

## 1.0 INTRODUCTION

This booklet is dedicated to the Saakumine and Makumine (i.e, old men & women respectively) of the Lawra District. According to tradition, they are the custodians of culture and history in the area. During the one and half years of research in 2006 and 2007, they happily shared their knowledge and experiences on threatened indigenous crops.

With financial support from COMPAS Africa Network, the first part of LACERD's documentation series is for the education of the people of Lawra District on how to enhance families' food security. In particular, it is targeted at young men and women farmers, Students of Junior and Senior High Schools, Agricultural Extension Officers, Agricultural Researchers and Rural Development Workers.

## 2.0 Indigenous Knowledge Practices

First, it is important to understand what indigenous knowledge within this booklet. In Africa, it is "an integrated body of knowledge and practices, not split up in disciplines such as science and arts. It is perpetually being reconstructed from generation to generation and over time and space" (Millar et al, 2006). But for a dagao (single native) in the Lawra District, "it is that body of knowledge that has been handed down by their great grand fathers and mothers some one hundred and fifty years ago including acquired knowledge and skills from birth to adulthood for good living in a community" (Naa Michael Zuwera II, 2007). The slight difference is the inclusion of "acquire skills from birth to adulthood" in the latter. But the importance still lies, as emphasized in both, in the handing on of a body of knowledge from one generation to another generation.

For the achievement of families' food securities throughout in the past one and half centuries, *Saakumine* and *Makumine* consciously practised action planning, developed, technical, and economic innovations and took into consideration the social and spiritual dimensions of their communities in finding answers to food security issues.

## **2.1 Action Planning**

Annually questions as: How was the rain pattern in the previous year? At what time did farmers carry out a particular farm operation? What crops did they grow and on which farm? Was there enough seed for sowing? Which early or late crops should be cropped? Which labour forms should be mobilized and how many times? Was the harvest good or bad and why? From this sharing, farming communities could continue, adopt or find new solutions for the following year.

## **2.2 Farming System**

Mix-farming, i.e farming crops & rearing of livestock, was the usual practice for communities. The animals kept included: cattle, goat, sheep and poultry. Another practice was mix-cropping, i.e, growing more than one crop on the same piece of land. These crops were of mainly sorghum, millet, maize, groundnuts, cowpea, bambara nuts and rice. Both these practices were adopted deliberately despite availability of a good vegetation of many trees and tall grasses cover (1) which meant that communities did not have to practice mix-farming and mix-cropping. This was because the forefathers used these systems to minimize risk, which meant that if one system failed the other would still provide food for their families.



Fig. 1: Vegetation of plenty trees & tall grasses cover of our forefathers before 19th Century

Additionally, considerations were given to growing early and late crops. Early legume crops, for example, were *bibiirtakone* (bean) and *siidang* (groundnut). Whereas late crops were *bengdaa* (bean), *siitiegbee* (groundnut) and *bengpula* (white cowpea). For early cereals, they cropped *gongo* (sorghum) and *zeze* while late crops included varieties such as *puokye*, *zie*, *dawanle* and *zele*. The valleys were solely for roots and tubers such as *yam*, *kurbara*, *nyuwome* and *piere* because of the high soil fertility and good retention of water. All these crops were disease and drought resistant and there was no need for inorganic fertilizers and agrochemicals for their cultivation.

### 2.3 Farm Operations/Practices

These included: land clearing, land tillage, sowing, first weeding, thinning of seedlings, transplanting, second weeding, reshaping/soil mulching, harvesting, processing and storage (Fig. 2). All these operations were timely and effectively carried out through the mobilization of local labour. Such labour sources were organised in a number of ways.

The *kotaa* labour organised from a peer group of 15-20 males was a reciprocal system of peer help and support; *nen kob* comprised of meat exchange for a labour group of 7-8 males; *diem kob*, labour supply of 15 - 20 males was organised by a son-in-law ; *libir kob*, money exchange for a labour group of 8 - 110 males; *ba kob*, a labour group of 25 - 40 males and females and *songfu kob*, group of 10-15 males and females for the purpose of helping the needy.

### **(a) Land Clearing**

This was carried out from March to April by selective killing of those tree species such as *kog*, *kankyele* and *gozie*, trees known by communities to prohibit good vegetative growth of crops. Species such as *dawadawa*, *shea tree*, *suge* and *kpagra* were kept as they were known by the community to be harmless and of economic importance to them. Agro-forestry, the system of growing trees and crops on the same piece of farm land which agriculturists of today see as a new technology, was so dear to them as captured by Millar et al (2006).

### **(b) Ploughing**

From April to June, this operation was done either by *falu* (mounding) using the *dangkube* method, i.e., strategic mounding in the form of an equilateral triangle, practiced in low lands as a means of using space effectively and enhancing crop population, or *bugfu*, i.e., fine tilth of ploughed soil of 15 - 20 centimetres deep using a local hoe. Within the tilled farm, soil and water conservation technologies were practised as confirmed by Millar et al (2006). Such technologies included stalks, grass. and stone bonding put in place across slopes of farmed land, terracing on slopes of high lands and hills, and creation of conical shapes at the tops of new mounds during *falu*.



### **(d) Thinning & Transplanting**

These were practices *Saakumine* and *Makumine* could not afford to miss from mid June to end of July in order to ensure good vegetative growth of crops. In particular, the thinning was done leaving at most three seedlings per mound or stand and equally using some of the thinned seedlings to transplant where the seeds failed to grow or there was a bigger space between some of the mounds.

