THE DEFECTS IN THATCHED RHOMBU GRAIN STORAGE SYSTEMS IN SUDAN SAVANNAH OF NIGERIA

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ABSTRACT

The common grain storage structures existing in Nigeria sudan savannah zone are the mud rhombus, thatched rhombus, underground pit, earthen pot and warehouse storage. The grains which are usually stored in unthreshed forms include millet, sorghum, maize and cowpea. The most popular of these structures is the thatched rhombus, probably due to the availability of the materials and low cost of construction. Preliminary survey was carried out on the structure to evaluate the defects of this popular storage structure with the view to provide possible solution to on-farm storage of grains. Results show that the construction of the structure is completed within three to four days. The defects are observed in virtually all parts of the structure that is the roof, walls, foundation and the supports. This is basically due to the poor strength of the construction materials which invariably leads to huge losses of stored products. The structure is not moisture proof, rodent proof, airtight, not resistant to insect/pest infestation and it is highly flammable. Therefore the use of this type of indigenous structure should be modified and other structures such as the use of small metal storage bins are suggested.

Keywords: Causes of defects, grain loss, material of construction, physical defects, thatched rhombus

INTRODUCTION

The northern sudan savannah zone of Nigeria is covered with tall grasses and acacia trees, with an average year round temperature of about 28°C. The major grain crops grown in this zone includes millet, sorghum, maize, cowpea and soybeans. A large proportion of the population in this zone depends on agriculture, with production pattern being governed by food requirement for home consumption. Since the large majority of the population is dependent on agriculture, only a small portion of the total food production finds its way into the market, (Olumeko, 1999).

The increase in yield through improved cropping systems and the introduction of high yielding varieties has re-emphasized the need for more resources to prevent post harvest losses. Storage is an important activity which enhances market efficiency by providing utility. Storage is particularly important to agriculture because agricultural production is seasonal while the demands for agricultural commodities are more evenly spread throughout the year. Post harvest facilities or appropriate storage technology has been the major problem in Nigerian agriculture for a long time, (Agboola; 1992 and Agridem 1995). This has resulted in considerable waste of agricultural output and hence considerable loss to the economy, (Olumeko,1999). It has been noted that farmers achieve varying degrees of success in applying the basic principles involved in the safe storage of food.

The farmer after harvest stores grains temporarily in bulk or in bags for a month or two before being transferred to a structure. The traditional grain storage structures in different parts of Nigeria are made of varying locally available materials, usually; the type of locally available material indicates the type of structures. The structures are made from paddy straw, split or whole bamboo poles, planks reeds, robes, mud bricks and so on. Most of the structures are constructed at the beginning of harvesting season. The time of harvesting is usually between the months of August and January. The grains are stored either in threshed or unthresed forms. The basic requirements of every grain storage structure or system are to protect the grains from insects, rodent and prevent deterioration of the grains by the activities of micro-organisms. (Appert 1986, Igbeka and Olumeko,1996). It is also essential to keep the grains dry and cool during storage.

The prominent structures found in the sudan savannah includes mud rhombus, thatched rhombus and underground pit storage systems. Others are pot storage, calabash and gourds storage, local ware house and so on. The thatched rhombus is one of the most popularly used grain storage systems in Nigeria sudan savannah, probably due to the abundant availability of the construction materials, (Adejumo and Raji; 2007, Birewar, 1990).

The objective of this study is to evaluate the defects that exist in the thatched rhombus system of grain storage with the view to analyse it appropriateness for use as a grain storage system.

METHODOLOGY

Preliminary investigations were carried out on the thatched rhombus systems existing in some selected States in the Nigerian sudan savannah. Ten villages in ten local government areas of Kano, Bauchi, and Borno state of Nigeria were randomly selected for the analysis; a total of 50 thatched rhumbu was accessed. The structure was analyzed with the aid of a structured questionnaire and personal interview with the farmers. Visual observations and measurements were also taken. The questionnaire assisted in determining the following:-

1. The types and location of structural defects.
2. Causes of defects and maintenance methods.
3. Types and causes of storage losses in stored products.

RESULT AND DISCUSSIONS

Defects in Thatched Rhombus.

The thatched rhombuses are usually cylindrical or circular in shape with capacity ranging from 500 to 800Kg. The construction of the structure is completed within three to four days. The grains stored are mainly millet and sorghum; other includes maize, groundnut and soybeans. The construction cost is between #2,000 and #10,000. The thatched rhombus is usually supported externally with tree stems ranging from 6 to 16 units depending on its size (Plate1). Loading and unloading of unthreshed grains are done by the removal of the roof, since no appropriate design for loading and unloading is included. Structural defects were found to exist in the foundation floor assembly, the wall and the roof.

Plate 1a: Tree stem foundation assembly with supporting poles

(b) Tree stem and stone assembly

Defects in Foundation Floor Assembly

The foundation – floor assembly is usually made of irregular stones and tree stems or tree poles stems penetrating the ground, and crossed with other tree stems. The defect includes low elevation which ranges between 100mm to 600mm with no rodent guard except for very few rhombus which has thorns used as rodent guard. The low elevation is basically to ease loading and unloading of the grains. In raining season however, water still splash on the walls and seeps into the structure due to the low elevation; which leads to moisture absorption by the stored grains. The main cause of this defect is the inadequate design of the structure adopted by the farmer and the poor strength of material (Plate 2).

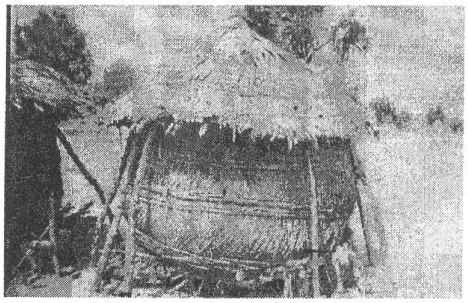

Plate 2: Thatched rhombus with very low elevation

Defects in the Wall

The wall of the thatched rhombus made of woven grass stems have two layers, being reinforced with two or three tension rings. Some of the structures have cow/animal dung in between the two wall layers to prevent farm animals from eating – up the walls. The walls are supported externally by 6 – 16 tree stems depending on the capacity; this to prevent the structure from tripling over when there is wind or rain storms. The supporting stems however does not penetrate the ground, hence the structure can tumble over in advent of heavy storm. The defect therefore includes inadequate external support, termite and pest infestation. The structure is neither airtight nor moisture proof. The major cause of these two defects was the poor strength of construction material. (Plate3).

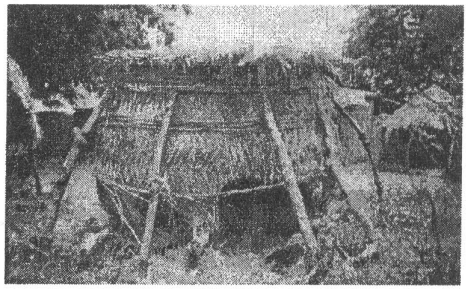

Plate 3: Failed thatched rhombus after 8 years of use

Defects in Roof

The roof of the thatched rhombus is usually conical in shape. The materials used for its construction are usually straws, tree stem,