Asian Journal of Agricultural Extension, Economics & Sociology

40(11): 352-359, 2022; Article no.AJAEES.91715
ISSN: 2320-7027

Adoption Level of Rural Women about Storage Structure and Practices for Storing Grains

Antim [a*], R. K. Doharey [a] and Manoj Kumar [b]

[a] Department of Extension Education, ANDUA & T Faizabad, 224229, Uttar Pradesh, India.
[b] SMS Agricultural Extension KVK Belipar, Gorakhpur, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJAEES/2022/v40i111721

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/91715

Original Research Article

Received 08 August 2022
Accepted 13 October 2022
Published 29 October 2022

ABSTRACT

The study was carried out during the year 2013-2014 in the Faizabad district because of its location nearer to the university campus. Out of 11 Community Development(CD) Blocks in Faizabad, the Sohaval block was selected purposively 4 villages were selected randomly for this study. A complete list of all the farmers in the selected village was prepared based on 4 categories i.e. marginal, small, medium, and large. A sample of 100 respondents was selected from said categories through proportionate random sampling techniques and the author herself collected data with help of the presented interview schedule. The results of the study depicted majority of respondents (95%) were found to be adopting gunny bags. None of the respondents was found to be adopting modern storage structures. The majority of the respondent (59%) were found to have a medium level of adoption of food grain storage structure. The maximum number of respondents (50%) were having a medium level of adoption of food grain treatment. The maximum number of respondents (72%) was found in the medium level of the overall average adoption score category.

Keywords: Food grain; adoption; grain storage; modern storage structures.

1. INTRODUCTION

A grain saved means grain produced for the growing population. An estimate indicates that between150-500 million people in the world do not have enough food to eat. The population has doubled and it is estimated that it will go to 8.9 billion by 2050. The number of hungry people is

**Corresponding author;*

likely to increase with the increase in population. It is estimated that 10 to 25 percent of total food grains worth Rs. 1500/- crore are lost due to defective storage every year. The problem of more losses in the storage of food grains may increase with the increase in food production. So it becomes imperative to minimize the losses in the best interest of the Country's food economy. According to a survey conducted by the Indian Grain storage Institute, Hapur in different Agro-climatic zones, it was found that 82 percent of the storage structures used by the farmers were primitive and therefore, vulnerable to insect infestation, mold attack, rodent and bird damage causing sustainable losses With the enormous amount of production, *why is there still a shortage of food for consumption?* Response to this question is the loss of food grains during the entire post-harvest system and thus the food grains worth Rs.350 crones are lost every year due to the absence of adequate storage facilities and transport bottlenecks. The post-harvest losses of not only the food grains but also of fruits and vegetables have an impact both at the micro and macro levels of the economy. Total loss to the extent of 9.33 percent in post-harvest operations which includes the loss in storage to the extent of 6.58 percent. Union Minister of state for steel, Mr. Brajakishore Tripathy has said the use of metallic and nonmetallic food storage bins and silos would help to save valuable food grains and increase steel consumption in the country. Addressing the inaugural function of a 10 days artisan's training workshop, the Union Minister said that there was an urgent need to ensure proper storage of food grains to provide food security to the people as nearly five percent of food grains in the country is wasted due to lack of storage facilities. Jointly organized by the Joint plant committee of the Union Steel Ministry, Ministry of Consumer Affairs, Food and Civil supplies, Tata steel, and the Orissa University of Agriculture Technology (OUAT), the workshop is meant to train rural artisans to produce metallic and non-metallic storage bins. Speaking on the occasion OUAT, Vice Chancellor Sahadev Sahoo said that there was the need for an intensive campaign to create awareness among the rural people to do away with the misconceptions and traditional myths. More and more farmers should be taught the use of a modern methods of storing food grains. The purpose of the workshop was also to ensure that the trained artisans will start individual units to manufacture storage bins and silos to meet rural needs [1-3]. These bins are also cost-effective in terms of transformation. "There has been a tendency to overestimate storage losses and to base estimates on extreme cases or guesswork rather than on sound empirical testing. 30 percent or more are not uncommon. In contrast, the results of detailed field studies suggest that under traditional storage systems in tropical countries, losses are typically around 5 percent over storage season" [4]. Food grain storage continued to be an important problem from the time man learned to grow crops. Millions of tons of food grains are either damaged or lost due to a lack of knowledge of scientific methods of storage. This problem is also a challenge to the scientists who are called upon to tackle it. The loss is not merely in terms of quantity but also the quality of the food grains [5,6]. "In most countries, grains are among the important staple foods. However they are produced on a seasonal basis and in many places, there is only one harvest in a year, which itself may be subject to failure [7-9]. It means that to feed the world's population, most of the global production of maize, wheat, rice, sorghum, and millet must be held in storage and therefore occupies a vital place in the economics of developed and developing countries. Storage involves substantial costs and risks as well as potential benefits for farmers, storage compares with other activities valued by farm family members, and it is necessary to understand where storage fits into the entire farming system and household economy to assess the need for interventions and the probability of their uptake" [4]. Storing farm produce is an important function by which a farmer preserves. It is an exercise of human foresight using which commodities are protected from deterioration. According to an estimate, about 35 percent of food grain gets spoiled every year due to improper storage practices or bad handling. Two major risks are involved in storing the form of produce. These are quality loss-caused by commensally rodents, insects, and pests, and quality loss which is caused by excessive moisture and temperature during storage. In rural areas, storage of farm produce is generally, the work of woman folk. These women use some defective traditional practices of food grain storage. The storage structures used by villagers are very faulty leading to high storage losses and, thus, they are required to the replaced by the innovated or new storage techniques. In the recent past, scientists have developed modified storage techniques but they are still not used by most rural women since they are not well versed in the techniques Losses of food grains are reported due to attacks by insects, pests, and rats in storage. Rats damage