### **(e) First & Second Weedings**

The first one called *dob* used to be done in June after two weeks of seed germination. The second one called *damu* used to follow in the second half of July to mid August. This practice ensured good soil aeration and control of weeds.

### **(f) Reshaping/Soil Mulching**

Also called *foru* locally, it was done in late August up to the end of September when the soil was wet enough as a result of the heavy rains. By reshaping the mounds or crop stands with new wet soil, the crop produced new roots in addition this practice helped in withstanding crop lodging or damages during rain storms.

### **(g) Harvesting, Processing & Storage**

From late October to December these practices were carried out in effective ways. A mixed farm with 2 crops, for example, yielded a mean harvest of 1,500 kg/ha sorghum and 1,200 kg/ha cowpea. Storage was in either a *saazu bogr* (Fig. 4), *kataa*, and *bogpula* made out of a mix of clay soil and *pirme* (local grass), that had a lifespan of between 25 - 30 years, or in baskets and clay

pots. Organic insecticide plants called *lodal* and *dunvaar* were utilized in storing cereals including bitter ashes from *kog*, *togbo*, millet stalks and *dunvaar*. These storage techniques realized a minimum post harvest loss of 5-8%.



Fig. 4: Saazu bogr at Walateng community



Fig. : Kataa bogr at Bu community

### (h) Other Related Practices

**Food Management:** This was the sole responsibility of the head of household and managed in relation to the year quarters. For farm communities in the olden days, the year began in April as it marked the rainfall season and ended with October as the dry season began.

The first quarter from April to June meant a scarcity of foodstuff that demanded prudent management for a successful farming season. The second quarter from July to September was a period of harvesting of early legumes and cereals as a relief from food stress. October to December meant a period of plenty. Lastly, January to March was a time in which families had to be economical with the remaining harvest for the rest of the year.

For all meals, controls in terms of quantity, usage and storage were important for food management. For example, *saab* (thick

porridge) was cooked on a weekly basis on Saturdays only using a *bogrpele* (medium basket) measure of flour. The storage of *saab* was in a clay pot/jar that preserved 20 - 25 sizeable balls each weighing a mean of 3 kilos and managed solely by the female spouse.

## Feeding Plan

Our forefathers had a clear feeding plan (Fig. 5). Early legumes were eaten from June to July while the late crop was used from September to March. Early cereals were used in June until August and late cereals were for consumption from September to May. Root and tuber crops were utilized between December and March. With this system, a family ensured availability of food throughout the year.

ROOTS AND TUBERS													
LATE CEREALS													
LATE LEGUMES													
EARLY CEREALS													
EARLY LEGUMES													
MONTHS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	

Fig. 5: Forefathers feeding plan

## Socio-culture

The men managed storage in *boge* (plural) and women controlled storage in baskets, jars and pots. In times of food scarcity, women had the responsibility of adjusting the family's food consumption pattern. In food deficit years, families postponed marriages that involved some cost due to feeding invitees. Similarly, bereaved families postponed funeral performance for at least one year on the same basis.

## **Spirituality**

Spirituality was evident in either the farm environment or the storage facilities. A 'fertility pot' containing the leaves of shea tree was kept in front of the farm with the belief that the 'gods' would ensure a fertile farm and good yield by protecting the farm from evil spirits. Also, a store room for the harvest was not just an ordinary place, as the positioning of deities and spirits gave it a scared character in order to ensure minimization of harvest losses.

As a consequence of the above outlined practices and management as well as wealth of knowledge existing within the community, there was the availability of food throughout the year for families. This led to no major hunger periods and as a result lower mortality and longer life expectancy of family members (NaaZuwera Michael II, 2007).

### 3.0 BEYOND 19TH TO PRESENT DAY PRACTICE

In present day farm communities, vegetation (Fig. 6) has deteriorated with less trees and grass coverage of the land. Indigenous knowledge practices and information are not gathered, considered or used. There is no assessment of the past year's performance as regards rainfall pattern. When the rain comes, a family does farming because it is a way of life. There is no consideration given to early or late crops when planting; no information is gathered to determine where to grow what crop; no consideration given to what type of additional labour is needed to harvest crops and or where/how to mobilize such labour.



Fig. 6: Vegetation of few tree cover & short grasses in the rain season from the 20th Century

Some vital farm operations such as thinning for the attainment of the right plant per stand; transplanting for optimum plant population per area; and damu for effective control of late weeds have all been abandoned (Fig. 7). Reshaping which is still in practice, is poorly carried out. Other farm operations are also



but instead people use polysacks and jute sacks that do not last as long as they are kept in poorly constructed stores. This has led to high post-harvest losses of between 20 - 35%. The little that is left for feeding is poorly managed. Selling around 50% for drinking *pito* (local beer) or *akpeteshi* (local gin) by spouses is common. Wastage through wrong eating habits and neglect of measuring exact quantities for cooking are other limitations to families' food securities. The overall negative impact is chronic food insecurity of families for five months (Fig. 8) from March to July.

## 4.0 THREATENED INDIGENOUS CROPS

### Threatened Indigenous Crops

This one and half years long survey revealed a total of thirty (30) indigenous crops categorized into cereal, legume and root and tuber crops. Presently, twenty-six (26) indigenous crops are still being grown by a small number of farmers and the remaining four (4) are extinct (LACERD, 2007). The table 3.1 below presents the local and English names, type, maturity age and economic uses of these crops.



