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Identification and Documentation of Indigenous Technical Knowledge on Agricultural Practices among Angami Tribe, Nagaland, India

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Abstract:

Nagaland is one of the seven sister states of India and is located in northeastern part of the nation. The main occupation is agriculture and rice is the staple food. The Angami tribes, besides other Naga tribes, possess spectacular wealth of indigenous knowledge. Since time immemorial farmers have been practicing traditional method of agriculture. Traditionally the Angami society has been sustained for generations through the indigenous practices of agriculture. This research was conducted to identify and document the indigenous technical knowledge in agriculture among the Angami Tribe. In this study descriptive research design was followed. Chiephobozou and Sechü-Zubza blocks under Kohima District, Nagaland was purposively selected, under which two villages from each block was selected randomly for the study *viz*., Tuophema , Chiechama, Jotsoma and Sechüma respectively with a sample size of 120. Through this study, a total of 44 ITK's on Agriculture practices followed by Angami tribe were collected and documented in detail. The ITK were collected on 9 important agricultural practices viz., Field preparation; Determination of time of sowing; Cropping pattern; Soil fertility management; Plant protection; Weed management; Post harvest management practices; Seed selection and preservation for next year; Soil and Water management.

Keywords: ITK, Angami, Nagaland, Agriculture, Identification, Documentation.

INTRODUCTION:

Indigenous knowledge develops within a particular community and maintains a non-formal means of communication. Indigenous Traditional Knowledge is the actual knowledge of a given population that reflects the experiences based on tradition and includes

more recent experiences with modern technologies (Haverkort, 1995)". Indigenous Technical Knowledge refers to the unique, traditional, local knowledge existing within and developed around the specific conditions of women and men indigenous to a particular geographic area (Grenie,1998).

In agriculture, indigenous knowledge is very vast and diverse. Over centuries this knowledge has been collected, accumulated and perfected. Indigenous Technical Knowledge is stored in people's memories and activities and is expressed in the form of stories, songs, folk fares, proverbs, dances, myths, cultural values, beliefs, rituals, community laws, local language and taxonomy, agricultural practices, equipment, materials, plant species and animal breeds.

Nagaland is one of the seven sister states of India and is located in northeastern part of the nation. The main occupation is agriculture and rice is the staple food. The Angami tribes, besides other Naga tribes, possess spectacular wealth of indigenous knowledge. Since time immemorial farmers have been practicing traditional method of agriculture.Traditionally the Angami society has been sustained for generations through the indigenous practices of agriculture. The Angami tribe practice terrace cultivation on the hilly terrains where they produce paddy and other minor crops and jhum cultivation is practiced only to a small extent. The traditional habitat of the Angami corresponds more or less to central and southern parts of the present Kohima and part of the Chumoukedima district of Nagaland.

Unlike the traditional society where people depended only on agriculture today, people are practicing other occupations like government services and other occupations such as business, contracts, *etc*. along with agriculture, hence, the indigenous practices that were being passed on from generation to generation, is now slowly reducing and forgotten. Therefore, it is necessary that effective measures are taken to study and document such invaluable knowledge bank and encourage beneficial indigenous agricultural practices to the farmers.

OBJECTIVE: To identify and document the indigenous technical knowledge in agriculture among the Angami Tribe

REVIEW OF LITERATURE: Pravin (2017) in his study found that there were 149 indigenous items in coastal farming system of Tamil Nadu. They are mostly low cost, made of available resources, eco-friendly and which may serve as alternatives to modern technologies.

Roy *et al.*(2018) in their study conducted in Murshidabad District of West Bengal found that ITK is in vogue throughout rural India, it is very little documented and there is danger of extinction of this knowledge. It is of huge importance to document these practices and access their validity. There is lack of proper alliance between the practice of indigenous and modern knowledge.

Slathia *et al.* (2018) documented the traditional knowledge of the local people in the mountaneous region of Jammu and Kashmir regarding traditional water mills locally called as "Gharats" used for grinding of different cereals and grains especially maize for their household consumption by using energy of flowing water.

