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An overview of traditional indigenous storage infrastructures and practices in India and Tamil Nadu

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Abstract

India is advancing towards becoming a leading global exporter of food grains, and it is essential to explore various indigenous grain storage practices that have been in use for centuries. Modernization of Indian agriculture has caused extinction of several Indigenous agricultural practices which once played a vital role in bringing down the dependency of our farmers. Preservation of food grains through indigenous methods is considered as one of the most important traditional ways in our Indian agriculture from time immemorial. These traditional storage methods are not only cost-effective but also sustainable, as they preserve grains without the use of harmful chemical preservatives. This paper delves into the design, materials, and ecological importance of these storage systems, emphasizing their role in enhancing food security and resilience among local farming communities.

Keywords: Indigenous knowledge, indigenous grain storage, ITK practices

1. Introduction

In 2022-23, India reached a significant milestone by producing 3296.87 lakh tonnes (union Agriculture Ministry, 2024) of food grains, an increase of 140.71 lakh tonnes compared to the previous year's production of 3156.16 lakh tonnes. This growth indicates the nation's self-sufficiency in food grains and its potential as a global leader in agricultural exports. However, to sustain this position, India needs to develop sufficient infrastructure for food grain storage, which is crucial for achieving long-term food security.

Historically, securing the food supply has been a matter of great importance to Indian communities, with evidence of grain storage practices dating back to the Vedic age. Traditional storage systems like granaries and underground godowns continue to be prevalent, especially among small-scale farmers. Estimates suggest that 60-70% of the food grains produced in India are stored at the household level using indigenous methods. Therefore, it is vital to study and preserve these traditional practices to ensure their continued use by future generations.

During 2000 B. C. Aryan people settled in different colonies, towns, cities, etc. It is found that in such towns, hoards of grains were seen in common granary. That food distribution system must have been adopted by the people of Harappa and Mohen-jo-daro is highlighted by the evidence of granaries. Such evidences are also found in the Mahabharata era, and now in the modern era, we have fully developed this science. But still, it is debated that the

traditional structures and practices of storing food grains are more sustainable and eco-friendly. These are the practices that are still supporting the small farmers who are not able to afford the modern sophisticated storage facilities. Certain studies have estimated that nearly 60-70 per cent of the food grains produced in the country are stored at a home level in indigenous structures by using traditional practices. Therefore, it is very important to understand these practices and incorporate them into our policy circles. Hence, a study was undertaken to collect and document the details of various indigenous grain storage structures available among the farmers so as to preserve and propagate them for use by the future generations. Until then, the farmers might have been possessing excellent storage structures and practicing indigenous storage techniques. Study focuses on an overview of traditional storage infrastructures and practices in India. The research likely explores historical and culturally specific methods used for storing agricultural produce, grains, and other essentials, examining how these systems have evolved over time. Such traditional methods might include earthen granaries, underground storage pits, and other indigenous practices suited to India's diverse climates. Their analysis may provide insights into the effectiveness, sustainability, and relevance of these methods in modern contexts, especially as India faces the challenges of balancing traditional knowledge with contemporary technology in storage solutions.

2. Traditional Storage Structures in India

The farmers of Andhra Pradesh have adhered to their century-old traditional storage pits which can store grains for nearly a decade. The process involves digging a rectangular pit, at least 6 feet deep, in the open space in front of farmers' houses. The pit is then filled with a mixture of hay and clay. Harvested food grains are carefully placed inside the pit, which is then sealed with mud, creating a protective heap. By storing grains in this manner, farmers are relieved of concerns about potential losses due to calamities such as rain, theft, or fire accidents. These pits which are also sacred places for farmers are regularly coated with cow dungs and traditional rangoli by the women of the house.

2.1 Bukhari: It is a square-shaped structure constructed either with mud or brick and cement and also has an opening/outlet at the ground level. The upper portion of the Bukhari is plastered with mud and straw and covered with polythene to protect against moisture. This structure is raised above the ground by a wooden or masonry platform. It generally has a capacity of 3.5 to 18 tonnes.

2.2 Moral: This type of structure is used to store paddy, maize, and jawar in rural areas of the eastern and southern regions of India. These structures are like the shape of an inverted cone. The improved structure consists of circular wooden plankfloors supported on pillars using timber joints. The bamboo splits are placed vertically along the inner surface without leaving any gap between them. The height of the bamboo split is equal to the height of the structure to store the desired amount of grain. Keeping the bamboo splits in position, the grains are filled up to the cylinder height and then the bamboo splits are held straight and continuous filling of grain and winding of the rope goes on simultaneously. To provide a smooth surface, about 1 cm thick layer of mud plaster is applied over the rope. A conical rod with an ample overhang is placed. Rat-proofing cones are also provided 1.5 m above on all four pillars to avoid damage by rats.

