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Survey study on Traditional storage practices of Finger millet

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Abstract

Current study aimed to assess the traditional storage practices being practiced in southern dry zone of Karnataka viz. Mysuru, Mandya, Hassan, Tumkur & Chamarajanagara districts and to identify the best storage practices being followed in these districts. Field survey was undertaken in major finger millet [Eleusine coracana (L.)] growing region of all five districts of Southern Dry Zone of Karnataka viz. Mysuru, Mandya, Hassan, Tumkur & Chamarajanagara. Information was documented by using Participatory Rural Appraisal (PRA) technique like observation and discussion. The data on various methods was collected by contacting the respondents through one-to-one interaction and group discussion methods, the indigenous technologies used by dry land farmers for storage of seed were documented. Survey observations delineated that hagevu, metal bin and gunny bag type of traditional storage practices being followed for the storage of finger millet in southern dry zones of Karnataka viz. Mysuru, Mandya, Hassan, Tumkur & Chamarajanagara districts. Precautionary measures before storage, during storage, and after receipt of grains highlighted in our study were being practiced by farmers in these regions to ensure protection from spoilage of grains. It was demonstrated through our field study that traditional technical skill teaches us how best the utilization of natural sources could be useful for storage and protection of life of grains or seeds.

Key words : Traditional storage, Finger millet, Metal bins, Hagevu, Gunny bag.

Almost 54.6% of the population engaged directly or indirectly in agriculture and allied activities, and hence agriculture is the backbone of Indian economy that plays a vital role in its development. In coarse cereal crop, Finger millet crop is one of the major crops

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and its production is not only in terms of food security, but also in creating better nutrient for people. Finger millet [*Eleusine coracana* (L.)] is one of the most important millet crops belonging to family Poaceae and sub family Chloridoidae[1]. Finger millet is originally native of the Ethiopian highlands and was introduced into India approximately 4000 years ago[2]. Finger millet is considered to be of Indian or African origin. It is cultivated widely in East Africa and tropical Asia, mainly in the rainy slopes. It is also cultivated in the upland area of the Himalayas at an elevation of 2,300 m. India is the largest cultivator of finger millet, which is primarily grown in the states of Karnataka, Tamil Nadu, Andhra Pradesh, Orissa, Maharashtra, Uttar Pradesh, Bihar and Gujarat. These eight states together account for more than 95 per cent of the total area under cultivation and more than 98.13 per cent of the total finger millet production in the country. Among the Indian states that produce finger millet, Karnataka is the largest producer, accounting for 58% of the country's production. It is main dietary component in dry land region of southern Karnataka particularly in districts of Bangalore, Kolar, Chikkaballapura, Tumkur, Mysore, Chamrajanagar, Hassan, Mandya and Chitradurga[3]. International Journal of Engineering Technology and Management Sciences.

Finger millet is important millet crop in dry hill area of India. It is rich in protein, calcium, phosphorus, iron, fiber and vitamin content. The calcium content is higher than all cereals and iodine content is considered to be highest among all the food grains. Ragi has best quality protein along with the presence of essential amino acids, vitamin A, vitamin B and phosphorus[4]. Finger millet contains higher proportion of carbohydrate which is the form of non-starchy polysaccharide and dietary fiber, which provides several nutritional and physiological benefits[5].

Finger millet contains moisture (13.10gm), protein (7.30gm), carbohydrate (7.00gm), fat (1.30gm), and energy (328.00Kcal).[4] Finger millet is believed to be one of the few special cereal crops that support the world's food supplies. It is a hardy crop that can be grown in diverse environments. The grains can be stored for years without insect damage, which makes it a valuable crop for famine-prone areas. Although grown under dry lands, an assured harvest makes it an indispensable crop in the semi-arid, arid and rainfall limited hill agro-ecosystems. Seed treatment and storage comprise of one of the most important aspects of agriculture. The seed treatment practices have to appropriate to get good germination, plant establishment, and crop protection in early stage of crop growth[6]. Traditional knowledge has been passed on to subsequent generation through oral means. There are no limited accounted versions of this knowledge, which can be preserved for future reference and dissemination[7]. With this background, the present study was field survey study was conducted to assess the traditional storage practices being practiced in southern dry zone of Karnataka viz. Mysuru, Mandya, Hassan, Tumkur & Chamarajanagara districts and to identify the best storage practices being followed in these districts.