Fig. 9: Threatened indigenous crops

**TABLE 3.1: THREATENED INDIGENOUS CROPS**

NO.		ENGLISH NAME	TYPE	MATURITY AGE (DAYS)	ECONOMIC USES
<b>CEREALS</b>					
1.	Gongo	Sorghum	Early	75	Food, culture, local drink & income
2.	Kamazie	Maize	Medium	90	Food & income
3.	Munzie	Rice	Late	120	Food & Medicine
4.	Puokye	Sorghum	Early	90	Food, local drink, income & culture
5.	Zeze	Maize	Early	60	Food
6.	Zikolbu	Millet	Late	120	Food & income
7.	Ziwaali	Millet	Late	120	Food & income
8.	Zongkuse	Maize	Late	105	Food
<b>LEGUMES</b>					
9.	Bengdaa	Bean	Medium	105	Food, culture & income
10.	Bengpula	Bean	Late	120	Food & income
11.	Bibiirtakone	Bean	Early	75	Food
12.	Dagara/ Siitiegree	Groundnut	Late	120	Food & income
13.	Napobpogbe/ Zokebar	Bean	Medium	105	Food & income
14.	Neri	-	Late	120	Food & income
15.	Siibogni	Groundnut	Late	120	Food & income
16.	Siigbile	Bambara nuts	Late	120	Food & income
17.	Sonsogli	-	Late	120	Food & medicine
<b>ROOTS &amp; TUBERS</b>					
18.	Bamu	Water yam	Late	130	Food & income
19.	Kpangyer	Yam	Late	130	Food & income
20.	Kurbara	-	Late	130	Food & income
21.	Kurbazigle	-	Late	130	Food & income
22.	Nanyur	Sweet potato	Late	130	Food & income

NO.	LOCAL NAME	ENGLISH NAME	TYPE	MATURITY AGE (DAYS)	ECONOMIC USES
23.	Nyuwome	Aerial yam	Late	130	Food & income
24.	Piere	Frafra potato	Late	130	Food & income
25.	Pogsie	Yam	Late	130	Food, spiritual & income
26.	Zorekesien	Yam	Late	130	Food
EXTINCT					
27.	Belur	Sorghum	Late	130	Food & income
28.	Dawanle	Sorghum	Late	130	Food & income
29.	Kudabuo	Sorghum	Late	130	Food & income
30.	Zele	Sorghum	Late	130	Food & income

## Uses of Threatened Indigenous Crops

Table 3.2 below has the details for the above-stated indigenous crops are still cropped by a few farmers.

TABLE 3.2: LOCAL USES OF THREATENED INDIGENOUS CROPS

CROP	PRODUCT	UTILIZED FORM	LOCAL MEAL/DRINK/MEDICINE
Gongo	Grain	Grain & flour	<ul style="list-style-type: none"> <li>* <i>Pito</i> - grains brewed as local beer</li> <li>* <i>Buulu</i> - watery porridge from flour</li> <li>* <i>Saab</i> - thick porridge from flour</li> <li>* <i>Sawale</i> - steamed flour</li> </ul>
Kamazie	Grain	Flour	<ul style="list-style-type: none"> <li>* <i>Buulu</i> - watery porridge from flour</li> <li>* <i>Saab</i> (thick porridge) from flour</li> <li>* <i>Kamasiena</i> - roasted cob</li> <li>* <i>Gbafugle</i> - steamed small ball of wet paste</li> </ul>
Munzie	Grain	Seed	<ul style="list-style-type: none"> <li>* <i>Mun-dugra</i> - cooked seed</li> <li>* <i>Buulu</i> - watery porridge for diarrrhea control</li> </ul>
Puokye	Grain	Grain & flour	<ul style="list-style-type: none"> <li>* <i>Pito</i> - grains brewed as local beer</li> <li>* <i>Buulu</i> - watery porridge from flour</li> <li>* <i>Saab</i> - thick porridge from flour</li> <li>* <i>Sawale</i> - steamed flour</li> </ul>
Zeze	Grain	Grain & flour	<ul style="list-style-type: none"> <li>* <i>Saab</i> - thick porridge from the flour</li> <li>* <i>Kamsiena</i> - roasted cob</li> <li>* <i>Sawale</i> - steamed flour</li> <li>* <i>Gbafugle</i> - steamed small balls of wet paste</li> </ul>