Tsegay (2018) in his studyconducted in Ethiopiaon a case of Farta district identified plants traditionally used as pesticides or insecticides during stacking of the crops at harvest time in Ethiopia. The survey showed farmers were using about 31 species of plants for bottom layering during stacking of their crops of which *Croton macrostachyus*was the most effective.

RESEARCH METHODOLOGY: In this study descriptive research design was followed. Chiephobozou and Sechü-Zubza blocks under Kohima District, Nagaland was purposively selected, under which two villages from each block was selected randomly for the study *viz*., Tuophema , Chiechama, Jotsoma and Sechüma respectively. A sample size of 120 respondents were chosen randomly.

RESULTS AND DISCUSSION:

1. **Documentation of ITK on agricultural Practices among the Angami Tribe of Nagaland**

Indigenous Technical Knowledge is exclusive to specific region and there is a constant need to document and preserve the indigenous technical knowledge of different communities which are at the brink of extinction. The rich Indigenous Technical knowledge base available with the highly diverse indigenous communities in India provide valuable clues for developing and innovating newer and effective bio-pesticide (Makol and Gupta, 2016). A study on ITK was conducted in Wokha district of Nagaland by Humtsoe (2011) and documented that the practices of baiting rodents with a mixture of rice and outer covering of the fruit of *Mucuna bracteata*is used by the Lotha-Nagas of Wokha district. He also reported the making of fire in and around the Jhum fields at night as a common practice among the farmers with the rationale that insects are attracted to the light of the fire, thus gets killed.

All possible ITK on agricultural practices among Angami tribe has been collected and documented in details as presented in table 1. The ITK were collected on 9 important agricultural practices viz., Field preparation; Determination of time of sowing; Cropping pattern; Soil fertility management; Plant protection; Weed management; Post harvest management practices; Seed selection and preservation for next year; Soil and Water management.

Table 1. Identified ITK's in agriculture

Sl. no	Cultivation practice	Description of identified ITK	Rationale behind the use
1.	Field preparation	Paddy field-: i)Slashing and burning is done on the seed beds of paddy.	Burning is done before sowing as it kills most of the soil borne pests and also ashes produced from burning add nutrients to the soil. When the clods are broken thoroughly it enables uniform growth of the seedlings.

		ii)Clods are thoroughly broken and leveled before sowing the paddy seeds. iii)Field is prepared by digging the plots during dry season (December-March). Jhum field-: iv)The understory vegetations are first cleared followed by cutting down the trees. v)Burning the slashed vegetation or felled trees. Bunds are made across the slope using logs, stones or bamboos.	Digging is done during dry season so that the soil borne pests can be exposed to the sun. This helps to clear off the field properly and helps in proper drying of the slashed vegetation or trees for easy burning. Burning helps release nutrients for farming and bunds prevents soil erosion.
2.	Determination of time of sowing	i)When the Cuckoo bird(*Cuculuscanorus*) calls, people say it is time for sowing any kind of seed. ii)First flowering of *Schimawallichii*tree (*Mechie*) iii)Flowering of *Hedychiumspicatum* plant (*Nipe*). iv)Sowing seeds at full moon	When this bird calls the rain season follows shortly after and seeds of any crop can be sown. Indicates the time for transplanting the paddy seedlings in cooler areas. Indicates the time for transplanting the paddy seedlings in warmer areas. When seeds are sown at full moon there will be no pest and disease infestation.
3.	Cropping pattern	i)Mixed type of cropping is practiced in the jhum fields as well as home gardens. ii)Leguminous crops such as *Vignaumbellata* (Rice bean)and*Glycine max*(Soybean) are grown on soil low in fertility .	Provides all food requirements for the family, land use pattern is better as it maintains continued cover of land, there is also assurance of harvesting many crops. When leguminous crops are grown on less fertile soils the fertility of the soil is improved. These are hardy crops and can survive even in less fertile soils. This way the