2.3 Kothar: It is common in the northern part of the country and is used to store paddy, maize, sorghum, wheat, and barley. The capacity ranges from 9 to 35 tonnes. It is a wooden box-type structure elevated from the ground by pillars. The roof is tilted and can be made of planks or corrugated metal sheets with sufficient overhang on all sides. The structure is raised on timber pillars 1.5 cm above the with rat-proofing.

2.4 Cylindrical Grain Bins: These are used for a variety of food grains. It has a capacity of 10 to 40 tonnes. The structure has a concrete base and is supported by columns. Two openings are given in the structure for taking out and putting grains in. The top hole which has a locked hinged cap is wide enough for a person to get in for cleaning purposes. The manhole at the top is also provided with a watertight steel lid.

2.5 Rectangular Grain Bin: On a farm, different kinds of grains are raised and therefore there is a need to make storage structures that can store different grains. In this type

of storage, different storage bins are made under the same shed. The bin walls are made 11.5 cm thick and laid in cement mortar. The front wall is provided with a rectangular hole at floor level to take out grains.

2.6 Bharola: It is an egg-shaped earthen yet portable storage bin that has a capacity of at least 40-80 kgs of food grains. **Kupp:** It is a cheap and easy way of storing the chaff and wheat straw, which are eventually used as cattle fodder. After the area for making a Kupp is earmarked a circular boundary of straw and sticks is laid out. After this chaff is filled into the center to ensure it fits tightly into the earmarked space. This process is repeated several times till a particular height is reached. The hay is then secured with the help of rope or metal wire. **Crib:** This is entirely made up of bamboo, wood, and metal wires, and roofed with thatch straws in a way that air can perpendicularly pass through them. It is a rectangular-shaped structure and elated above ground by 0.5m to 1m. The legs are fitted with a rat-proof device to prevent them from harming the product. Its shape allows the drying process of grains with ease as the natural ventilation continues.

2.7 Kanaja: It is an underground grain storage container made of bamboo. The base is usually round and has a wide opening at the top. The height and capacity vary. The Kanaja is plastered with mud and cow-dung mixture to prevent spillage and pilferage of grains. The top is also plastered with mud and cow dung mixture or may be covered with paddy straw or gunny bags.

2.8 Sanduka: These are usually used for storing smaller quantities of grains, pulses, and seeds. The storage capacity of these boxes may vary from 3 to 12 quintals. Partition walls may also be made inside the box to store two to three types of grains simultaneously. A big lid on the top with a small opening enables taking out the grains. To protect the grains from moisture, the box is kept 12 inches (about 30.5 cm) above the ground level with the help of stands/legs. The box must be regularly polished for its maintenance.

3. Traditional Storage Practices in India

1. In the northern part of the country, farmers indigenously store wheat after drying it in the sun and cleaning it by sifting it. It is scientifically agreed that this process reduces the chances of attack of storage pests.
2. Farmers store red gram after mixing with common table salt. These mixed grains are later packed in jute gunny bags and stitched. The corrosive action of salt on the skin of insects prevents the movement of insects in the gunny bag. This practice can be used to store red gram for a short period of 6-8 months.
3. Ash at the ratio 1:4 can be used to store Sorghum seeds in the airtight jute gunny bag. It has been reported that in Rajasthan and Punjab, farmers mix moth bean and moong with ash to prevent the attack of beetles. According to agro-scientists, Ash contains silica which acts as an insect repellent. Farmers strongly believe that ash application can control crop damage by 80 per cent.
4. Farmers in Tamil Nadu use neem and thumbai leaves in the storage of ragi. These leaves are cheap, organic, and

safe methods to get rid of pests. Farmers also use neem seed kernel extract to treat the jute bags which can be further used to store food grains.

5. Camphor is also being used by the farmers to repel pests and insects during the storage of pulses and grains. The strong odor of camphor can protect grains for 3 months from the pests.
6. There is a practice of mixing Gingelly seeds (*Sesamum*) with paddy to prevent the webbing of larvae of Indian meal moths in oil seeds. This method can be used to store the oil seeds for at least 3 months. Gingelly oil which is also used to cook food in some regions of India, is stored with palm jaggery pieces in the tin container. This not only avoids the problem of rancidity but also helps to preserve oil for at least 18 months. To tackle the problem of spoilage and fetid in stored oil, farmers first heat the long iron rod of 8 cm width and 6.93 length on the earthen stove for 30 months. When the iron rod becomes reddish then it is dipped in stored oil for 5 minutes and the narrow opening of the container is tightly sealed with a cotton cloth.
7. There is a practice of storing tamarind in earthen pots with salt. This will help in loosening the flesh of tamarind and prevent it from pests and moths.
8. For the last 40 years, farmers have been practicing an indigenous technique of storing grain with sweet flags. In this technique grains, pulses, etc are mixed with powdered sweet flag. The strong odor of the sweet flag prevents the infestation in the grains.