CROP	PRODUCT	UTILIZED FORM	LOCAL MEAL/DRINK/MEDICINE
Ziwaali	Grain	Grain	<ul style="list-style-type: none"> <li>* <i>Buulu</i> - watery porridge from flour</li> <li>* <i>Saab</i> (thick porridge) from flour</li> <li>* <i>Mwime</i> - fried balls of fermented flour</li> <li>* <i>Zokuo</i> - watery flour</li> <li>* <i>Sawale</i> - steamed flour</li> </ul>
Zongkuse	Grain	Grain & flour	<ul style="list-style-type: none"> <li>* <i>Buulu</i> - watery porridge from flour</li> <li>* <i>Saab</i> (thick porridge) from flour</li> <li>* <i>Kamasiena</i> roasted cob</li> <li>* <i>Gbafugle</i> - steamed small balls of wet paste</li> <li>* <i>Sawale</i> - steamed flour</li> </ul>
Bengpula	Seed	Seed or flour	<ul style="list-style-type: none"> <li>* <i>Sese</i> - fried cakes from flour</li> <li>* <i>Bengsaab</i> - cooked thick paste of the grains</li> <li>* <i>Beng-wuwure</i> - boiled grains</li> <li>* <i>Beng-mamar</i> - cooked grains in paste form</li> <li>* <i>Sawale</i> - steamed flour</li> <li>* <i>Belebele/Tumpaane</i> - steamed oblong shapes of wet flour.</li> </ul>
Bengdaa	Seed	Seed or flour	<ul style="list-style-type: none"> <li>* <i>Sese</i> - fried cakes from flour</li> <li>* <i>Bengsaab</i> - cooked thick paste of the grains</li> <li>* <i>Beng-wuwure</i> - boiled grains</li> <li>* <i>Beng-mamar</i> - cooked grain in paste form</li> <li>* <i>Sawale</i> - steamed flour</li> <li>* <i>Belebele/Tumpaane</i> - steamed oblong shapes of wet flour.</li> </ul>
Bibiirtakone	Seed	Seed or flour	<ul style="list-style-type: none"> <li>* <i>Sese</i> - fried cakes from flour</li> <li>* <i>Bengsaab</i> - cooked thick paste of the grains</li> <li>* <i>Beng-wuwure</i> - boiled grains</li> <li>* <i>Sawale</i> - steamed flour</li> <li>* <i>Belebele/Tumpaane</i> - steamed oblong shapes of wet flour.</li> </ul>
Dagara/ Siitiegbie	Seed	Seed or nuts	<ul style="list-style-type: none"> <li>* <i>Simie zier</i> - soup using paste or pounded form</li> <li>* <i>Sibier</i> - cooked paste with flour of sorghum or millet</li> <li>* <i>Sii-siena</i> - roasted seeds</li> <li>* <i>Siidugra</i> - boiled nuts</li> </ul>
Napobpogbe	Grain	Grain & flour	<ul style="list-style-type: none"> <li>* <i>Sese</i> - fried cakes from flour</li> <li>* <i>Bengsaab</i> - cooked thick paste of the grains</li> <li>* <i>Beng-wuwure</i> - boiled grains</li> <li>* <i>Sawale</i> - steamed flour</li> <li>* <i>Belebele/Tumpaane</i> - steamed oblong shapes of wet flour.</li> </ul>
Neri	Seed	Powder form or paste	<ul style="list-style-type: none"> <li>* <i>Neri zier</i> - soup using paste or pounded form</li> </ul>

CROP	PRODUCT	UTILIZED FORM	LOCAL MEAL/DRINK/MEDICINE
Sibogni	Nut	Nut, seed or paste	<ul style="list-style-type: none"> <li>* <i>Simie zier</i> - soup using paste or pounded form</li> <li>* <i>Sibier</i> - cooked paste with flour of sorghum or millet</li> <li>* <i>Sii-siena</i> - roasted seeds</li> <li>* <i>Siidugra</i> - boiled nuts</li> </ul>
Siigbile	Seed	Nut, seed or paste	<ul style="list-style-type: none"> <li>* <i>Siigbile saab</i> - cooked seeds into a thick paste</li> <li>* <i>Sigbil wuwure</i> - cooked seeds</li> <li>* <i>Sigbil siena</i> - roasted seeds</li> <li>* <i>Sawale</i> - roasted flour</li> </ul>
Songsogli	Grain	Grain & flour	<ul style="list-style-type: none"> <li>* <i>Sese</i> - fried cakes from the flour</li> <li>* <i>Bengsaab</i> - cooked thick paste of the grains</li> <li>* <i>Zokuo</i> - watery flour for treating poison</li> <li>* <i>Sawale</i> - steamed flour</li> <li>* <i>Belebele/Tumpaane</i> - steamed oblong shapes of wet paste.</li> </ul>
Bamu	Tuber	Tuber	<ul style="list-style-type: none"> <li>* <i>Nyusiena</i> - roasted tuber</li> <li>* <i>Nyudugra</i> - cooked pieces of peeled tuber</li> <li>* <i>Perepere</i> - cooked porridge of small pieces of peeled tuber.</li> <li>* <i>Nyusaab</i> - cooked &amp; pounded pieces into ball forms</li> <li>* <i>Nyukyiina</i> - fried slices</li> </ul>
Kpangyer/ Mwaamkukpir	Tuber	Peeled tuber	<ul style="list-style-type: none"> <li>* <i>Nyusiena</i> - roasted tuber</li> <li>* <i>Nyudugra</i> - cooked pieces of peeled tuber</li> <li>* <i>Perepere</i> - cooked porridge of small pieces of peeled tuber.</li> <li>* <i>Nyusaab</i> - cooked &amp; pounded pieces into ball forms</li> <li>* <i>Nyukyiina</i> - fried slices</li> </ul>
Kurbara	Root	Root	<ul style="list-style-type: none"> <li>* <i>Kurba-dugra</i> - boiled broken corms into small ones</li> </ul>
Kurbazigle	Root	Root	<ul style="list-style-type: none"> <li>* <i>Budugra</i> - boiled roots</li> </ul>
Nyanyur	Root	Root	<ul style="list-style-type: none"> <li>* <i>Nyanyur-dugra</i> - boiled roots</li> </ul>
Nyuwome	Bulbs	Bulb	<ul style="list-style-type: none"> <li>* <i>Budugra</i> - boiled bulbs</li> </ul>
Piere	Root	Root	<ul style="list-style-type: none"> <li>* <i>Budugra</i> - boiled roots</li> </ul>
Pogsie	Tuber	Peeled Tuber	<ul style="list-style-type: none"> <li>* <i>Nyusiena</i> - roasted tuber</li> <li>* <i>Nyudugra</i> - cooked pieces of peeled tuber</li> <li>* <i>Nyukyiina</i> - fried slices</li> </ul>
Zoreksien	Tuber	Peeled Tuber	<ul style="list-style-type: none"> <li>* <i>Nyusiena</i> - roasted tuber</li> <li>* <i>Nyudugra</i> - cooked pieces of peeled tuber</li> <li>* <i>Nyukyiina</i> - fried slices</li> </ul>

## 5.0 AGRONOMY OF SOME INDIGENOUS CROPS

This section presents the morphology and agronomic practices of some of the known crops.

