Food Grains Storage Mechanism (A Case Study of Rajasthan State)

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Abstract: **Food grains are important part of agriculture commodities and having lion's share of vegetarian's diet. Grain production is continuously showing increasing trend because of introduction of advance technology of crop cultivations. Lack of knowledge of scientific storage resulted in heavy losses after harvesting of food grains. World Bank Report (2005) indicates, approximate 12 to 16 million metric tons of food grains losses observed every year. [1] One of estimate concluded by Rajasthan State Ministry of Agriculture (2014) approx 1.00 to 1.20 million metric ton of food grains losses observed every in Rajasthan State due lack of scientific storage capacity, an amount that the stipulates could feed one-third of Rajasthan's poor. The monetary value of these losses amounts to more than Rs 4000 Crores per year. [2]**

Food grains are natural contamination mainly influenced by environmental factors such as temperature, storage structure type, moisture and humidity of climate etc (Sashidhar et al, 1994). Food grains are mainly stored in structure made by locally available materials. 6% of total losses are mainly observed due to rotting and rodents attacks on storage structures. Some important variable factors are there to affect the storage losses i.e. length and purpose of storage, types of structure used, grain treatment and pre-storage practices. [3]

Insects, rodents, and micro-organisms cause quantitative as well as qualitative losses during storage. Stored grains are associated with a large number of insect pests. Climatic and geographical conditions plays important role for occurrence and numbers of stored grain insect pests. (La1 and Srivastava, 1984). [4] Grains contamination may cause destruction of 10-15% of the grain and result into undesirable odors and flavors. Insect pests also play a pivotal role in transportation of storage fungi (Sinha and Sinha, 1992). [5]

Keywords: **Food grains storage, agricultural storage, agriculture warehousing, Rajasthan, storage structures.**

1. INTRODUCTION

Food Grain Storage Methods:

There is an estimate that approx 60-70% food grains stored in indigenous structures made by locally available materials with farmers.

Domestic grain storage structures are having important role in preventing losses which are mainly due to moths, weevils, rodents and beetles (Kartikeyan et al, 2009).**[6]**

Food grains are stored at farmer level, *Mandi* level traders and at manufactures / processer level. The factors which are having important role regarding retention of food grains at farmer level are family size, farm-size, consumption pattern, yield per acre, marketing infrastructure, advance credit availability and future crop expectations (Greeley, 1988).**[7]**

Domestic food grain structures available at farm level: Mainly used by famers at village level.

a. ***Kothi:*** Kothi is made by farmers with use of cow dung, mud, clay mixture and bricks. These are mainly mud structure.
b. ***Thekka:*** Cotton wounds with wood support made rectangular structure
c. ***Kanaj:*** Bamboo woods used for construction of container kind of structure, cow dung mixed with mud used for plaster of kanaj at farm level for storage of food grains.
d. ***Sanduka:*** These are small size wooden boxes used for storage of pulses, seeds and smaller quantity of grains.
e. **Metal drums:** Metals sheets used for manufacturing of cylindrical structures. (Patil H. et al 2016)**[8]**
f. ***Dokal:*** These are earthen pots made by loamy clay mixtures used for storage of grains used for day to day purpose. These are placed at floor level.
g. ***Gummi:*** It is outdoor structure made with bamboo sticks, base is made with stone slabs and used to store post harvest un-threshed crops produce.
h. ***Kacheri:*** Wheat and paddy straw woven with rope to construct this structure. Plastering is done with mud.
i. ***Hagevu:*** It is indoor structure and constructed in underground pits. Straw and ropes are stuck to walls to prevent the moisture seepage. It is suitable in dry agri-climatic regions and fumigations are not required in such structures (Channal et al 2008) **[9]**

Above domestic food gain structure are used covered with various post harvest straw of crops, gunny bags and plastics sheets to prevent the natural hazards. Indigenous structures are not scientific way to store the food grains so not suitable for long term storage. Maintenance i.e. plastering, removal of rotted straw or grain are required at regular interval for safe storage of grains.

Modern structures for grain storage:

Losses are at large scale in indigenous structure. Various agriculture universities conducted research on scientific ways of grain storages.

a. **Small size storage structures:** PUSA Bin, Hapur Tekka and PAU (Punjab Agriculture University) Bin. PAU bin is made with galvanized metal iron structure where 1.5 to 15 quintals can be stored.

