

TRADITIONAL KNOWLEDGE SYSTEM ASSOCIATED WITH TARO STORAGE: A CASE OF THE KONYAK NAGA, NAGALAND

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Abstract: Taro (*Colocasia* sp.), as a food crop, is often associated with mixed cropping patterns in the agricultural practices of the Konyak population in Nagaland. Its farming included intensive care and proper use of tools to prevent damage to the plants during their maturation process. Taro farming is mainly associated with women, who also carry out harvesting and storage. A well-defined work distribution among the Konyak population serves as the proper channel by which every gender was to follow the path, making taro farming associated with women, but at the same time, men could also participate in taro-related activity as no one in the society was barred from farming taro. Storage of taro forms the primary source of food security among the Konyaks of Nagaland; the process of taro storage has been in practice among the Konyak population for a long time, and remains a significant practice. The sheer matter of experienced hands was required to perform storage and adaptation to such subsistence, which led to the reflection of their cultural identity. The preparation also depends on the female folks; well-dried taro corms served as a potent means to their survival in times of food shortage and provided a cyclical nature of seedlings for planting.

Keywords: Cultivation, Harvest, Konyak, Storage, Taro, Work.

Introduction

Throughout human history, enormous activities surrounded him for survival. As such, agricultural development has been a remarkable testament, transforming the hunter-gatherer life of man into a settled one, prompting him to produce food, fuel, and raise plants and animals to meet his needs. Although it is difficult to pinpoint the exact genesis of agriculture, it developed at different times and in various places before the advent of written history, contributing to the rise of civilization and the expansion of empires. The adoption of taro into human vegetable culture has also significantly impacted subsistence through surplus production. The excess of products was also stored for uncertainties that the future had in store for humans. Storage methods were developed through fermentation, drying, smoking, and other techniques in response to specific needs, experiences, and experiments. Among cultivar species adopted by humans for survival, taro (*Colocasia esculenta*, also known as *Colocasia* sp.), a member of *Araceae* family, is widely regarded as a cultivable root crop. The scientific name genus name *Colocasia* comes from the Greek vernacular name *Kolokasia* (Grimaldi *et al.*, 2018). The term *Colocasia* was supposedly derived from the Egyptian word *Colcus* or *qolqas* and recognizes

two morphological types, namely Dasheen and Eddoe *Colocasia esculenta* var. *esculenta* and *Colocasia esculenta* var. *Antiquorum* respectively (Ahmed, 2014).

The earliest trace of taro according to Grimaldi (2016) citing Lebot (2009); Porterfield (1944), Loy et al. (1992) and Fullagar et al. (2006) stated taro has long being neglected by researchers considering it to be a minor crop. But excavation at Kuli cave in the Solomon Island have yielded evidence of taro from stone tools through observation of starch grains and calcium oxalate crystals dating to 28000 and 20000 BP and reports of Starch grains in Kuk swamp from Papua New Guinea, supporting long history of agricultural development.

Agriculture among the tribal inhabitants of Nagaland, India, forms the backbone of the economy, where the majority of the population depends on it for their survival and subsistence. Agriculture in Nagaland plays a significant role in the lives of people, utilising traditional skills and indigenous knowledge, along with other factors such as variations in climatic and soil conditions, resulting in diversified cultivation. Agriculture is a predominant form of occupation and income in Nagaland, a practice that has been ongoing since time immemorial (Solo and Kikhi, 2020). Variation in altitude and different agro-ecological patterns, the farming system includes shifting cultivation as a predominant practice in the state (Kuotsuo *et al.*, 2014). *Jhum* cultivation remains a dominant economic activity practiced by the farmers (Solo and Kikhi, 2020) and the population mainly relies on seasonal rainfall for their cultivation in many instances. Due to its topographic nature, the population is able to rely on shifting cultivation with a mixed cropping pattern, where rice forms a significant share of cultivation, followed by taro, maize, job's tears, corn, chilli, ginger, and other crops.

