Indigenous method of rat proof grain storage by Adi tribes of Arunachal Pradesh

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Rodents are important storage pest of NEH region due to availability of congenial habitat. The farmers of West Siang district of Arunachal Pradesh with their years of wisdom have been using an indigenous method of rat proof granary called Nahu in Adi language. The study reveals three scientific features of this structure used as rat proof grain storage. Use of stone pad at the bottom, wooden plate at the middle and airtight compartment at the top makes it a unique and innovative storage structure.

Keywords: Granary, Grain storage, Nahu, Adi, Rat proof storage, Rodents, Arunachal Pradesh

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Rodents are the most prolific mammals found throughout the world. This group includes rats, mice, bandicoots, hamsters, voles, gerbils, squirrels, porcupines, jerboas and birch mice, dormice and bamboo rats. Rodents are one of the most important pests of NEH region due to availability of congenial habitat in the vast forest areas of the region. This pest not only damages the standing crops but also largely the stored grains particularly rice, which is the most important food grain of the region. The famines were also reported due to enormous increase in rodent population at the time of bamboo flowering in Mizoram and Arunachal Pradesh at the intervals of 18 and 30 years.

Fifteen species of rodents were recorded from NEH region belonging to the genus Rattus, Bandicota, Cannomys, Mus, Vandelevia and Callosciurus. Bandicota bengalensis (Gray) has been recorded as a predominant species as constituted 31.57% of the total collection followed by Rattus nitidus nitidus (Hodgson) (24.51%). The Rattus rattus (Linn.) constituted 14.3% and Mus musculus (Linn.) 16.9% in houses. The rodents were observed causing damage to stored maize and paddy in the farm godowns. Losses to paddy to the extent of 4.6 to 54%, maize 14% were reported. The rodents not only eat away considerable quantity but also contaminate/spoil the product in such a way that sometimes it becomes unfit for human consumption. After harvest, rice is stored for a long period before consumption. In storage, insects, mites, microorganism, birds, rodents and environmental factor like moisture cause significant/substantial losses. The rice grains are stored in indigenously made storage structures in different parts of India by different tribal communities. The indigenous method of rat proof grain storage used by the Adi tribes of Arunachal Pradesh has been studied in the investigation.

Methodology

The study was conducted in 4 villages of West Siang district of Arunachal Pradesh, India situated at an altitude of 660 m asl, which were selected through multistage random sampling technique (Fig. 1). The villages are inhabited by Galo sub tribe of Adi tribe practicing jhum as well as settled agriculture. Rice is the staple food of these people. Data were collected through personal interview and direct measurement in the field using a structured schedule prepared specially for the study. Local leaders, farm women and village agricultural workers were consulted about this indigenous agricultural knowledge prevalent in this region.

Results and discussion

In Arunachal Pradesh, the majority of farmers store food grains and meat near the kitchen, where the
free from insect pest infestation. The farmers in the
smoke of burning firewood penetrates to keep these
(Toko palm) (Arecaceae)
Livistona jenkinsiana
(Fig. 5). Capacity of a
structure at 210-225 cm high from the ground (Fig. 4).
West Siang district of Arunachal Pradesh with their
years of experience and wisdom have developed a
traditional system of storing grains of rice, maize,
millet, etc. locally called, Nahu (Fig. 2). These storage
structures are constructed in a cluster near to the
village, however, farth enough away to avoid a fire
accident in the village (Fig. 3). The shape of the
granary is rectangular to square, with base of the
structure at 210-225 cm high from the ground (Fig. 4).
The space below the nahu is used to store fuel wood
(Fig. 5). Capacity of a nahu varies from 5.0–8.0 tonnes
dependning upon the size of land holding of the farmer
(Fig. 2). They store around 0.20–0.24 t / nahu for seed
purpose. A nahu is used for a period of around 20 yrs,
whereas the leaves of toko palm (Livistona jenkensisiana
Griff.) used for roofing are changed every 5 yrs. The
following plants and their parts are used for
construction of a nahu.