   PUSA bin is made with mud and bricks structure and embedded with polythene on walls. Hapur thekka is made with cloth and bamboo sticks in a cylindrical structure.**[10]**

b. **Large size storage structure:** Silos, Silos bags, Cover and Plinth (CAP) storage**.** Silos and CAP are large size grain storage structures. These are made with brick pillars with hight of 14 feet from the ground where grain stack are covered with LDPE Sheet of 250 micron from top and all four sides. Food corporation of India is using this method at most of storages and it is one most of economic structure. The structure can be made in less than 3 weeks. (India Agronet, 2011). **[11]** The silos are made with metal or concrete.

Table-1: Major Food Grain production in Rajasthan State in Year 2015

Production and yield of various principal crops during 2014-2015 (Area in - Hectare, Production in-Tonnes)						
Crop	Area			Production		
	Kharif	Rabi	Total	Kharif	Rabi	Total
Rice	167752		167752	315577		315577
Wheat		2932800	2932800		9868872	9868872
Jowar	660969		660969	454719		454719
Bajra	4076909		4076909	4554411		4554411
Maize	891457	17622	909079	1488902	78784	1567686
Small Milles	11095	785	11880	2650	1163	3813
Barley		409300	409300		1207435	1207435
Total	5808182	3360507	9168689	6816259	1156254	17972513

(Source: - Hand Book of Agriculture statistics 2015 published by Ministry of Agriculture Rajasthan)

Scientific and safe storage – Warehousing in Rajasthan :

Warehouses are scientifically constructed for bulk storages and protection of agriculture commodities for quality and quantity. These are mainly used by *Mandi Arthias,* manufactures/processors of agriculture commodities and Food Corporation of India. In Government sector mainly owned by Rajasthan State Warehousing Corporation (RSWC), Central Warehousing Corporation of India (CWI) and Food Corporation India (FCI). Approx 120 agricultural and processed commodities are being stored in these warehouses at bulk level. **[12]** As per one of the estimate Government sector provides approx 108 to 110 MT storage capacity. Service like fumigation, cleaning and forwarding, transportation and handling, disinfection, procurement and distribution and other ancillary facilities i.e. security and safety, standardization, quality certification, insurance are being provided by RSWC, FCI and CWI (India Agronet, 2015).

Approx 26.62 million tones capacity is owned by Food Corporation of India, which makes it the single largest agency to handle such large storage capacity.

Selection of the storage site, to undertake cleaning and fumigation, storage structure, proper aeration assurance of grains followed by regularly inspection of food grains stack are important for scientific and safe storage. Relatively humidity, moisture content of grains, temperature, storage period, fumigation frequency and hygienic conditions are main factors to affect the pest infestation in grains.

Beetles (*Callosobrunchus* sp, *Trogodermagranarium, Tribolium confusum*), moth (*Corcyra cephalonica*), rodents and weevils (*Acanthoscel idesobtectus*) are the major pest of stored grains.

Two type of control measure can be used for treatment –curative and prophylactic. Fumigant aluminium phosphide is used in curative method. DDVP (76% EC) Malathion (50% EC), and Deltamethrin (2.5% WP) these pesticide are used in prophylactic method of treatment. Poison baits and cages are used for control of rodents (India Agronet, 2014).

CONCLUSION

Rajasthan has agriculture based economy. Agrarian community majorly constitutes the major part of population. Major lacuna of state is non availability of scientific storage infrastructure, where approx small and marginal land holding constitutes 68-70% and 18-20% respectively of total farming community. Large farmer are very few in state. Major crops produced in Rajasthan are Mustard, Bajra and Wheat. Scientific methods of crop cultivation resulted in increase of the grain production. Farmer are also utilizing advance facilities in terms of technology, seeds, pesticides, irrigation and fertilizers. In parlance of above mentioned advancement of crop cultivation storage structures are not developed that resulted into the loss of grains of approx Rs. 4000 crores every year. Natural factors i.e. temperature, moisture, pH and environmental factors also cause contamination of food grains to large extent. Traditional

structures at any given time stored 60-70% of grains at farm level.

Total major coarse food grain production increased from 12 million tons in years 1998 to 18 million tons in year 2015 in Rajasthan state. In contrast, agriculture storage capacity increased from 4 million tons to 8 million tons in year 2015 in state. The gap can be mitigated to analyze the weaknesses, opportunities, strengths and threats of storage system of state.

It is well tested that indigenous storage structures cannot store the grains for long period. There is large gap between storage capacity and agriculture production scenario in state. Hence government, public sector, private sector and individual farmers need to focus on improvement of storage structures in sustainable manner for long duration to avoid any kind of distress selling, losses of food grains and yearlong household needs at farm level.

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