



Role of Indigenous Technical Knowledge in Grain Storage and Conservation: Evidence from Traditional Practices in India

*Tanisha Passah¹ and Chethan Kumar K B²

¹Indian Agricultural Research Institute, New Delhi, India

²NBPGR, Hyderabad, Telangana, India

*Corresponding Author's email: tanishapassah30@gmail.com

Indigenous Technical Knowledge (ITK) plays a vital role in sustainable agriculture, particularly in grain conservation and post-harvest management in India. Developed through generations of observation and interaction with the environment, ITK provides location-specific, cost-effective, and eco-friendly solutions to minimise post-harvest losses. This article highlights various indigenous grain storage structures, such as Kulumai, Underground Storage Pits, Mud Kothi, and Chindo, which are widely practiced across different regions of India. These structures utilise locally available materials and are designed to protect grains from pests, moisture, and environmental fluctuations without the use of harmful chemicals. Despite the availability of modern storage technologies, indigenous methods remain relevant for their affordability, sustainability, and adaptability to local conditions. The study emphasises the importance of documenting, preserving, and integrating ITK with modern scientific approaches to enhance food security and promote sustainable agricultural practices.

Keywords: Food security, Grain storage, Indigenous Technical Knowledge (ITK), Post-harvest management, Sustainable agriculture, Traditional storage structures

Introduction

Indigenous Technical Knowledge (ITK) refers to the knowledge, skills, and practices developed by local communities over generations through continuous interaction with their environment. Indigenous knowledge evolved through **trial and error, observation, and experience**. Early communities learned by interacting with nature, understanding weather patterns, soil types, plants, and animals. This knowledge became location-specific and adapted to local environmental conditions. It was transmitted from one generation to another through traditions, customs, and daily practices, making it a cumulative and dynamic system. Hence, UNESCO defined ITK as *“the cumulative body of knowledge, practices, and beliefs that evolve through adaptive processes and are passed down through generations by cultural transmission.”*

Indigenous Grain Storage Structures

Agriculture plays the most vital role in the Indian economy. However, the storage loss of the agricultural products, i.e. food grains, is a major concern in most of the agricultural countries, including India. The farmers of most agricultural countries have to struggle hard to protect their grains from various conditions causing damages to them. With the era of the Green Revolution, many improved techniques entered Indian agriculture, not only for producing crops but also for storing grains. However, along with such methods, chemical protectants also entered the agricultural sector. Nevertheless, in many parts of the country, the farmers practice indigenous storage techniques possessing excellent storage structures. These structures are eco-friendly, cheaper and locally available and do not cause any health hazards

1. Kulumai

These indigenous grain storage structures are found in the **Dindigul** district of **Tamil Nadu**. Kulumai (Fig. 1) is an indoor storage structure traditionally used for preserving various food grains, particularly paddy (*Oryza sativa*). It is locally constructed using a plaster composed of tank silt, rice bran, and paddy straw. This structure effectively **safeguards stored grains from pests, diseases, and even rodents such as rats**. Paddy grains stored in a kulumai can be preserved for up to three years with minimal deterioration in quality, demonstrating its high efficiency compared to many modern storage systems. Typically, the storage capacity of a kulumai ranges between 600 and 700 kg, depending on its size and the number of rings used in its construction. Once filled, it is securely covered with a lid. Being a largely stationary structure, Kulumai is not frequently moved from its place of installation.



Figure 1: kulumai (Sundaramari et al, 2011)

2. Underground Grain Storage Pit

An underground grain storage pit is a multipurpose and cost-effective traditional structure used for storing grains. It is constructed by digging a pit below ground level, typically in the front or backyard of a house, in shapes such as square, rectangular, or circular. These pits are mainly used for storing millets, including sorghum, pearl millet, finger millet, and other minor millets. Before filling, a layer of bran or crop residues is spread at the base of the pit. The inner walls are then lined with dried stalks of sorghum or pearl millet to provide insulation and protection. After preparation, the pit is filled with grains and sealed using stone slabs. It is further covered with gunny cloth and a layer of dry sand to prevent moisture entry. Grains stored in these pits can be preserved for approximately **3–5 months**. However, this method is generally avoided during the rainy season due to the risk of moisture infiltration.



Figure 2: Underground Grain Storage Pit (Sundaramari et al, 2011)

3. Mud Kothi (Kachha Kothi)

Mud kothi, also known as *kachha kothi*, is one of the most widely used indigenous grain storage structures at the farm level, particularly in regions like **Chhattisgarh**. It is a traditional storage bin constructed using locally available materials such as mud and unbaked bricks, making it cost-effective and easily accessible for farmers. The structure is generally built either at ground level or slightly elevated and may be placed inside or near the house. It is typically rectangular, square, or circular in shape, depending on local practices and space availability. The walls are made thick to provide insulation and protection against external environmental conditions. Mud kothi is mainly used for storing paddy and other food grains for household consumption as well as for seed purposes. The mud plastering helps in maintaining a relatively **stable internal environment, protecting grains from pests, temperature fluctuations, and moisture** to some extent. The structure is usually covered with a lid or sealed at the top to prevent contamination. The storage capacity of mud kothi varies depending on its size and construction but generally ranges from small



Figure 3: Mud kothi (Bakane et al, 2008)

household-level storage to larger units used by progressive farmers. Its widespread use highlights its reliability, low cost, and adaptability to local conditions.

4. Chindo

Chindo is an indigenous seed storage method practised by tribal communities in **Sikkim**, particularly the **Lepcha and Limboo tribes**, in which dried gourd shells, such as bottle gourd or ash gourd, are used as natural containers. Mature gourds are harvested, cleaned, and dried for several months until they become hard and hollow; the top is then cut open, and the inner contents are removed. Seeds of crops like vegetables, black gram, and green gram are placed inside, and the opening is sealed to create an airtight condition. This method **effectively**



Figure 4: Seeds stored inside mature and dry shell of bottlegourd (Lamichaney et al, 2019)

protects seeds from moisture, insects, and spoilage, allowing safe storage for about 2–3 years. Chindo is a low-cost, eco-friendly, and efficient example of Indigenous Technical Knowledge, although it is mainly suitable for small-scale storage.

Conclusion

Indigenous grain storage systems are a valuable component of traditional agricultural practices in India, offering effective solutions to reduce post-harvest losses. Structures such as Kulumai, Underground Pits, Mud Kothi, and Chindo demonstrate the ingenuity of local communities in utilising natural resources to ensure safe and long-term grain storage. These methods are not only environmentally sustainable and economically viable but also minimise health risks associated with chemical storage practices. However, with increasing modernisation, there is a gradual decline in the use and transmission of such traditional knowledge. Therefore, it is essential to document, validate, and promote ITK while integrating it with modern technologies to improve efficiency and scalability. Recognising and supporting indigenous practices can contribute significantly to sustainable agriculture, food security, and rural development in India.

References

1. Bakane, P. H., Patel, S., & Yadu, Y. K. (2008). Farm level storage systems of paddy in Chhattisgarh, India.
2. Lamichaney, A., Chettri, P. K., Mukherjee, A., Maity, A., & Kumari, S. (2019). Indigenous methods of grain storage followed by the Lepcha and Limbo tribes in the Himalayan tract of Sikkim. *Indian Journal of Traditional Knowledge*, 18(4), 769-774.
3. Sundaramari, M., Ganesh, S., Kannan, G. S., Seethalakshmi, M., & Gopalsamy, K. (2011). Indigenous grain storage structures of South Tamil Nadu. *Indian Journal of Traditional Knowledge*, 10(2), 380-383.