

Impact of different grain storage systems on quality of grains

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Received: 23.07.2012; Revised: 28.09.2012; Accepted: 07.11.2012

■ **ABSTRACT :** In a country like India, where 70 per cent of farm produce is stored for local consumption, there is urgent need to provide safe storage facilities at the farm level and house-hold levels immediately after harvest. Small-scale and subsistence farmers must store and protect their grain until it can be marketed or consumed. Keeping in view the above facts, three grain storage system of small capacity (*i.e.*, Tanki, Kuthala and Kothi) were tested to find out the proper storage of grains and seeds. At Krishi Vigyan Kendra, Tepla, Ambala an investigation was carried out during the year 2005-06. From 9 villages of Saha block of Ambala district (Haryana), 60 respondents (farm women) were randomly selected from low-income group (LIG) families. Data were collected through structured pre-tested personal interview schedule. The results showed that majority of the farm women (55 %) used Sheet Tanki for storage of grains, 35 per cent used Kuthala and 10 per cent used Kothi for safe storage of grains. The results revealed that majority (85 %) of the farm women were of the view that sheet Tanki is costly but they liked it because it needed little maintenance cost. Although, Kuthala and Kothi needed time- to-time maintenance but quality of grains was not affected in Kuthala and Kothi because they absorb moisture from grains and chances of infestation of insect-pest were reduced to a great extent. The results also revealed that small capacity storage system was mainly (90 %) used for grain storage purpose whereas 10 per cent for the seed storage purpose. Conclusively, 100 per cent population was using sheet Tanki for storage of grains whereas maximum respondents reported that quality of the grains remained good in Kuthala and Kothi system as compared to that of Tanki.

■ **KEY WORDS :** Grain storage, Bins, Infestation, Insect-pests, Storage system

■ **HOW TO CITE THIS PAPER :** Singh, Upasana and Ahmad, Afzal (2012). Impact of different grain storage systems on quality of grains. *Asian J. Home Sci.*, 7 (2): 413-416.

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Over the last 25 years, the role of women in agriculture has become a familiar and well developed subject, broadly speaking, the early studies legitimized the idea of women as productive partners in agriculture, discovering and documenting the various roles played by women as farmers, farm wives and agricultural professionals and recounting the stories of successful women in these roles (Krishnamurthy *et al.*, 2011). After the post-harvest operations, women play an important role in storage of grains. The importance of food grain storage is self-evident to our modern society where food losses signify an intolerable waste of our limited resources. However, without the development of appropriate technologies, food losses during storage can and frequently do result in disastrous waste. In the country like India, where farmers for local consumption store 70 per cent of farm produce, there is urgent need to provide safe storage

facilities at the farm level and household level immediately after harvest. Small-scale and subsistence farmers must store and protect their grain until it can be marketed or consumed and this often poses insurmountable problems due to insect infestations and mold (fungus) development. Farmers store grains in bags, bulk and using different types of storage structure made from locally available materials, but due to inappropriate design and construction, it often causes major losses of grains. The pre-treatment necessary for better storage life is cleaning and drying of grains but design and its construction is also a vital role in reducing or increasing the losses during storage (Mohapatra and Mohapatra, 2007). For storing of grains at household level, farm women generally use Tanki (made of iron sheet), Kuthala (made of mud and wheat straw) and Kothi (made of sand, cement, iron etc.) in Ambala district of Haryana. The present study on farm trial

was conducted with the following objectives: to assess the effectiveness of different bins (Tanki, Kuthala and Kothi) for safe grain storage in the family and to create awareness about safe grain storage and to maintain the quality of grains during storage in the bins.

■ RESEARCH METHODS

The study was conducted during the year 2005-06 in adopted villages of Krishi Vigyan Kendra (Tepla) viz., Phulel Majra, Tepla, Akbarpur, Sambhalkha, Dhurala and Samlehari of Saha block, Ambala district in Haryana state. Ten farm women from each village were selected in random sampling techniques, thus, making a total of 60 respondents. These farm women were selected from Low Income Group (LIG) families and these respondents also comprised large, medium and small farmer families. Those farmers who were having more than 4 ha. of land were grouped under large, having 2-4 ha. of land were grouped under medium and those having less than 2 ha. of land or no land were categorized under small and marginal farmers. The data pertaining to type of grains stored, duration for which grains are stored, type of storage system, maintenance cost of different storage systems, pesticide used to save grains in storage system, purpose of grain storage, quality of grains in storage system, cause for deterioration in quality of grains, storage losses, from where the knowledge of storage of grains gained were considered. Data were collected by using pre-tested interview schedule by personal interview method. The data were tabulated and analyzed by frequencies and percentage.

■ RESEARCH FINDINGS AND DISCUSSION

The results obtained from the present investigations are presented below in Table 1 and 2 and discussed accordingly.