the crop at every stage of production and storage, it is reported that an adult rat consumes 5 gm. Of grain per day and spoils 10 times what he eats. A loss of about 40 crore quintal grain per annum due to rats is estimated in India. If we succeed to control rats we can save grains 60 crore quintals/annum. Therefore, control of becoming inevitable in the crop fields, go-downs, residential premises, etc.(Ramesh, 2005) according to a report, 69-70 percent of woman help in labor inputs such as the operation of harvesting, threshing, and storing. These women face the problem of deterioration of food grains arising from improper storage devices and methods which ultimately result in colossal wastage of money. To arrest these losses, knowledge on recent technological know-how on efficient preservation methods for food grains such as the application of modern and improved techniques of insect and rodent control, introduction and construction of modern and scientific storage structures, and scientifically modify the traditional structures to minimize moisture, rodent and insect loss, and maximum benefits must be imparted to this woman and their families. Since a woman can be used as an effective disseminator and communicator for simple agricultural and post-harvest technologies, appropriate training for the farmers particularly the woman folk in rural areas is essential. An insect-clearing device has been developed by Tamil Nadu Agricultural University for removing insects from stored grain/seed. It is a bin of 25 kg capacity. It has 4 parts, outer container, inner perforated (2mm) container, pitfall mechanism, and collection device. In the inner perforated container, a perforated tapering cone (2mm) is fixed to clear the insects quickly from the grains. The grains are to be stored in the inner perforated containers. The insects in the grain, while wandering here and there enter the perforation, slip and hit the pitfall mechanism, and get trapped in the collection device. A preliminary study with this new model showed nearly 100% removal of insects like red flour beetle *Tribolium castaneum,* Rice weevil *Sitophilus oryzae,* and lesser grain borer. *Rhyzopertha dominica* can be removed within 5 days. This bin is a modification of an earlier bin developed by Mohan in 2008. “Over the past two decades, the need for economic and social analysis in the planning and design of storage inventions has become more widely recognized [10-12]. This stems from the realization that any improvements in storage will only be attractive to farmers, traders, or governments if the perceived benefits substantially outweigh the costs. Technical superiority is generally insufficient (although it can be attractive for its prestige values) and farmers and traders are likely to tolerate quite high storage losses before undertaking complex or expensive changes to their storage systems, an understanding of the reasons why people store, and the systems within which storage occurs, is necessary to estimate how the benefits and costs of innovations are likely to be assessed by the intended users of technology” [4]. Women play a very productive role in rice seed management and make significant contributions to rice production. The pre and post-harvest such as visual examination of seed, for seed health and purity, conducting tests for germination and vigor, seed treatment against insects and diseases, selection and harvest of plants for seed purposes,, and threshing, drying, and storage of seed. In India, women have a crucial role to play in post-harvest technology (PHT), particularly that relating to winnowing and grain storage. However, little attention has been paid to food losses, it is suggested that proper handling and management needs to be taught systematically to rural women. The purpose of this study is to determine the Adoption Level of Rural Women about Storage Structure and Practices for Storing Grains.

2. METHODOLOGY

The study was conducted in the Faizabad district because of its location nearer to the university campus. Out of 11 CD blocks in Faizabad, the Sohaval block was selected purposively 4 villages were selected randomly for this study. A complete list of all the farmers in the selected village was prepared based on 4 categories i.e. marginal, small, medium, and large. A sample of 100 respondents was selected from said categories through proportionate random sampling techniques and the author herself collected data with help of the presented interview schedule. The percentage, average, standard error (SE), and correlation coefficient were used for making simple interpretations.

