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RESEARCHARTICLE

Traditional practices for storage of wheat and maize grains in identified villages of Samastipur district Bihar, India

Dinesh Rajak*, Genitha Immanuel

Department of Processing and Food Engineering, SHUATS, Prayagraj, Uttar Pradesh, India

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ABSTRACT

A survey was conducted on the traditional practices for the storage of Wheat & Maize grains in 15 villages of Samastipur districts in Bihar viz.Fulhara, Ajana, Gopalpur, Maniarpur, Rampura, Ladaura, Birsingpur, Kalyanpur, Akbarpur, Pratapur, Basudevpur, Dhruvgama, Teera, Mirjapur, Kabargama of Samastipur for the study. A pre drafted questionnaire was used to record the details of the storage practices. Information was collected from 90 farmers selected randomly from all these 15 villages. It was found that 16% of the farmers used all five storage modes like (Jute bag, Plastic bag, Mud bin, Plastic container & Metal bin) for storage of grains while31%, 23%, 18% and 12%farmersuses four(Jute bag, Plastic bag, Plastic container & Metal bin)three(Jute bag, Plastic bag & Mud bin) two (Jute bag & Plastic bag) and one (Jute bag)storage types respectively modes based on the availability. The present study revealed that 28.89% farmers were using Jute Bags, 35.56 % farmers were using plastic bags, 6.66% farmers were using Mud bin, 8.89% farmers were using Plastic container and 20.00% farmers were using Metal bin. It was also observed that 6.66% farmers prefer to use Mud bin (Khothi) made of clay. However, due to lack of space, immovable characteristics, lack of skilled person for construction of Khothi, now a days the use of Mud bin hasbeen renounce by the farmers. Hence jute bag and plastic bags of good quality with 50 kg capacity need to made available for storage of wheat and maize.

Keywords: Jute bag, metal bin, mud bin, plastic bag plastic container, storage modes

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INTRODUCTION

India is the world's largest producer and consumer of wheat having a total average production area of 29.32 million hectares during 2019-20 while 31.45 million hectares during 2020-21 the total production of wheat was nearly 10.38 million metric tonnes while the productivity of 35.3 quintals per hectares. Maize has a total average of 9.72 million hectares during 2019-20 while 9.20 million hectares during 2020-21 the total production of maize was nearly 28.64 million metric tonnes having productivity of 30.40 quintals per hectares: (USDA, 2020; National Agricultural Statistics Service).

The total area of wheat in Bihar was 21.1 lakh hectares, production was 61.5 lakh tons and productivity was 29.22 Q / ha in the year 2018-19. The total area of maize in 2018-19 was 6.8 lakh hectares, production was 30.2 lakh tons and productivity was 55.51 Q / ha.(USDA,2020National Agricultural Statistics Service). The production of wheat and maize was sixth at the

* *For correspondence*: D. Rajak (Email: dineshrajak437@gmail.com)

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national level of Bihar. Post-harvest Food Loss (PHL) is defined as measurable qualitative and quantitative food loss along the supply chain, starting at the time of harvest till its consumption or other end uses (Hodge et al., 2011).This system comprises interconnected activities from the time of harvest through crop processing, marketing and food preparation, to the final decision by the consumer to eat or discard the food.the climate smart villages project was going on in BISA (Borlaug Institute of South Asia) Pusa, Samastipur under the University of Illinois, under which the village of Samastipur was also selected, due to the high yield of Wheat and Maize in this district, the grain storage situation was assessed from the farmers.

Postharvest loss includes the food loss across the food supply chain from harvesting of crop until its consumption (Aulakh et al., 2013). The losses can broadly be categorized as weight loss due to spoilage, quality loss, nutritional loss, seed viability loss, and commercial loss (Boxall, 2001). Magnitude of postharvest losses in the food supply chain vary greatly among different crops, areas, and economies. In developing countries, people try to make the best use of the food produced, however, a significant amount of produce is lost in postharvest operations due to a lack of knowledge, inadequate technology and/or poor storage infrastructure. On the contrary, in developed countries, food loss in the middle stages of the supply chain is relatively low due to availability of advanced technologies and efficient crop handling and storage systems. However, a large portion of food is lost at the end of the supply chain, known as food waste. “Food waste” can be defined as food discarded or alternatively the intentional non-food use of the food or due to spoilage/expiration of food (FAO, 2014). Cereal grains, such as wheat, rice, and maize are the most popular food crops in the world, and are the basis of staple food in most of the developing countries. Minimizing cereal losses in the supply chain could be one resource-efficient way that can help in strengthening food security, sustainably combating hunger, reducing the agricultural land needed for production, rural development, and improving farmers’ livelihoods.