### Cereals

#### 1. Gongo (Sorghum Sp.)

Having good qualities of early maturity and high yielding potential than the popular puke (sorghum), its production was common up to the middle of the 1980s. Thereafter, many farmers lost interest in its production for two reasons, storage difficulties because it matured too early when rainfall was at its peak and due to high losses of matured grains from attack by wild birds. By the beginning of the twentieth century, the number of farmers planting this crop began to reduce drastically. The situation presently is that only one or two farmers in a community still grow it for consumption.

**Morphology:** Its stalk is single and erect. The leaves are alternate and big with the sheath encircling the stalk (Fig. 8). The inflorescence is dense and long which usually curves prominently downwards with many spikelets which later form the grains after cross-pollination. The colour of the grains is light-brown when the harvest is timely. When late, the colour changes to dark-brown.



Fig. 10: A typical gongo crop at Puffieu



Fig. 11: Harvested heap of gongo

## Indigenous Agronomy

**Arable Land:** High yield is obtained from a loamy soil. This requirement makes farmers plant it in compound farms or valleys where this condition is prevalent.

**Cropping system:** Monoculture or sole cropping is the common practice. An alternative is mix-cropping with cowpea which is grown at dispersed stands to promote spreading out over ground.

**Land preparation:** Compound farms are ploughed flat or mounded using a local hoe. In valleys or low lands, the mounds are of medium sizes measuring averagely 1.25 metres in diameter at a height of 0.5 - 0.8 metre high.

**Sowing/Planting:** The kyaru method is applied for good seed rate of 2 - 3 per hole or stand. The covered soil is firmed up gently with the right foot after sowing. This is important because it allows the moist soil to touch the seeds for good germination and equally prevents insects and rodents from picking sown seeds.

**Thinning & Transplanting:** A crop stand that has more than 3 seedlings are thinned and some use for filling vacancies or large spaces by transplanting. This practice is used to ensure that the right crop population gives good productivity.

**Weed control & Re-shaping:** Weeds are manually controlled twice in the season using a local hoe. The second weeding also known as damu is specially meant for improving soil aeration after heavy rains that compact the soil. The re-shaping is in the form of soil mulching of the mounds or stands when in a flat land. Its advantages are twofold: prevents logging or breakdown of the crop during rain storms and also enhances replacement of soil

nutrients for healthy growth which is always lost over a period of time.

**Harvesting & Storage:** Harvesting entails cutting the stalks with a sharp cutlass, lining them up in rows for easy identification of crop heads and cutting them using small knives. The harvest is transported to the house by women and children using baskets. At the house they are dried for 3 - 5 days and stored in a granary.

**Disease & Pests:** No serious attack of diseases have been identified.. Common pests include insects, birds and rodents on the farm or in the store. Particularly, a type of bird called *dakyie* likes the grains in their early stage of maturity. As a control method, in the early or late hours of the day a notorious sound is made with a metallic container or orally, as scaring tactics.

## 2. Kamazie (*Zea sp*)

This crop was introduced into the locality by the grandfathers some one and half centuries ago during migration from the *Gaun* state, a region in what is now called the Northern Region. It was accepted by many farmers as an additional variety of maize for enhancing their families' food security.



**Fig. 12:** Stored kamazie cobs as seed for cropping the following year

the promotion of improved varieties by the Ministry of Food and Agriculture (MOFA) in the 1970s. For now, only a few farmers still grow it for its sweet taste and the yellow colour of saab meal prepared using its flour.

**Morphology:** It differs slightly from *zeze* in height, cob size and maturity period. Unlike *zeze*, it grows at a height of 1.5 -1.7 metres and with longer internodes, many leaves and a bigger stem measuring 2 - 3 cm in diameter. The matured cob is bigger than that of *zeze* and has bigger grains at 90 - 95 days.

## Indigenous Agronomy

**Arable Land:** An ideal soil is 30-45 cm deep with very high organic content. For this condition, it is mostly cropped in *simame* (compound farms) and valleys that have these soil specifications.

**Land preparation:** The same as described for *gongo*.

Sowing/Planting: The same as described for *gongo*.

Thinning & Transplanting: The same as described for *gongo*.

Weed control & Re-shaping: The same as described for *gongo*.

**Harvesting & Storage:** Harvesting is manual by breaking the cobs and de-husking with the hands thereby removing the thick sheath or cover. Storage in boge is done after drying for 4- 7 days. For seed storage, a bundle of 20 - 30 cobs is hung in a kitchen where it benefits from the fire and smoke from cooking food on *dame* (local stoves). Also, attack by pests and insects is eliminated in this process.

**Disease & Pests:** Diseases are not known with this crop. As regards pests, local birds called *gyilangyiir* eat up grains on

matured cobs in the farm.