2.1 Percentage (%)

The frequency of a particular cell was divided by the total number of respondents in that particular category and multiplied by 100 for calculating the percentage.

2.2 Average ($\bar{x}$)

The average ($\bar{x}$) was calculated by adding the total scores obtained by the respondents and dividing it by the total number of respondents using the following formula.

$$\bar{x} = \frac{\sum x}{n} \quad \ldots\ldots\ldots\ldots\ldots \quad \ldots\ldots(i)$$

where,

$\bar{x}$ = Average or mean

$\sum x$ = Total number of scores obtained by respondents

n = Total number of respondents

2.3 Standard Error

S.D. is the square root of the mean of the squares of all deviations. The direction is measured from the arithmetic mean of the distribution. The standard error (SE) is given by

$$S.E.(\sigma) = \frac{\sigma}{\sqrt{n}} \ldots\ldots\ldots\ldots \quad \ldots\ldots\ldots\ldots(ii)$$

Where,

σ = standard deviation

n = Total number of items.

2.4 Correlation Coefficients

The coefficient of simple correlation(r) is a measure of the mutual linear relationship between two variables *i.e.* X and Y, the relationship is measured by the commonly termed product moment. The correlation coefficient was computed by the following formula:

$$\text{Correlation (r)} = \frac{\sum(x_i-\bar{x})(y_i-\bar{y})}{\sqrt{\sum(x_i-\bar{x})^2 \sum(y_i-\bar{y})^2}} \ldots\ldots \quad \ldots(iii)$$

where,

r = Correlation coefficient

XY = two variables for which the test is applied.

N= number of observations

$\bar{x}$ = mean of the values of the $\bar{x}$ variable

y = values of the y – variable in a sample

$\bar{y}$ = mean of the values of the $\bar{y}$ variable

3. RESULTS AND DISCUSSION

The Table 1 shows that the maximum number of respondents (95%) who used gunny bags. whereas the respondents (68%), (55%), (30%) used plastic bags, Handis/ Kuna/ Khona/ Matka/ Gagri followed by respondents (22%) pucca Kothi, (20%) bukhar, and (15%) Storage drum used respectively.

Table 2 shows that the most of the respondents (44%) were found to be used neem leaves followed by the respondent putting onion bulbs and only salt mixed with food grains the same response, 2.00%, putting salt along with neem in paddy and only 1.00% mixing with food grains and Rusa (Plant) for wheat used respectively.

Table 4 clearly shows that the overwhelming majority of respondents (98.00%) and (95.00%) were found to be using sun drying of grain for proper moisture content, cleaning, screening, and grading of foodgrains followed by the respondents (75%), (69%), (25%) and (24%) and (10.00%) were found to be adopting the practice, keeping the storehouse structure airtight by closing the window, door and outlets sanitation of storehouse, Plastering of wall and floor of the storehouse and \closing of cracks and crevices and Treating gunny bags/ plastic bags against malathion using respectively.

Table 1. Distribution of the respondents about adoption extent of indigenous food grain structure

S. No.	Category	Respondents	
		Frequency	Percentage
1	Gunny bags	95	95.00
2	Plastic bags	68	68.00
3	Pucca Kothi	22	22.00
4	Kuccha kothi	30	30.00
5	Handis/ Kuna/ Khona/ Matka/ Gagri	55	55.00
6	Storage drum	15	15.00
7	Bukhari	20	20.00
8	Khatti	0	0.00

Table 2. Distribution of the respondents about adoption extent of indigenous food grain treatment

S. No.	Category	Respondents	
		Frequency	Percentage
1	Use of neem leaves	44	44.00
2	Sand/ ash mixing	0	0.00
3	Covering onion bulbs	0	0.00
4	Putting onion bulbs	10	10.00
5	Oil mixing (veg oil) for dal	0	0.00
6	Putting salt along with neem leaves in paddy	2	2.00
7	Rusa (plant) for wheat	1	1.00
8	Only salt mixed with foodgrain	10	10.00
9	Maize khukuri foodgrains	0	0.00

Table 3. Distribution of the respondents about modern food grain treatment

S. No.	Category	Respondents	
		Frequency	Percentage
1	EDB ampule	07.00	07.00
2	Delphos	30.00	30.00
3	Parad tablet	60.00	60.00
4	Zinc phosphide	03.00	03.00

Table 4. Distribution of respondents about adoption extent of food grain storehouse treatment