Agricultural development has two major aspects – production and post-harvest processing (Spurgeon, 1976). The technology of post-harvest processing refers to the processes and treatments carried out on agricultural produce after harvest for its protection, conservation, processing, packaging, distribution, marketing, and utilization to meet the food and nutritional requirements of the people in relation to their needs. Hence, the scope of post-harvest processing activity encompasses all operations from the stage of the harvest till the material reaches the end-users at the desired form, place, packaging, quantity, quality, and price. It has to develop in consonance with the needs of each society to stimulate agricultural production, prevent post-harvest losses, improve nutrition and add value to the products. Presently, more attention is needed on primary processing aspects, which include cleaning and grading, drying, storage, and packaging. Bihar is yet to make a sound beginning on these aspects. Losses are a measurable reduction in foodstuffs and may affect either quantity or quality". They arise from the fact that freshly harvested agricultural produce is a living thing that breathes and undergoes changes during post-harvest handling. The main objective of conducting this survey was to study the traditional practices for the storage of Wheat and Maize in the Samastipur District.

MATERIALS AND METHODS

A questionnaire was prepared covering the storage practices and other parameters. The location of study was limited to Samastipur District, Bihar. In this district 15 villages were selected and from each village randomly selected 6 farmers from each village. Total of 90 farmers were selected for the survey detailed information has been obtained from all these farmers about the method of storing corn and wheat grains. Farmers use jute bags, plastic layer bags, mud bins, metal bins and large and small plastic containers for grain storage. According to the information given by the farmers of all the villages, the data

was been collected. While storing the information received from the farmer, the status of moisture percentage in the grain, for how many days the farmer can get more profit by storing the grain Fig. 1 shows the method of study.

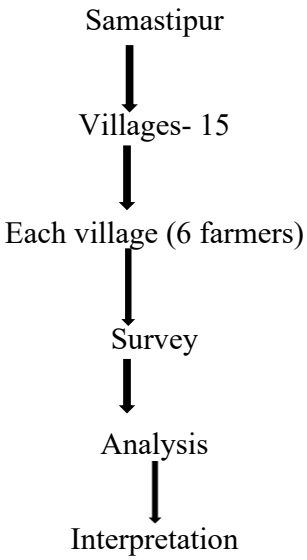


Fig. 1 Method of study

RESULTS AND DISCUSSION

Traditional practices of wheat and maize grain storage in Samastipur District of Bihar. In the survey of farmers done in selected villages, marginal (25.55%), small (33.33%), semi medium (27.78%), medium (11.11%) and large (2.22) farmers have land. These were found in all 90 farmers.Wheat and maize are cultivated by all the farmers in this area. Total 15 villages (6 farmers each) of Samastipur district were included for the study. Information were collected from the farmers regarding traditional grains storage method. The present study revealed that the percentage of storage mode is variable.

Out of 15 villages, it was observed that the Farmers of 11 villages uses Jute bags 33.34% while and Farmers of 4 villages uses16.67%. Regarding use of plastic bags, it was found that farmers of 4 villages use 50% and farmers of 9 village use 33.34%, and farmers of 2 villages use 16.67%.It was also noted that the farmers of only 6 villages use 16.67%Mud Bin for storage of grains. However, Gopalpur, Maniarpur, Birsingpur, Kalyanpur, Akbarpur, Pratapur, Dhruvgama, Mirjapur and Kabargama had not used Mud Bin for storage of grains. In study it was observed that plastic containers had not used by farmers of villages Fulhara, Ajana, Rampura, Kalyanpur, Pratapur, Dhruvgama and Teera. While, Farmers of only 8 village uses 16.67% plastic containers. During study it was observed that farmers of 3 village uses 33.34% and farmers of 12 villages use 16.67% metal bin for grain storage method (Table 1 and Fig. 2).

Table. 1 Uses of different storage modes percentage in villages of Samastipur Districts

Samastipur		Storage mode (%)				
Sl. No.	Villages	Jute Bags	Plastic Bags	Mud Bin	Plastic Container	Metal bin
1	Fulhara	16.67	16.67	16.67	0	16.67
2	Ajana	16.67	33.34	16.67	0	16.67
3	Gopalpur	16.67	33.34	0	16.67	33.34
4	Maniarpur	33.34	16.67	0	16.67	16.67
5	Rampura,	33.34	33.34	16.67	0	16.67
6	Ladaura	33.34	33.34	16.67	16.67	16.67
7	Birsingpur	33.34	33.34	0	16.67	16.67
8	Kalyanpur	33.34	50.0	16.67	16.67	16.67
9	Akbarpur	33.34	33.34	0	0	33.34
10	Pratapur	33.34	50.0	0	0	16.67
11	Basudevpur	33.34	50.0	0	16.67	16.67
12	Dhruvgama	33.34	33.34	0	0	33.34
13	Teera	33.34	33.34	16.67	0	16.67
14	Mirjapur	33.34	50.0	0	16.67	16.67
15	Kabargama	16.67	33.34	0	16.67	16.67