		iii)Tapioca, yam and colocassia are grown on less fertile soils. iv)Creeping crops such as cucumber, pumpkin, gourds etc are sown on the boundaries. v)Usually the seeds of paddy are sown alone on the seed bed except for some few maize plants or herbs in between.	unfertile land can be utilized for growing such crops and which serves for the purpose of consumption and also fodder as well. So that they do not interfere with the main crops. As paddy is the main staple crop.
4.	Soil fertility management	Paddy fields:- i)In the seed beds of paddy ashes left after burning of the field and also ash of rice husk is mixed with the soil during sowing of the crops. ii)Leguminous crops usually *Vigna umbellata*(Rice bean)and *Glycine max* (Soy bean) are sown on the seed beds of paddy after they are uprooted for transplanting. iii)The terraces of paddy are desirably left fallow after paddy is harvested until the time for the next sowing season. iv) Weeds and stubbles of paddy plants are ploughed along with the soil and buried during ploughing season. v)While harvesting paddy only panicles are collected and straw is left behind.	Ashes improve soil fertility and also there is less attack of insect pests. When Leguminous crops are grown they make the soil fertile and renew the soil for the next sowing season. In this way the land is kept fertile and at the same time food crops are also grown thereby maximizing the use of land. To give rest to the soil allowing weeds to grow along with the stubbles on its own and these serves as manures to the soil in the next sowing season. So that during '*tekhukenyo*' i.e., when water is kept for a week or longer the grasses and weeds get well rotten and become manure. So that the crop residue can contribute to organic manure and humus. In this manner no other extra manures are required. Ashes improve soil fertility and also reduce incidence of insect pests. So that crop residues can be used as mulching materials or can be burned to

		Jhum fields:- vi)The ashes left after burning of jhum fields is mixed with the soil during sowing of crops. vii)While harvesting the crops from the fields minimum vegetation is removed from the site. viii)Weeds are uprooted and buried or heaped on the soil. ix)Fallow management is practiced by keeping the jhum fields uncultivated for two to three years.	release ash to the soil. Weeds when buried or heaped gets decomposed and turns into manure. This will give rest to the soil and allow it to regain its fertility. During the fallow period leguminous crops as well as the trunks of trees which are chopped from time to time during cultivation are allowed to grow.
5.	Plant protection	i) Piece of cloth is tied and hung to a long pole and placed in the centre of the field. ii)Making of fire in the field iii)A bamboo piece is split in the middle and left hanging in the field. iv)Traps made of bamboo are set in the field and also catapults and stones are used to kill birds and rodents. v) The standing Paddy plants which are blown down by the wind or other factors are gathered or tied together (*telhakhro*).	The movement of the object frightens the birds and this prevents them from attacking the crops. The smoke from the fire scares the birds and rodents. The movement of the split bamboo caused by the winds produces sound which scares the birds away. To kill birds and rodents that attack crops. Tying gives support and prevents the paddy plants from falling to the ground.
6.	Weed management	i)For the management of weeds slashing, burning, hoeing and hand weeding is done on sunny days.	When weeds are slashed and burned not only the plant but the seeds are also destroyed. Uprooting the weeds by hoeing will remove the roots of the weed and hand weeding is effective when weeds are in between the seedling that are yet very small and tools cannot be used in between.

			Such crops have vigorous vegetative growth and can suppress the growth of weeds.
		ii)Crops such as *Glycine max*, *Vigna umbellate*, and *Perilla frutescens* are sown in areas prone to weed infestation.	Weeds wilt and die quickly when uprooted and exposed to sun. Weeds get decomposed.
		iii)Weeding is generally done on sunny days.	
		iv)Weeds are uprooted and buried or heaped on the soil.	
7.	Post harvest management practices	i)Cleaning of thrashed paddy is done by using a winnowing basket '*liherii*'.	To separate the chaffs from the grains so that chaffs can be left on plot for manure.
		ii)The grains of paddy are dried on bamboo mat on hot sunny days.	When the grains are sundried it hardens the grain and enables to remove the husk easily.
		iii)The grains of paddy are stored in locally made bamboo structure called '*tsünuo*' the base of this is raised about one to two feet from the ground.	In such structures the grains can be stored for many years without getting spoiled as there is good aeration. Attack of rats is also less since the base is lifted above the ground level.
		iv)Spring onion, garlic, red chillies, etc., and hung or placed on traditional baskets made from bamboo called '*khora*' and placed near the fireplace.	The smoke from the fire minimizes damage from insects. Drying in the sun also minimizes damage from insects and prolongs the shelf life.
		v)Soybeans are boiled and proccessed into fermented product. Mustard leaves as well as the liquid extracted from it are made into delicacy items after boiling and sundrying. Fruit flower of *Hibiscus cannabinus* and herbs such as *Elsholtzia sp.* are sundried, stored and consumed. Stem and leaves of collocasia are sliced into pieces, dried in the sun and consumed as delicacy.	So that they can be stored and consumed even during off-season when enough greens are not available.