S. No.	Category	Respondents	
		Frequency	Percentage
1	Sanitation of storehouse	69	69.00
2	Plastering of the wall and floor of the storehouse	25	25.00
3	Closing of cracks and services	24	24.00
4	Sun drying of grain for proper moisture Content	98	98.00
5	Cleaning, screening, and grading of food grains	95	95.00
6	Keeping the storehouse structure airtight by closing the window, doors, and outlets	75	75.00
7	Treating gunny bags/ plastic bags against malathion	10	10.00
8	Fumigation godowns against lindane smoke	0	0.00

Table 5. Correlation coefficient between different independent variables and knowledge extent

S. No.	Variables	Correlation coefficient
1	Age	-0.08955
2	Education	0.132602
3	Cast	0.026435
4	Family Type	-0.10801
5	Family Size	-0.13641
6	Housing Pattern	0.201121*
7	Landholding	-0.01363
8	Social Participation	-0.07702
9	Material Possession	0.117526
10	Extension contact	-0.15772
11	Economic motivation	0.318036**
12	Scientific orientation	0.235647*
13	Risk orientation	0.101023
14	Value orientation	0.027037

** Significant at 5% probability level = 0.1946, **Significant at 0.01% probability level= 0.2540*

Table 6. The correlation coefficient between different variables and adoption extent

S. No.	Variable	Correlation coefficient
1	Age	0.127824
2	Education	0.067184
3	Cast	0.112823
4	Family Type	-0.061
5	Family Size	-0.12031
6	Housing Pattern	0.052963
7	Landholding	0.03115
8	Social Participation	-0.07835
9	Material Possession	-0.05633
10	Extension contact	-0.13612
11	Economic motivation	0.517052**
12	Scientific orientation	0.330215**
13	Risk orientation	0.108256
14	Value orientation	-0.05264

**Significant at a 5% probability level, ** Significant at 1% probability level*

Table 7. Correlation coefficient (r) between different variables and Employment

S. No.	Variable	Correlation coefficient
1	Age	0.085422
2	Education	-0.08205
3	Caste	0.036544
4	Family Type	-0.11592
5	Family Size	-0.09756
6	Housing Pattern	0.099836
7	Landholding	0.031358
8	Social Participation	-0.04819
9	Material Possession	-0.15779
10	Extension contact	-0.0115
11	Economic motivation	0.384445**
12	Scientific orientation	0.149014
13	Risk orientation	0.088572
14	Value orientation	-0.05264

**Significant at a 5% probability level, ** Significant at 1% probability level*

Table 8. Distribution of respondents according to overall adoption extent about food grain treatment

S. No.	Category	Respondents	
		Frequency	Percentage
1	Below 13 (Low)	52	52.00
2	14-19 (Medium)	32	32.00
3	20 and above (High)	16	16.00
Total		100	100.00

Mean=16, SD =3.12, Min = 9, Max =21

Table 3 reflects that the majority of respondents (60%) were found to be using parad tablets followed by (30%) Delphos, (70%) EDB ampule, and (3.00%) zinc phosphide using respondents respectively.

It is evident from the values of correlation coefficient (r) in Table 5 that out of 14 variables. The economic motivation was found to be highly significant and positively correlated with the extent of knowledge about food grain storage practices. The variables that are economic motivation were found to be moderately significantly and positively correlated with the extent of knowledge about grain storage practices.

Table 6 focuses on that among 14 variables, two variables that is economic motivation and scientific orientation were found to be highly significant and positively correlated with the extent of adoption. The variable that is age, education, caste, housing pattern, land holding, ad positive correlation with the extent of adoption of grain storage practices. The variables viz., family type, family size, social participation, material possession and extension contact economic motivation, and knowledge were found to be negatively correlated with the extent to the adoption of food grain storage practices.

Table 7 shows that among 14 variables, two variables that is education and scientific orientation were found to be insignificant and negatively correlated with the extent of adoption. The variable that is age, caste, family type, housing pattern, land holding, occupation pattern, Annual income, social participation, communication media possession, farm materials possession, and household possession were found in grain storage practices. The variables viz., economic motivation and knowledge were found to be highly significant and positively correlated with extent to adoption of food grain storage practices. The variables i.e. Risk orientation was to be in moderately significant and positively correlated with extent of adoption about food grain storage practices.

Table 8 focuses that 52% of respondents were found to have below adoption score (below13) in the low-level category followed by 32% in medium adoption (14-19) and 16% in high level with (20 and above) adoption score categories, respectively.

4. CONCLUSION

It may be concluded on the basis of finding that the majority of respondents (95%) was found to be adopting gunny bags. None of the respondents was found to be adopting modern storage structures. Majority of respondent (59%) were found having medium level of adoption about food grain storage structure. Maximum numbers of respondents (50%) were having medium level of adoption about food grain treatment. Maximum numbers of respondents (72%) were found in medium level of overall average adoption score category.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/91715