This is a working paper in progress that examines taro as a food choice among the Konyaks of Nagaland, specifically those residing in the Mon District of Nagaland, India. Taro as the primary source of subsistence for the Konyaks of Nagaland, India in particular while other cultural/tribal groups of Nagaland do have close association with taro as its subsistence such as Aos, Phoms, Rengmas to cite a few. Taro serves in different ways of subsistence such as fresh preparation of leaves and corms for immediate consumption, dried taro leaves prepared with non-vegetarian diet as the main recipe. However, this paper primarily focuses on the process of storing taro corms as a source of food security for the Konyak population, utilising indigenous knowledge in the storage process.

Area of study

Konyaks are one of the significant tribes inhabiting the present-day Mon District of Nagaland, India. Apart from this, they can also be seen inhabiting the Changlang and Tirap Districts of Arunachal Pradesh, as well as parts of Upper Assam. Internationally, they are also said to inhabit the present-day north-western Myanmar

region. Their surrounding neighbours include Phoms of Longleng and Changs of Tuensang Districts of Nagaland, India, respectively. They also share national boundaries with Assam and Arunachal Pradesh, as well as an international boundary with Myanmar. Based on the tattooing nature among the population, they are divided into ‘*Thendu*’ and ‘*Thenkoh*’, where the former term signifies people with whole tattooed faces and the latter meaning people with less tattoos on their face, especially a line of tattoo on their forehead or chin. On the pretext of their settlement, they primarily identify themselves as Upper Konyak residing in the higher hill ranges of Patkai along Indo-Myanmar border and Lower Konyak occupying the lower ranges and wider valleys down to Assam plains (Pereira *et. al.*,; 2019 : 42). In all, the Konyaks inhabiting the Mon district of Nagaland share a similar subsistence in agriculture with the rest of the population in Nagaland, India, where taro forms the second most important crop grown alongside rice, which is the people’s choice for subsistence.

For the present study data has been collected in the following ways:

- a) In-depth interviews with individuals, families and group discussions in relation to taro cultivation and storage knowledge
- b) Observation of taro corm storage
- c) Secondary data collected through journals and papers published related to taro.

Taro cultivation

Taro cultivation among the Konyaks has been a long-standing agricultural practice, as taro farming involves planting in *jhum* fields mixed with other crops, such as rice, chilli, ginger, pumpkin, maize, and jobs tears, to name a few. Agriculturally, taro forms the majority of the Konyak population, as Christop von Fürer Haimendorf mentions in his *Konyak Nagas* (1969) about the uses of taro, its plantation utilising a wooden pick, and its consumption, especially in the Wakching area (a Konyak village under the Mon district of Nagaland). The cultivation of taro takes place after the forest is cleared and burned in January. The planting season starts in February. Taro farming is supposedly a year-round crop, starting from the seed sowing months of February and harvesting towards the end of October, and continuing until January of the following year.

The farming technology included, tilling of land in the shape of a small hole with an iron hoe in the spot where taro seedlings are to be laid after which the sprouted taro plant are to be inserted along with the corm attached in the dug hole with the sprouted plant above the ground while the corm inside the hole after which softer soils taken out while digging the hole were to be poured and fill the hole along with the seedling. In another instance, if there were no sprouts from the corm, the corms

would be inserted in the hole dug with the head of the corm facing the sky. The planting of taro was to be done under strict observation of proper spacing between two taro plants, such as two feet between each plant in all corners. The spacing was maintained so that the spaces between two taro plants would be suitable for planting rice in the upcoming months. With the setting of spring and monsoon rains, weeds would start to grow. At this juncture, the employment of iron hoe and bamboo make shift scrapper would be used to clear the weeds in the entire filed plot and also to scrap and pour softer soils to the base of taro plant. This was done so that corms would grow bigger in size with the accumulation of softer soils above it as the population cling to the understood knowledge of pouring softer soils at the base would led to healthier growth of both the plant outside and corm inside. Harvest of taro were done in two seasons firstly during the peak of its plant growth, the months of July to August serves the best season for harvesting matured leaves and petioles of taro where petioles would be harvested for swine feed while leaves are harvested, sliced and sun dried. After taro leaves are dried properly, it is stored in the shelves above the kitchen hearth wrapped in *Phrynium capitatum*/*Phyrinium pubinerve* leaves locally called *Lai* in Konyak language. Secondly, freshly plucked young taro leaves is used for preparing taro curry, locally known in Konyak language- *Teang Hoi* (*Teang* meaning taro and *Hoi* meaning curry) to eat along with rice. Freshly prepared taro leaves served as a staple diet in the daily