Study area :

Karnataka is divided in to 10 agro

climatic zones as per Soil, rainfall and other aspects are as follows 1) North eastern transition zone 2) North eastern dry zone 3) Northern Dry zone 4) Central dry zone 5) Eastern Dry zone 6) Southern dry zone7) Southern transition zone 8) Northern transition zone 9) Hilly zone 10) Coastal zone[8].

The present field study was conducted Mysuru, Mandya, Hassan, Tumkur & Chamarajanagara districts of southern dry zone of Karnataka.

Field survey :

Field survey was undertaken during work period in major finger millet growing region of all five districts of Southern Dry Zone of Karnataka. Information was documented by using Participatory Rural Appraisal (PRA) technique like observation and discussion[9]. The survey was continued for different stages of crop and season (Kharif, Rabi and summer) for collecting the sample to assess the safe storage method.

During the Survey it was observed that the Traditional storage structure practices to identify and gather description that are prevalent in the five viz. Mysuru, Mandya, Hassan, Tumkur & Chamarajanagara districts of Southern Dry Zone of Karnataka. The data on various methods was collected by contacting the respondents through one-to-one interaction and group discussion methods, the indigenous technologies used by dry land farmers for storage of seed were documented.

Natural contamination of food grains is greatly influenced by environmental factors such as type of storage structure, temperature, pH, moisture, etc.[10]. Types of structure used, length and purpose of storage, grain treatment (*e.g.*, parboiling) and pre-storage practices are all important variables affecting storage losses. The importance of these regional and crop variations immediately determines certain necessary characteristics of crop storage research1 micro- organisms. A large number of insect pests have been reported to be associated with stored grains. The occurrence and numbers of stored grain insect pests are directly related to geographical and climatic conditions. Furthermore, for a country like India, it is necessary to minimize the storage losses. As of now storage losses in India is 10% which is abnormally high as compared to other developing countries. In India, 60-70% of food grain produced is stored at home level in indigenous storage structures. Grain is generally stored either in bags or in bulk. A combined system of bag-cum-bulk storage is also practiced in some parts of the country. In villages the bulk storage system is more common than the storage in bags which is considered to be a practicable method of storing grain in the government godowns as well as in trade[11]. However, our field survey study revealed the following traditional practices being practiced in southern dry zone of Karnataka viz. Mysuru, Mandya, Hassan, Tumkur & Chamarajanagara districts. There are mainly following three types of storage practices being followed for storage of finger millet grains.

- Hagevu type of storage
- Metal bin type of storage
- Gunny bag type of storage

Hagevu type of storage :

Hagevu is a popular underground storage structure Mysuru, Mandya, Hassan, Tumkur & Chamarajanagara regions belonged to southern dry zones of Karnataka. The structure is egg-shaped and has a round opening, large enough for one person to descend into the pit. The inner walls are smeared with cow dung and then covered with paddy husk. After filling the hagevu fully, the paddy straw is spread on top as a thick layer and the structure issealed with mud plaster. The size of the hagevu depends on the size of the land cultivated by the farmer. This method of storage is advantageous and the grain stored becomes red and sturdy. It can be used to store large quantities of grain without taking up space, as it is located underground (Figure 1).

Figure 1: Hagevu type of storage practices

Metal bin type of storage :

Metal bins made up of steel, aluminium RCC are used for storage of finger millet grains inside and outside the house in some regions of Mysuru, Mandya, Hassan, Tumkur & Chamarajanagara belonged to southern dry zones of Karnataka. These bins are fire and moisture proof. The bins have long durability and produced on commercial scale. The capacity ranges from 50 kg to 10 tonnes (Figure 2).

