference to machine transplanted paddy. **In many paddy-growing areas, the rice farmers in this study region also lack knowledge about its mode of operation, the method of preparing seedling trays (80 trays per acre), and the appropriate age of seedlings (14–15 days) for transplantation.**

Hence, all these circumstances could be enhanced by increasing the awareness and knowledge of the rice farmers on farm mechanization through conducting demonstrations, organizing training programmes, exposure visits to successful farm mechanization farms, presentation of success stories, promoting informal communication on farm mechanization through local opinion leaders.

## **Conclusion**

The findings revealed that majority of the rice farmers were found to have medium to high level of knowledge on various farm machinery and implements used in rice cultivation and possessed high knowledge on puddler, mould board plough, rotavator, harrow, combine harvester and paddy drum

seeder. However, their knowledge on cono weeder, thresher, paddy transplanter, straw baler and paddy reaper appeared to be relatively limited. The reason for above trend might be **probably** due to their experience in farming and paddy being labour intensive **crop**, demands more labour which forced them to look for other alternatives. Majority of rice farmers had an education level ranging from intermediate to graduation. This education level enabled farmers to access mass media and ICT tools, which in turn allowed them to gain knowledge about various farm mechanization implements. The results imply that there is a need for targeted extension programs to enhance the knowledge of farmers, especially those with medium and low knowledge, regarding advanced farm machinery. Efforts should also focus on improving accessibility to affordable machinery and providing necessary training to facilitate broader adoption, which could lead to increased productivity in rice cultivation.

#### **Disclaimer (Artificial intelligence)**

**Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.**

#### **References**

- Barman and Nivedita. 2019. Impact of farm mechanization on income of farmers in Assam, India. *Asian Journal of Agricultural Extension, Economics and Sociology*. 30(1): 1-17.
- Chandran, V and Podikunju, B. 2018. Knowledge level of homestead vegetable growers about vegetable production practices. *Indian Journal of Extension Education and Rural Development*. 26(1): 9-15.
- Jaganathan, D., Ram, B., Roy, B.R and Lenin, V. 2012. Knowledge level of farmers on organic farming in Tamil Nadu. *Indian Research Journal of Extension Education*. 12(3): 70-73.
- Kumar, G., Sailaja, V., Satyagopal, P.V and Prasad, S.V. 2015. Construction and Standardization of knowledge test to measure the knowledge level of farmers on SRI technology. *Indian Research Journal of Extension Education*. 15(4): 161-166.
- Pauline, A.A. 2012. A study on farm mechanization in paddy cultivation in Madurai district of Tamil Nadu. *M.Sc. (Ag.) Thesis*. AC&RI, TNAU, Madurai.
- Rani, S. N. 2020. An analysis of sustainable cultivation practices followed by groundnut farmers in Andhra Pradesh. *Ph.D Thesis*. Acharya N.G. Ranga Agricultural University, Guntur.

- Rao, S. N. 2016. A study on knowledge and adoption of turmeric farmers in Guntur district of Andhra Pradesh. *M.Sc. (Ag.) Thesis*. Acharya N. G. Ranga Agricultural University, Guntur.
- Ravishankar, Raghuprasad, K.P and Ahmed, T. 2018. Knowledge level of paddy growers about farm mechanization in paddy cultivation. *International Journal of Current Microbiology and Applied Sciences*. 7(10): 3062-3067.
- Samthoth, M and Yadav, B. (2020). Farm mechanization level for paddy production in Uttar Pradesh: A review. *The Pharma Innovation Journal*. 9(8):114-118.
- Sandip, D. 2020. Factors affecting farm mechanization in rainfed area on Western Maharashtra in India. 2020. *Gujarat Journal of Extension Education*. 31(2): 186-191.
- Sumitra, S., Santhosh, A and Surabhi, S. 2018. Awareness and adoption of drudgery reducing technologies among farm women of Dantiwada Taluka. *International Journal of Agricultural Sciences*. 10(1): 4972-4975.
- Venuprasad, H.D., Premlatha, S and Venkatramulu, M. 2018. Study on farmers level of knowledge towards vegetable cultivation. *The Journal of Research, ANGRAU*. 46(2): 75-82.
- Wanglin, Renwick and Grafton. 2018. Farm machinery use, off-farm employment and farm performance in China. *The Australian Journal of Agricultural and Resource Economics*. 9(5): 279-298.