### 3. Munzie (*Oryza sp.*)

This crop was domesticated from the wild variety by forefathers. Even now, some of this wild variety still exists. The propagation of this crop was popular for both its nutritional and medicinal uses up until the middle of the twentieth century at which time the production began to decline. Nonetheless, some few farmers still crop it on a very small scale.

**Morphology:** It has an erect stalk of between 0.45 - 0.55 metre tall but curves when the inflorescence is matured. The root system is shallow and is concentrated in the upper layer. The stalk is cylindrical and rough with solid nodes and hollow internodes. The buds in the axils of the leaves at the lowest nodes grow out to produce tillers. From each node, there is one leaf with a lamina and a long sheath which completely encircles the internodes.



Fig. 13 : A typical matured munzie farm in Kokoligu community

The inflorescence is loose but with many branched panicles. Each one bears one or more spikelets. The developed grains are enclosed by husks. A matured crop has a shattering character that can result in a great loss of grains at the time of harvest. During processing for food, the husks are removed leaving the edible part which is dark-brown in colour.

## **Indigenous Agronomy**

**Arable Land:** These are low lands and valleys where the soils have good organic matter and retention of water for 3 months or more.

**Cropping system:** Farmers practice mix-cropping with maize and okro. However, mono cropping is practised by some farmers.

**Land preparation:** The mono cropping is common and is done by the "slash and burn" method using a cutlass. Afterwards, the land is ploughed using *lepalu* (local hoe). The soil lumps are broken into fine tilth for achieving good seed germination and vegetative growth.

**Sowing/Planting:** This is done in April before the start of the rainfall in May so as to avoid possible flooding that prevents seeds from germination. Sowing method is the same as described for *gongo*. However, the seed rate differs as 5 - 6 seeds are sown per stand/hole.

**Weed control:** This is done manually using the local hoe and hands two weeks after sowing. The second weeding referred to as *muo-vob* (pulling out big grasses by hand) follows in September.

**Harvesting, Storage & Processing:** This is done manually by hand using a sharp knife or sickle to cut the ears/heads. These are carried to the house where the harvest is dried for 3 - 4 sunny days. The threshing is manual by beating the heads/ears with sticks for the removal of grains. After winnowing, the grains are dried again for 1 - 2 days and stored in a *bogpula* (small local granary) or *kataa* (medium local granary) when the yield is plenty. Processing for food is done by pounding the required quantity in a mortar with a pestle and winnowing to ensure the removal of the husks for dark-brown grains.

**Disease & Pests:** The crop is disease resistant in character. The only known pest is the mouse that can enter a poorly constructed *bogr* to eat some of the grains.

#### 4. Zeze (*Zea sp.*)

Its origin is the same as described for kamazie but its cobs are smaller than *kamazie* (Fig. 10). The crop serves as a food coping strategy for the most hungry month of July each year. There are two ways of taking it as food. One is harvesting the fresh cobs and roasting for eating by family members. The other is grinding



Fig. 14: Left - Zeze & Right (front) 3 cobs of Zongkuse

the grains into flour for cooking *saab*. At the end of August, there are only one or two bundles of the cobs kept as seed for the next cropping season.

**Morphology:** Unlike *kamazie*, it is shorter, between 1-1.2 metres. Bearing few leaves on the erect stem, their blades taper to a point at the tip while the nodes are also shorter. Additional description is the same as for *kamazie*.

## Indigenous Agronomy

**Arable Land:** The same as described for *kamazie*.

**Land preparation:** The same as described for *kamazie*.

**Sowing/Planting:** The same as described for *kamazie*.

**Weed control:** The same as described for *kamazie*.

Harvesting & Storage: The same as described for *kamazie*.

Disease & Pests; The same as described for *kamazie*.

## 5. Ziwaali (*Pennisitum* sp.)

Its origin is the same as described for *kamazie*.

**Morphology:** The stem is solid with prominent nodes marked by rings of long white silky hairs. Its height is between 2.5 - 3.25 metres depending on the soil fertility status. The leaf sheath clasps the stem while the inflorescence or panicle is stout and hairy varying in length from 35 - 45 centimetres and about 4 - 5 centimetres thick. The grains are sizeable and have a distinct ash colour (Fig. 11) when there is good weather for maturing. When

the maturing period coincides with rainy days, the colour changes to dull-grey.



Fig.15 : Two bundles of harvested ziswaali in the middle

## Indigenous Agronomy

**Arable Land:** The same as described for *gongo*. However, some yield can also be reaped from poor sandy or stony soils where other crops would not grow.

**Cropping system:** The common practice is mix-cropping with cowpea.

**Land preparation:** The *dankube* method of mounding as described for *gongo* is the popular practice. Some farmers also plant it on flat lands.

**Sowing/Planting:** The same as described for *gongo*.

**Thinning & Transplanting:** The same as described for *gongo*.

**Weed control & Re-shaping:** The same as described for *gongo*.

**Harvesting & Storage:** The same as described for *gongo*.

**Disease & Pests:** This crop is disease resistant. In relation to pests, a certain type of midge that causes seed formation to shrivel and some

species of birds eat up some of the grains. Different ways of controlling the birds is by making loud noises with the mouth or hitting any metallic container.

## 6. Zongkuse (*Zea sp*)

Its origin is the same as described for *kamazie*. The literal meaning of its local name is "blind man can't roast me for eating". This is because the colour of its cob (Fig. 11) which is deep purple makes no difference after roasting it for eating.