Figure 1: Bamboo crafted peg and scrapper

lives of the people. Fresh taro leaves are cooked in earthen pots along with other available vegetables (Fürer-Haimendorf, 1969). Thirdly, by the end of October, when the plants cease to grow and die out naturally, taro corm harvesting begins, which continues until next January, as November and December are the peak periods for harvesting. Taro corm harvest is done with the help of a digging tool such as an iron hoe, a bamboo pick or a *Machete*. The dug-out corms are then cleansed of dirt and taken to the field huts for initial storage by a carry basket. Once the entire harvest of taro corms is complete, they would be carried home part by part until the whole harvest reached home. At home, the corms would be sorted by species and piled in a mound for both consumption and storage. The sorting was done for multi-dimensional purposes, such as for immediate consumption, later consumption, detaching smaller corms from the mother corms for seedlings for the next cycle of plantation. Additionally, the detached, smaller corms could be used for drying, which would later serve as a source of subsistence during the lean season or when the rice storage runs low.

Taro storage

Cultures around the world have an association with food storage, which serves as a security measure for all, including resource-poor families. This association of the indigenous knowledge has been passed down through generations by selecting food in the form of rice, non-rice crops such as tubers and vegetables. The indigenous knowledge related to the ecological system and the practices that evolve from the interaction of both human and non-human elements in the environment give birth to practices that are totally owned by the people who practice them for their survival and subsistence. As such, taro provides a fine example of food storage and food security for Polynesian cultures and parts of Southeast Asia. The association of taro storage have a long-lasting practice of storing taro corms, such as, the pits storage technology of Toyama and Nigata in Japan where pits were dug under the floor of the main living room or near an open hearth, utilizing raised shelter for taro storage in Karam (Eastern Highland of New Guinea). Cyprus method of storing taro corms in a store room in a heap or in a shallow pit outside of the house yard, buried in various combinations of sand, soil and straw or in a shallow pit in or next to the taro field. Mentions can also be made about storage in buckets or bins kept in shade with a loose cover of damp sackcloth, a practice observed in Cyprus. Another motive for the taro storage system in southern and central China is for planting material and later consumption, as well as further storage for late, delayed, progressive, and staggered harvests after growth has ceased. The field storage varied, including leaving the plants in the field until frost killed the top of the plant, cutting off the top of the plant and leaving it in the field, and harvesting mother corms while leaving the side corms to mature for later harvest. Piled storage

systems are mentioned in instances where mature corms selected in October are sun-dried for two to three hours, then stored in piles covered with soil and a straw mat (Matthews, 2002).



Figure 2: Sorted taro corms stored in open porch.

The concern regarding taro corm storage systems, which provide a source of food security, has been a long-standing association with the Konyaks. The means by which taro corms are stored stands out from the rest of the Naga food storage systems and those cultures associated with taro culture. Taro storage among the Konyaks is considered one of the most efficient methods of providing food security and authenticity, as it stands out from other cultures associated with storage systems. Konyaks have long been associated with taro cultivation. However, there are less or no folklores related to taro discovery and farming of taro but the given environment allowed the people to incorporate a procedure of its own in relation to the type of their agricultural practice (*jhum* cultivation) to provide endless supply of food when there were less or end of stocks of other crops such as maize, millets, rice and jobs-tears. Konyak taro storage system as stated earlier, served a multi-dimensional purpose.