Figure 2: Metal bin type of storage practices

Gunny bag type of storage :

In some other regions of Mysuru, Mandya, Hassan, Tumkur & Chamarajanagara belonged to southern dry zones of Karnataka gunny bag type of storage being practices. These structures are generally used for the storage of 25 to 500 tons of grain. The length of the structure is about twice the width or greater than that. A typical floor plan of such a structure large enough to store about 6000 bags (500 tones) of grain. Bags of different capacities (35, 50, 75 and 100 kg) with or

without inside plastic lining are used. The standard size of a 100 kg bag is 100 cm x 60 cm x 30 cm i.e. length of bag is 100 cm, width of bag is 60 cm and height of filled bag is 30 cm. This bag can store 93 Kg of Wheat and 75 Kg of Paddy (Figure 3).

Figure 3: Gunny bag type storage

Stored product pests can be managed either behaviorally (traps viz., probe traps, light traps, pitfall traps etc…) or with several preventive and curative measures (both chemical and non-chemical methods). Once a facility is obtained, a number of steps are to be taken to ensure safe storage of grains. These steps comprised as follows; (i) checking for leakage of rainwater and sufficiency of drainage facilities, (ii) cleanliness of the facility and environment, (iii) assessment of capacity of the facility, (iv) pesticide treatment, (v) security and firefighting arrangements and (vi) repairs to available equipment are some of the important steps to be followed before storage of grains. During the storage of grains, steps to be tracked as follows; (i) maintenance of cleanliness, (ii) ensuring aeration where necessary, (iii) checking for leakage after rains, (iv) inspection for insects, rats and mites at fortnightly intervals, (v) watch for advancement in deterioration, if any, (vi) pesticide treatments necessarily based on observations, (vii) ensuring disposal where called for, (viii) arrangement for segregation, salvage and processing, wherever, damage owing, and (ix) checking for leakage of water and other causes might. While, during the receipt of grains from storage following steps to be undertaken; (i) inspection for variety and soundness of quality, (ii) inspection carefully for infestation, it any, and when present, for type and extent of infestation, (iii) inspection whether grain has excess moisture, whether it had been heated up in earlier storage and has any musty or rancid odor, and (iv) any grain rendered wet or damaged to be segregated and salvaged with facilities available and check the weight received. Literature reports evidenced various types of traditional practices being followed by farmers for the storage of cereals, grain, sorghum, and agricultural products for future use. Kiruba *et al*.,[8] studied the basic design, the type of materials used and the ingenuity of the storage systems have been elucidated with the view of modifying such a system to suit the present day storage needs[12]. Karthikeyan *et al*.,[7] isolated on the traditional storage practices was done by direct interview and group discussion methods triangulation exercise was done in the study villages to gather reliable information and indigenous technical knowledge of the dry land farmers of Tamilnadu[13]. Furthermore, Wambugu *et al*.,[14] studied on seed security are key to the attainment of household food security among resource poor farmers in developing countries. The traditional methods included hanging cobs over the fireplace and storing in gunny bags with cow dung ash as the seed treatment. They

also follow the principle of airtight, though not new, should be used to design low-cost seed storage containers for resource- poor farmers which will result in better seed quality. And also shows that cow dung which is freely available in most homesteads is a good seed protect ant and is effective in maintaining seed quality in storage. Cow dung ash should therefore be combined with airtight storage to increase the seed longevity[14]. In addition, Kumar *et al*., studied on Indigenous knowledge is eco-friendly and safe both to man and his environment. It is estimated to 60-70% of food grain produced in the country is stored at home level in indigenous structures ranging from bamboo baskets to mud structure, gunny bags and modern bins.

Our field survey study conducted at Mysuru, Mandya, and Hassan, Tumkur & Chamarajanagara regions of southern dry zones of Karnataka revealed majorly hagevu, metal bin and gunny bag type of traditional storage practices being followed for the storage of finger millet [*Eleusine coracana* (L.)]. Precautionary measures before storage, during storage, and after receipt of grains highlighted in our study were being practiced by farmers in these regions to ensure protection from spoilage of grains. It was demonstrated through our field study that traditional technical skill teaches us how best the utilization of natural sources could be useful for storage and protection of life of grains or seeds.

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