**Morphology:** The same as described for *kamazie*.

### Indigenous Agronomy

**Arable Land:** The same as described for *kamazie*.

**Land preparation:** The same as described for *kamazie*.

**Seed Sowing:** The same as described for *kamazie*.

**Weed control:** The same as described for *kamazie*.

**Harvesting & Storage:** The same as described for *kamazie*.

**Disease & Pests:** The same as described for *kamazie*.

## Legumes

### 1. Bengpula, Bibiirtakone, Napobpogbe & Sonsogli

Their origins are the same as described for *gongo*. The first three comprise of the *phaseolus sp.* popularly called bean.



Fig.16: Harvested heap of Napobpogbe



Fig. 17: A sonsogli plant

**Morphology:** Their main differences are: nature of growth; time of maturity and colour of leaves and grains.

**Bengpula** has a late maturing period of between 120-135 days; its vegetative growth spreads wide on the ground, between 1.3-1.5 metres radius; the leaves are green in colour producing light-grey or light-grey or white colour too depending on the weather at the time of harvest.

**Bibiirtakone** is early maturing between 60-75 days. Its vegetative growth spreads not more than 0.5 metre radius on the ground having dark-black leaves that produce either light-purple, or dark-purple pods containing dark-black grains.

**Napobpogbe** is slightly longer in maturity (90-115 days); spreads out on the ground in the same manner as bengpula; has mixed coloured leaves of purple, dark-brown and light-green that produce either dark-grey (Fig. 12) or light-yellow pods and grains.

**Sonsogli** has a long maturity age of 120-135 day, is erect in vegetative growth and bushy with light-green leaves. The nuts are

produced underneath with ash or light-grey colour coat containing a black grain.

## Indigenous Agronomy

**Cropping system:** For *bengpula* and *napobpogbe*, mix-cropping with either maize, millet or sorghum is the common practice. Mono cropping of *bibiirtakone* and *sonsogli* is popular but where arable land is a limited, farmers do mix-cropping with maize or sorghum.

**Arable Land:** Well-drained sandy-loam soils of medium texture are the best for maximum productivity. However, *tisog wonkyog* (gravelly soil) can also give some relative yield.

**Land preparation:** The same as described for *gongo*.

**Sowing:** The same as described for *gongo*.

**Weed control:** The same as described for *gongo*.

**Harvesting & Storage:** For *bengpula*, *bibiirtakone* and *napobpogbe*, this is done by hand at various times as the pods do not ripe. Drying them takes from 5-7 sunny days. The processing is by threshing the pods with a stick on a cleaned flat ground or on the roof top of a room which is well plastered. Grains are winnowed and stored in clay pots or jars using organic insecticides, such as bitter *tampelu* (ash) of either *tongbo* and millet stalks or *lodol* powder from the *lodol* shrub.

**Disease & Pests:** They are disease resistant. If not well stored with the organic insecticides, insects called *ben biir* attack the grains and eat the flour inside thus making them unsuitable for human consumption. When the pods are matured on the farm,

partridges and rabbits eat some of the pods.

## 2. Siibogni & Siitiegbee

Their origins are the same as described for *kamazie* and belong to the *Arachis sp.*

**Morphology:** The main differences between these crops include, nature of growth, shape of leaves and sizes of seeds. *Siibogni* is erect and bush- like in its growth like *sonsogli*. The leaves are light-green, broad and oval in shapes. At matured stage, the nuts are clustered around the base of the plant. The matured crop has characteristic dry grey leaves with some of them dropping onto the ground. In character, the crop is easier to harvest than *siitiegbee*.

*Siitiegbee* grows in branches up to 45 cm from its base. The leaves are dark-green in colour, small in size and nearly circular in shape. The nuts are distributed at the internodes of the vines up to the terminal region of the branches. The matured crop after 135-140 days, shows the same colour of leaves as *siibogni*. Harvesting of the crop is difficult as one has to hoe diligently around the bottom of the plant for proper removal of all the nuts as there is always a tendency for losing many nuts when the soil is dried a little.

## Indigenous Agronomy

**Arable Land:** Soils with high organic manure are not good as the crop grows vegetatively very big with very poor nutting. They yield better in well drained sandy-loam soils of medium texture.

**Land preparation:** Ploughing the farm in the bugfu way (i.e, 10 - 15 cm deep & breaking all lumps for a fine tilth) with the local hoe is the best method. With this, germination and vegetative growth are effective for good nutting or harvest.

**Sowing/Planting:** This is by the dankube method while the seed rate regulation is by the kyaru method.

**Weed control:** The same as described for munzie.

**Harvesting & Storage:** The nuts are harvested by digging the plants out of the soil using a *lepalu* for *siibogni* and *ku-kogsogo* for the *siitiegbee* which are the appropriate hand tools for effective digging in relation to these crops. A mean yield of 1,440 kilogrammes unshelled nuts (12 maxi jute sacks equivalent) is the harvest from 0.4 hectare (1acre). Drying the nuts takes 5-7 sunny days. They are stored later in either a *bogpula* or *kataa* after sterilizing these containers with burning *dunvaar* (local weed that gives off an unpleasant smell).