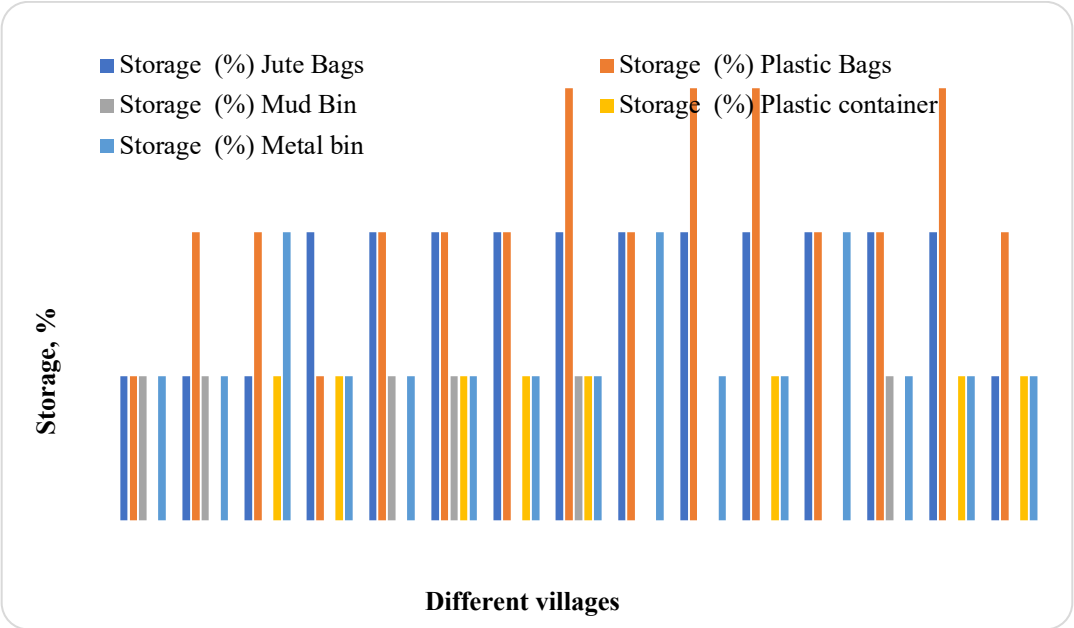


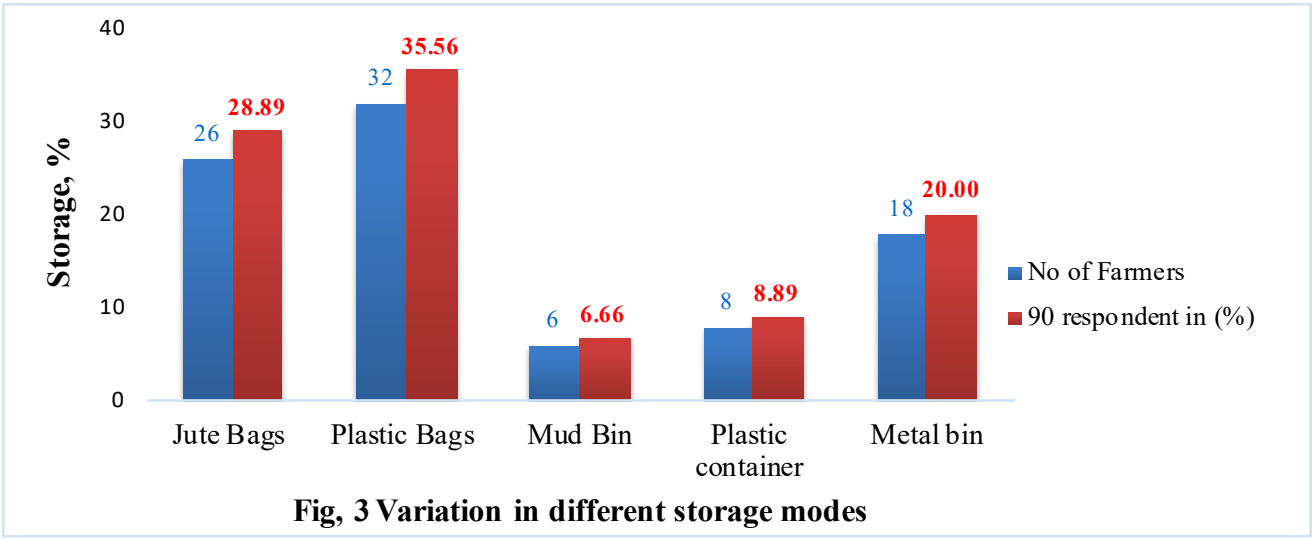
Fig. 2 Uses of different storage modes percentage in different villages of Samastipur Districts

Various storage structures adopted

In the study it has been found that some of the farmers were uses all five storage modes like Jute bag, Plastic bag, Mud bin, Plastic container and Metal bin for storage of grains while few farmers use four, three, two and one storage modes. The present study revealed that out of total 90 respondents, 26 farmers were using Jute Bags (28.89%), 32 farmers were using plastic bags (35.56 %), 6 farmers were using Mud bin (6.66%), 8 farmers were using Plastic container (8.89%) and 18 farmers were using Metal bin (20.00%) (Table 2 and Fig. 3).