Three scientific features of this structure include:
feet of the wooden pillars are made to stand on stones
to avoid its contact with moist soil, which otherwise
leads to rottenning in this high rainfall area (Figs. 2 &
4). Just below the base of the storage, rectangular or
square wooden planks are fitted horizontally to stop
rats to enter the granary. Now-a-days instead of
wooden planks, tin plates are wrapped around the main
pillars to make it more slippery (Figs. 6 & 7). The
structure is divided vertically into 3 compartments. In
the lowest compartment, fuel wood is stored, middle
compartment remains empty, while the grains are
stored by making air tight compartments at the top,
made up of bamboo mats and toko palm leaves.

There are two partitions in the store, one is used for
storing rice grains and other is used for storing ragi,
maize, sorghum, etc. The number of storage units
varies from one to two per farmer. Farmers store the
grains after thoroughly drying in the month of
September-October. They withdraw around 40 kg grain
at a time for consumption. Well dried grains are stored
for future use, while grains with some moisture are
used initially to avoid its damage. Gunny bags are not
used inside the store. Farmers believe that use of gunny
bags leads to entry of small rats. Very finely woven
bamboo mats are tightly set on the ground and the
walls to create an air tight compartment for storing of
grains. After the grains are added to the store, it is
covered tightly with a bamboo mat by keeping stones
over it, so that there is no space left for entry of rats.
The bamboo mats are used for 10-15 yrs.

In Rajasthan women use traditional storage
structures such as mud bins, stone bins and bamboo
bins for storage. Before storage, they used to disinfect
the grains with smoke of cow dung cake and neem
leaves\(^1\). A traditional system of storing rice, maize,
millet and colocasia is highly scientific storage system
in Arunachal Pradesh\(^5\). The paddy retained at farm
level are stored in indigenously made storage structures
such as granary, locally made bamboo structures (mar,
dully and pachi), sack, etc., which cannot protect the
paddy completely from insect, pests, rodents, birds,
etc\(^6\). The study however reveals that structures used by
the Adi tribes protect the grains to a maximum extent
from storage pests. The structures are low cost and
constructed with use of locally available materials, of
which toko palm is most important (Figs. 8-12)\(^7\). Nishi
tribe of Arunachal Pradesh use rat trap called Gurung.
The trap is made of tauk (thin bamboo) with long
internodes. Garo tribes of Meghalaya use grain storage
structures made up of thatch grass, bamboo and
wooden poles\(^8\). The tribal people of Koraput district of
Orissa have their own indigenous way of storing crop
seeds and grains called Dhoosi and Khaniki. The
Dhoosi is made up of long straw rope twined spirally,
whereas, Khaniki is a big pot shaped bamboo basket
plastered with cow dung paste\(^9\). The importance of
managing rats has also been mentioned in our ancient
scriptures.

| Table 1—Local multipurpose tree species used for construction of nahu |
|-----------------------------|-----------------------------|
| **Plant name**               | **Parts used**              |
| Livistona jenkinsiana Griff. (Toko palm) (Arecaceae) | 20-25 bundles of leaves are used for roofing. (1 bundle = 40-45 number of leaves) |
| Bambusa spp. (Bamboo) (Poaceae) | Stem for steps, for making mats to spread inside the store on which grains are kept and covered with closely woven mat pressed with stones. The bamboo mats are used for 10-15 yrs. It is also used for making the wall of the structure. |
| Calamus spp. (Rattan) (Arecaceae) | For binding of bamboo, wooden logs and roofs. |
| Castanopsis indica A. DC. (Koyom/ Indian chestnut) (Fagaceae) | Posts are used as support to the roof, floor, etc. |
| Morus laevigata Wall. Ex Brandis (Bola) (Moraceae) | 14-15 posts are used as pillars of the structure. |
| Terminalia myricarpa Heurck & Muell.-Arg. (Hollock) (Combretaceae) | Timbers are sawed to make door of the structure. |
Fig. 1 Map of the study area
Fig. 2 Scientific features of Nahu
Fig. 3 Rat proof grain stores

Fig. 4 Nahu An indigenous rat proof granary
Fig. 5 Space for storing fuel wood
Fig. 6 Modified Nahu with tin plates

Fig. 7 Close view of tin plates
Fig. 8 Toko palm leaves harvested from forest
Fig. 9 Curing of Toko palm leaves

Fig. 10 Adi house of West Siang district
Fig. 11 The ground view of Adi house
Fig. 12 Adi house and kitchen garden
References