		Bamboo shoots are harvested wrapped in banana leaves and kept underground.	
8.	Seed selection and preservation for next year	i)Seeds are selected from healthy plants. Big, healthy and attractive seeds are selected. ii)The seeds of crops such as cucumber, tomato, pumpkin, gourd, etc are smeared on a piece of cloth, sundried and stored. iii)The paddy seeds are separately collected carefully from the field during harvest. iv)Maize cobs, millets, spring onion, garlic, chilli, beans, peas, etc for seed purpose are tied and hung near the fireplace in the kitchen. They are also hung outside and sundried.	These are usually the signs of a promising vigorous growth. The seeds of such crops are taken out from watery pulps, small in size and therefore they cannot be dried and stored. So they are smeared on a cloth. Also this way they can be stored for long without getting spoiled as they are spread evenly and dried. This is done to prevent mixture of unwanted varieties and select those varieties to be sown the next season. The heat from the sun and smoke minimizes damage from insect pests.
9.	Soil and Water management	i)The fields are cut into terraces and the slopes are leveled, bunds are made and divided into shorter ones. ii)When the cultivation season arrives rainwater is harvested from rivers and from small irrigation channels, it is diverted to the paddy fields. iii) Hollow pieces of bamboo are placed on the plots.	This decrease erosion, surface run-off thus conserving nutrients. This also helps in holding/ retaining water in the paddy fields. For irrigating the paddy fields. These hollow pieces of bamboo allow water to pass through those terraces where it is difficult for the flow of water from the terraces directly.

CONCLUSION:

A total of 44 ITK's on Agriculture practices followed by the Angami tribe were identified and documented on table 1, through this research.

In **field preparation** of paddy, slashing and burning is done on the seed beds of paddy. Clods are thoroughly broken and leveled before sowing the paddy seeds. The terraces of paddy are filled with water and kept for a week or longer before transplanting. Bunds are made across the slope using stones or bamboos which prevents soil erosion. For **determining the time of sowing**, when the Cuckoo bird (*Hutu* in local dialect) calls, seeds can be sown. The *Schimawallichii* tree (*Mechie* in local dialect) indicates the **time for transplanting** the paddy seedlings in cooler areas and the flowering of *Hedychiumspicatum* plant (*Nipe*in local dialect) indicates the time for transplanting the paddy seedlings in warmer areas. Seeds are also sown at full moon stage. For **soil fertility management**, in the seed beds of paddy ashes left after burning of the field and also ash of rice husk is mixed with the soil during sowing of the crops. Leguminous crops usually *Vigna umbellate* (Rice bean)and *Glycine max* (Soybean) are sown on the seed beds of paddy. While harvesting paddy only panicles are collected and straw is left behind. For **plant protection** scarecrows are placed in the centre of the field, making fire in the field, traps made of bamboo and tar are set in the field, using catapults and stones to kill birds and rodents. For the **management of weeds** slashing, burning, hoeing and hand weeding is done. Crops such as *Glycine max*, *Vigna umbellate*, and pyrilla/black sesamum are sown in areas prone to weed infestation. **Post harvest**, cleaning of thrashed paddy is done by using a winnowing basket '*liherü*', the grains of paddy are dried on bamboo mat, the grains of paddy are stored in locally made bamboo structure called '*tsiinuo*', spring onion, garlic, red chillies, etc., and hung or placed on traditional baskets made from bamboo called '*khora*' near the fireplace. **Seeds are selected** from healthy plants. Bold, healthy and attractive seeds are selected. The fields are cut into terraces and the slopes are leveled, bunds are made and divided into shorter ones. When the cultivation season arrives rainwater is harvested from rivers and from small irrigation channels, hollow pieces of bamboo are placed on the plots.

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