The storage methods included;

- a) After sorting the corms and piling them in mound formation of the different species, mother corms along with the smaller corms attached would be carried home and stored in a granary or open porch attached to the house in a shaded area, which is for immediate consumption.

- b) For later consumption, the smaller corms would be detached from the mother corms and stored for seedling and the mother corms that remain would be for immediate consumption. At times, the corms would be kept intact without detaching smaller corms for germination.
- c) Mostly sun-dried detached smaller corm storage remains the preferred exercise that makes the Konyak taro storage system stand out. The procedure included in the process has been a texting one; as when the smaller corms are detached, it will be taken to a nearby stream in a carry basket and wash on the flowing stream by stamping on the corms to wash off the dirt and the upper furry part of the corm skin or make a small scrapper out of bamboo split and peel off the corm skin to expose the corms inside take back home, string it on a small thin bamboo strip by piercing through the corms using a bamboo pointed pick of six inches long and hang outside of the house to be sun dried which takes nearly four to six weeks



Figure 3: Strung taro corms for sun-drying

to completely dry and harden. After completely drying, it would be taken inside the house to be stored on the shelves above the kitchen hearth or made into a bunch with the strings attached, bind it and kept in the corner section near the kitchen hearth. It was at this point of drying taro corms that depicted the amount of patience women could endure, especially the itching sensation caused by the discharge of acrid juices while peeling off the corm skin. This determines whether she can endure uncertainties and pressure in the future as she continues to live.

Taro storage has become one of the most potent practices for the Konyaks, as subsistence has long relied on indigenous knowledge associated with the preparation of taro storage. This knowledge has been passed down through skill impartation, adaptability, future uncertainties, experience, and necessity.

The utility relating to taro storage serves in varied dimensions such as food security in times of shortage in supply of rice as dried ones are boiled and consumed per piece meal, smaller corms stored served as a source of seedling for planting after germination providing the people sufficient seedling for planting in the next cycle, dried taro leaves cooked with meat and fish formed a part of their meal course. The fresh leaves, when cooked and served, provided a source of curry to accompany rice. The preparation of dried taro corms remains time-consuming, as the following procedures would justify the amount of time taken to prepare and make them ready for consumption. In the first step for preparing dried taro corms, the dried corms are removed/pulled out from the thin bamboo string which was previously used for drying, wash the corms in cold water and soak it in cold water for a day in an earthen pot after which it will be rinsed out from the pot previously soaked, place it in another cooking pot and leave the loaded pot adding fresh cold water at the kitchen hearth with live charcoal below the pot. By the next morning, the corms will be ready for consumption, and the family will consume it in place of a meal.

It is worth noting that women were solely responsible for every kind of task associated with taro (Fürer-Haimendorf 1969). However in-depth interviews revealed people expression on the existence of a sort of understood work distribution between the genders of the society where men was task with craft production, administration, providing family needs from outside their homes and venturing out to struck diplomatic deals while women took responsibilities to take care of all household related works and agriculture to some extent where taro farming was to be done only by women. There existed no discrimination between genders based on the workload associated with taro, as the understood work force distribution binds the society to flourish, demarcating a well-defined, understood indigenous system of work culture that brings out the originality of their diverse cultural heritage and maintains deep historical and cultural ties.



Figure 4: Well dried taro corms stored in shelf above kitchen hearth for longevity