Socio-economic profile of the respondents:

The information regarding personal and socio-economic

profile is given in Table 1. It indicates that majority of the respondents (60 %) were having large family size (more than 6 family members) whereas 30 per cent and 10 per cent respondents were having medium (4-6 members) and small (less than 4 members) family size, respectively. 70 per cent respondents belonged to schedule caste or backward class caste and 30 per cent respondents belonged to General caste. Majority of the respondents (55 %) were uneducated and 45 per cent respondents were educated. Majority of the respondents (85 %) were landless and only 15 per cent respondents were having land.

Grain storage system adoption profile of respondents:

Table 2 indicates the information regarding distribution of respondents with respect to grain storage system. It is revealed that 55.00 per cent farm women used sheet Tanki for storage of grains, while 35.00 per cent farm women used Kuthala and only 10.00 per cent farm women used Kothi. The reasons for using iron sheet Tanki by the majority of the farm women might be easy to handle and easy to transport and no investment on maintenance cost. 68.34 per cent respondents said that they generally store cereals under storage system. It might be due to high production of cereals in Ambala district. Here, rice-wheat cropping system is the dominant cropping system, therefore, most of the farmers grow rice in *Kharif* season and wheat in *Rabi* season. Table 2 also indicated that most of the farm women (88.34 %) stored grains for less than one year and only 3.32 per cent farm women stored grains for more than 2 years. Majority of the farm women (63.34 %) used dry neem leaves as the pesticide to protect the grains against infestation of insect-pests. 20 per cent farm women responded that they used endosulfan against insect-pests. Grains with dry neem leaves were put together in the storage system. Dry neem leaves contain azadarachtin as natural chemical which acts as repellent against insect-pests. 10.00 per cent of farm women used Match box stick and 6.66 per cent women used flit (*i.e.*, *lipai* in Kuthala and Kothi). 90.00 per cent farm women

Table 1 : Personal and socio-economic profile of the respondents			
Sr. No.	General profile	No. of respondents (n = 60)	Percentage
1.	Family size		
	Small (less than 4 members)	6	10
	Medium (4-6 members)	18	30
	Large (more than 6 members)	36	60
2.	Caste		
	Schedule caste/ Backward caste	42	70
	General	18	30
3.	Education		
	Educated	27	45
	Uneducated	33	55
4.	Land		
	Yes	9	15
	No	51	85

responded that they stored grains for house hold consumption purpose and 10.00 per cent women said that they stored grains for seed purpose. Majority of the farm women (50 %) responded that rats were the main reason for deterioration in quality of grains whereas 35 per cent responded that moisture was the reason for deterioration in quality and 15 per cent opined that insect-pests were the reason for quality deterioration. On the question related to source of knowledge for proper storage of grains, 35.00 per cent farm women consented that they gained knowledge through Krishi Vigyan Kendra. They got this specific knowledge through trainings, KVK visits,

demonstrations and trials. But majority of the farm women (50.00 %) got knowledge from other neighbour educated farm women of the village. Agriculture Department of the state government was responsible for imparting knowledge to 15.00 per cent women. On the storage losses, 86.67 per cent women admitted that there were no storage losses during storage of grains while 13.33 per cent admitted that storage losses occurred during storage of grains in storage system.

Conclusion:

Production of grains has been steadily increasing due

Table 2 : Distribution of respondents regarding grain storage system			
Sr. No.	Specific information	No. of respondents (n = 60)	Percentage
1.	Type of storage system		
	Tanki	33	55.00
	Kuthala	21	35.00
	Kothi	6	10.00
2.	Type of grains stored		
	Cereals	41	68.34
	Pulses	11	18.34
	Oilseeds	7	11.67
	Seed material	1	1.65
3.	Duration of grain storage		
	Less than 1 year	53	88.34
	1-2 years	5	8.34
	More than 2 years	2	3.32
4.	Maintenance of storage system		
	Needs maintenance	10	16.67
	No need of maintenance	50	83.33
5.	Pesticide used to save grains in storage system		
	Dry neem leaves	38	63.34
	Endosulfan	12	20.00
	Match box stick	6	10.00
	Flit (<i>Lipai</i> in Kuthala and Kothi)	4	6.66
6.	Purpose of grain storage		
	For seed purpose	6	10.00
	For house hold consumption	54	90.00
7.	Reasons for deterioration in quality of grains		
	Moisture	21	35.00
	Insect-pests	9	15.00
	Any other (rat)	30	50.00
8.	Source of knowledge for storage of grains		
	Krishi Vigyan Kendra	21	35.00
	Agriculture Department	9	15.00
	Villagers	26	43.33
	Television/Radio	4	6.67
9.	Storage loss occurrence		
	Occurs	8	13.33
	Does not occur	52	86.67

to advancement in production technology, but losses of food grains are also increasing. The main reason for this is improper storage, and an average of 6 per cent out of total 10 per cent loss takes place during storage of food grains. Storage of grain in India is done at many levels. The major production is stored at farmers level and root cause of massive storage lies here. The suitable low cost structures developed have been identified. Among them, Tanki, Kuthala and Kothi are the important ones which are used at house hold level in the villages of Ambala district.

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