In Sundaramari *et al.*, 2016 ^[8] conducted a study emphasizing the role of indigenous traditional knowledge in South Tamil Nadu's agriculture, particularly focusing on grain storage and food security. Their findings highlighted how local communities have passed down valuable practices that ensure effective adaptation to the region's unique environmental and socio-economic conditions. Below are some of the key structures and methods discovered:

4. Traditional structures in south Tamil Nadu

4.1 Kulumai: Kulumai is a significant indigenous structure used for storing various food grains, especially paddy (*Oryza sativa*). It plays a vital role in the local food security system by allowing long-term storage of grains.

4.2 Kaambara (Kalangiyam): Kaambara, locally referred to as Kalangiyam, is a permanent masonry structure that can hold large quantities of food grains (approximately 2-3 metric tonnes). It is usually built in a corner or on one side of a room, providing ease of access for both filling and removing grains. To prevent moisture damage, the interior walls are lined with palmyra leaf mats. Castor oil lamps are placed on small wooden stands inside for illumination during work.

4.3 Kudhir (Kuthir): Kudhir (or Kuthir) is another traditional storage structure commonly used in rural South Tamil Nadu. It serves as a sustainable solution for storing staple grains like rice, millet, and pulses. This method reflects the agricultural wisdom of the community, offering an eco-friendly alternative to modern storage solutions.

4.4 Modappanai: Modappanai is a large mud pot used for storing food grains and other household items such as tamarind, chilies, and coriander seeds. It is made from clay soil, shaped on a wheel, and fired in a brick kiln for hardening. With a capacity of 25-30 kg, it is smaller than Kulumai but more portable, making it ideal for household consumption. Both Kulumai and Modappanai are crafted by local artisans known as "kuyavas," who possess specialized skills. The pots are often stacked one over another in a corner of the room. To prevent the bottom Modappanai from lodging, it is placed on a layer of sand or a circular base called "uri" or "pirimanai," which is typically made from coir or paddy straw, and has a diameter of about 15 cm.

5. Conclusion

Traditional grain storage methods in India demonstrate a deep-rooted knowledge of local environmental conditions and resource management. While modern storage techniques offer advantages such as increased capacity and mechanized pest control, these indigenous systems provide sustainable, eco-friendly, and cost-effective solutions that have stood the test of time. Preserving and enhancing these practices, possibly integrating them with modern technologies, could contribute to more resilient food storage systems, especially for rural and small-scale farmers. In the context of increasing climate variability and the need for sustainable practices, these traditional methods offer valuable insights for future food security. If these indigenous grain storage structures are conserved and propagated for use among the farming community, they would definitely lead to the endogenous development of rural areas thereby providing a basis for self-sufficiency and self-determination of the common rural clientele.

6. References

1. Dhaliwal RK, Singh G. Traditional storage practices. *Indian J Tradit Knowl*. 2010;9(3):526-530.
2. Dhingra D. Evolution and trends in food grain storage in India. In: Navarro S, Jayas DS, Alagusundaram K, editors. *Proceedings of the 10th International Conference on Controlled Atmosphere and Fumigation in Stored Products (CAF2016)*. Winnipeg, Canada: CAF Permanent Committee Secretariat; 2016. p. 47-52.
3. Kannan E, Kumar P, Vishnu K, Abraham H. Assessment pre- and post-harvest losses of rice and red gram in Karnataka. *Crops*. 2013;44(6):61-70.
4. Karthikeyan C, Veeraraghavathatham D, Karapagham D, Firdouse A. Traditional storage practices. *Indian J Tradit Knowl*. 2009;8(4):564-568.
5. Mann S, Dixit AK, Tushir S, Bashir AA. Traditional grain storage practices in India: SWOT analysis. In: Navarro S, Jayas DS, Alagusundaram K, editors. *Proceedings of the 10th International Conference on Controlled Atmosphere and Fumigation in Stored Products (CAF2016)*. Winnipeg, Canada: CAF Permanent Committee Secretariat; 2016. p. 500-503.
6. Muganyizi J, Bisheko, Rejikumar G, Ibiroga D, Kikonyogo S. Traditional grain storage methods: an exploration of their contribution to the sustainability of Indian agriculture. *Cogent Food Agric*. 2023;9(2). DOI: 10.1080/23311932.2023.2276559.

7. Subramaniagowdar R. An experienced and specialized farmer on indigenous storage structures, Mangarai Nettiapatty, Dindigul district, Tamil Nadu, India; 2001.
8. Agarwal V. What is the Aryan Migration Theory? [Internet]; 2000.