Results and discussion

Taro, as a crop, was practiced on a large scale production based on *jhum* cultivation, where the entire cultivable plot would be utilised for taro farming in a mixed cropping pattern. As like the Dayak communities in West Kalimantan Province apply rice farming through shifting cultivation with intercropped system while maintaining abandoned forest (Sumarwati, 2022). Taro among the Konyak population turns out to be a crop associated with women, a matrilineal crop brought about by work distribution among the genders without any discrimination, as like the population of Polynesian outliers, where men depended on women for taro production and all tasks associated with taro cultivation were connected to women, while men identified with that to fish (Bayliss-Smith, 2012). The biodegradable tools, such as bamboo-crafted rake, scrapers, digging tools like pegs and bamboo-crafted hoe, depicts the knowledge among the Konyaks to depend and extract resources from the environment surrounding them, which was easily accessible and managed with

proper care, so that environmental balance was maintained without destroying much and at the same time crops were cultivated for sustenance. The storage system initiated by the people of Konyak stands out in its authentic form, which can be hypothetically stated as a result of sustenance brought about through a process of experience and experimentation over years of contact with the given environment. This considerably makes taro as the most significant source of subsistence in times of food shortage. The storage system practised among the Konyak population can be related to four categories of storing, viz., i) storage of viable material for planting, ii) storage of unprocessed material for eating, iii) storage of partially processed material for eating and iv) storage of fully processed material, ready for eating (Matthews, 2002). The knowledge of taro farming and storage was passed down from a mother to daughters by means of skill impartation, demonstration and adaptation. It was also a source of determining whether a woman could endure future uncertainties, such as patience in taking care of her family, also be able to find a good partner. If she lacks patience in enduring the entire process of drying taro corms and storing them, then she will struggle to find a suitable husband. The association of taro as the primary means of subsistence has led to the cultural identity of the people as a significant population of taro consumers.

The complex Socio-biological and environmental interactions also play a significant role in the possible and actual storage of any crop (Matthews, 2002). The indigenous knowledge of taro storage allows the people (Konyak population) to maintain their cultural identity with taro as their main diet, farming pattern clearly associated with harmonious co-existence without destroying much of the environment through *jhum*/shifting agriculture, no use of fertilizers and pesticides. The selection process of taro landrace for storage and smoking in the kitchen shelf above the kitchen hearth for longer shelf life, the process of using natural springs to wash the corms selected for drying and storing provides an insight to the cumulated knowledge for long generations which have been passed down through instructions by oral and practical means. This calls for recognition of indigenous knowledge in storage and food security with agriculture as the primary source of subsistence bringing to mind that indigenous knowledge consisting of combined skills, technology and knowledge derived from the intimate ties that local communities had with their environment (Kumbhar and Kharwar, 2023).

With taro as the primary source of food security, there has also been a driving act of the ecological knowledge known to the people which have been passed down through generations by verbal and non-verbal means such as folktales and phrases/sayings associated to taro and the knowledge imparted through practical means. This led us to remind on the ecological knowledge on non-rice food security which have been passed down through generations by means of verbal and non-verbal which included folktales, taboo, ceremonial processions and offers (Sumarwati, 2022).

Conclusion

In summary, this paper presents a continuing agricultural practice of *jhum*/shifting cultivation, where taro is farmed in a mixed intercropping pattern with other crops such as rice, chilli, pumpkin, corn, maize ginger, and the like. The method of taro cultivation also provides the population of Konyak culture/tribe to navigate seasonal period of when to clear forest, when to sow taro seeds, period for weeding, harvest and post harvest storage and most significantly the lean period between June to September when the dried and stored taro corms would become the vital source of subsistence when other stored crops have run low. It also represents the continuing tradition of taro as the main stable crop, besides rice, a passed-down indigenous knowledge associated with taro corm storage which served as a means of food security, with females playing a leading role towards taro farming and harvest. At the same time, male members take the initiative in clearing the forest for agriculture and guarding the village perimeters, so that taro farming can be carried out with security by the female folks. Taro has also become the source of work distribution among the population of Konyak based on gender without any discrimination between the genders since time immemorial, as the past population, especially women, decided to take care of taro while assigning men to guard their settlement from outside dangers, as the past life of Konyak population like other cultures/ tribe of Nagaland practiced head hunting/ head-taking. The practice of taro storage among the Konyak population serves as a storehouse of traditional indigenous knowledge that needs to be recognised and encouraged to continue with enthusiasm, so that the indigenous knowledge associated with taro does not vanish from the culture that practices it.

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