**Disease & Pests:** There are only two known diseases of the crop. One is rosette that causes brown spots on the leaves that leads to sudden death. The other called *siikong baalu* locally or scientifically *cercospora personata*, first gives the plant a clumsy/nasty vegetative appearance and successive formation of new leaves are smaller, curled and distorted, uniformly yellow and formed without green veins which can result eventually in stunted growth and death. The most common pests are specific birds that eat the sown seeds, rabbits that eat the vegetative part during growth and both rabbits and monkeys who dig for the nuts to eat when they are matured. In storage termites called *gume* destroy the nuts.

## Roots & Tubers

### 1. Kurbara

Kurbara was domesticated from the wild variety two centuries ago by the great grand fathers. Its propagation was popular until the first half of the twentieth century when its production began to decline and presently a small number of farmers still crop it on a small scale. Scientifically, the crop belongs to a group of herbaceous plants called *colocasia sp.*

**Morphology:** Its structure looks similar to that of cocoyam. But a closer examination shows some differences in leaf formation and colour. While the leaves of kurbara are slightly circular in shape and light green in colour, those of the cocoyam have an oblong shape and are a deep green colour. Each leaf is attached to a corm underneath by means of a long petiole which flares out.

At adult age, it looks bushy with a number of unisexual inflorescence; the female flowers occurring at the base while the male ones occur at the top. When it is matured for harvesting, the corms (big ones for food) and cormels (small ones for seed), the leaves dry up and turn light-green to light-yellow in colour.

### Indigenous Agronomy

**Arable Land:** Valleys and low lands are suitable because of their fertile soil of loose loamy nature and good water holding capacity during growth. Soil with a heavy clay content tends to be waterlogged which results in rotting of the corms and difficulty in harvesting.

**Cropping system:** Farmers practice mix-cropping with yam

(*Dioscorea rotundata*), *nyuwome* (*Dioscorea bulbifera*), *nanyie* (*Impomea batatas*), and *piere* on rectangular mounds but with maize on circular ones.

**Land preparation:** Between November and March, slashed grasses are gathered at mean distances of 2.25 metres apart for mounding over them to ensure maximum soil fertility from the rotten grass at the bottom. The rectangular or circular mounds are either medium or large having mean sizes of 2.3 long x 1.2 wide x 0.6 metres high and 3.3 x 2.2 x 0.8 metres respectively. When the mounds are circular a mean size of one is 0.8 metre radius and 0.6 metre high for a medium and 1.2 metres for a large one.

**Planting:** Good time for planting is in April in readiness for the start of rains in May. The cormels or daughters of a corm numbering 3 - 4 are planted at 2 - 3 spots of a circular mound and 1-2 at the sizes of a rectangular mound and one in the centre.

**Weed control:** This is done twice manually using the local hoe for the first one in late July and second by pulling out grasses by hand in early September.

**Harvesting & Storage:** Harvesting is done between November and December using *lepalu* - type of local hoe for valley farming. The sign of maturity is dried leaves with light-yellow colours and cracks around the stand. Sometimes these cracks are large enough that some of the matured corms and cormels are seen with the eye.

The mature corms and cormels are removed in such a way that they remain together as a bundle for effective storage. These are

stored in the farm by digging a large hole in the centre of one mound and burying the produce. Protection from destructive domestic animals such as pigs and cattle is achieved by covering the spot with old stakers for yam crop and some thorny shrubs.

**Disease & Pests:** There is no known disease and pest vulnerability associated with this crop. A thin and tall nature of growth known as etiolation occurs when there is inadequate sunlight and that results in low yields. Also, storage at high temperature of 30 degree Celsius and above causes the corms and cormels to rot.

## 2. Kurbazigle

Its origin is the same as described for *kurbara* and also belongs to the *Dioscorea* sp.



Fig, 18: A farmer with harvested seed in hand & some roots on a polybag

**Morphology:** The stem is a thin twinning structure where the direction of twinning around a support such as the sticks used for

staking yams on a mound is on the left or anticlockwise. The leaves are simple, net-veined, devoid of hair and generally green colour in the growing stage but turns to light-yellow or brown when the plant is matured for harvest.

As a dioecious plant it produces both male and female flowers on different plants. The female flowers are borne in spikes arising from the leaf axils, while the male are much smaller and borne in panicles. After cross pollination, the plant bears fruits that resemble that of a bean crop, each containing seeds that are used for its propagation.

### **Indigenous Agronomy**

**Arable Land:** The same as described for *kurbara*.

**Cropping system:** The same as described for *kurbara*.

**Land preparation:** The same as described for *kurbara*.

**Planting:** The seed rate is 2 -3 per stand that are planted at one or two sides of a mound. This position allows it to make use of the yam's nyilugr or stake.

**Weed control:** The same as described for *kurbara*.

**Harvesting & Storage:** The same as described for *kurbara*.

**Disease & Pests:** The same as described for *kurbara*.

### **3. Nyuwome**

The origin is the same as described for *kurbara*. Scientifically, it belongs to the *Dioscorea sp.*



**Fig.19: Yield on one plant**

**Morphology:** The stem resembles that of kurbazigle as it is thin when young but becomes sizeable when it is fully grown. The leaves are generally green colour and net-veined. Their arrangement on the stem are either opposite or alternate.

## **Indigenous Agronomy**

**Arable Land:** The same as described for *kurbara*.

**Cropping system:** The same as described for *kurbara*.

**Land preparation:** The same as described for *kurbara*.

**Planting:** The same as described for *kurbara*.

**Weed control:** The same as described for *kurbara*.

**Harvesting & Storage:** The same as described for *kurbara*.

**Disease & Pests:** The same as described for *kurbar*.

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