Table. 2 Uses of different storage modes percentage 15 villages of Samastipur Districts.

	Storage mode				
Jute bags	**Plastic bags**	**Mud bin**	**Plastic container**	**Metal bin**	
No of Farmers	26.0	32.0	6.0	8.0	18.0
90 respondent, (%)	28.89	35.56	6.66	8.89	20.00



Fig, 3 Variation in different storage modes

Use of such types of storage structures appears to be common in tribal and rural areas across the globe. Similar practices (square or rectangular shaped earthen containers and bamboo baskets) were observed in the tribal farmers in Hoshangbad and Chindwara districts of Madhya Pradesh (India) (Arjjumend, 2004). Traditional storage structures like Ningei, Kei, Kot, Apuachouba, Chujak yum and Chujakmapun are used by Kabui tribes in Manipur (Barwal and Devi, 1993). Mud rhombus, thatched rhombus and underground pit were the common storage structures existing in Sudan Savannah zone of Nigeria for storing millets, sorghum [*Sorghum bicolor* (L.) Moench], maize and cowpea [*Vigna unguiculata* (L.) Walp.] (Adejumo and Raji, 2007) as similar to the structures (Ragiguli, thenemane and thombe) used by Soligas.

The storage containers are built from a variety of locally available materials differing in design, shape, size, and functions (Channal et al., 2004; Kanwar and Sharma, 2003).The tanks come in different size and shapes. Plastic containers dedicated as a silo for grains storage are kept under shade or indoors, away from direct solar radiation on a raised platform above ground level to allow for an easy discharge of the stored grains (Ochandio et al., 2010).The metal and plastic drums are closed air tight; the grains can be stored for a year or more without using insecticides. One major disadvantage of grain storage in a drum is that the drum must remain sealed for it to be effective because the insect is prone to resume physiological activity at the slightest inlet of oxygen when opened indiscriminately (Hall, 1980; Murdock et al., 1997; Makalle, 2012). At any given time 60-70% of grains is stored on the farm in traditional structures like Kanaja, Kothi, Sanduka, earthern pots, Gummi and Kacheri. However indigenous storage structures are not suitable for storing grains for very long periods (Abhinav et al., 2012).These results are over 50% less than the storage losses reported by (Khader et al., 2019). However, in relative terms, storage loss in Egypt ranked second only next to marketing loss which is consistent with other studies (Bala et al., 2021; Majumder et al., 2016; Aulakh et al., 2013) which found storage loss being the most important source of loss. In spite of some research done on the storage of grains, wheat and maize. The most suitable storage technologies are yet to be developed and disseminated among the farmers. There is a need for development of domestic level techniques for drying and storage of various crops.

CONCLUSION

According to the information obtained by the survey, it was observed that the percentages of different types of grain storage structures such as jute bags, plastic bags, mud bins, plastic containers and metal bins etc. adopted by farmers are variable. It was observed that the Farmers of 11 village uses Jute bags 33.34% while and Farmers of 4 villages uses16.67%. Regarding use of plastic bags, it was found that farmers of 4 village use 50% and farmers of 9 village use 33.34%, and farmers of 2 village use 16.67%., It was also noted that the farmers of only 6 village use 16.67% Mud Bin for storage of grains. Farmers of only 8 village use 16.67% plastic containers. During study it was observed that farmers of 3 village uses 33.34% and farmers of 12 village use 16.67% metal bin for grain storage method. The present study reveals that out of total 90 respondents, 26 farmers were using Jute Bags (28.89%), 32 farmers were using plastic bags (35.56 %), 6 farmers were using Mud bin (6.66%), 8 farmers were using Plastic container (8.89%) and 18 farmers were using Metal bin (20.00%). During study it was observed that mostly farmers want to use Mud bin *(Khothi)* made of clay. It might be possibly due to minimum losses as compare to other storage mode. However, due to lack of space, immovable characteristics, lack of skilled person for construction of Khothi, now a days the use of Mud bin has been renounce by the farmers. Study also reveals that the other mode of storage essentially needs sun dried at 3-4 month's intervals. However, it was also observed that some farmers does not like to use Mud bin and Plastic containers.

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