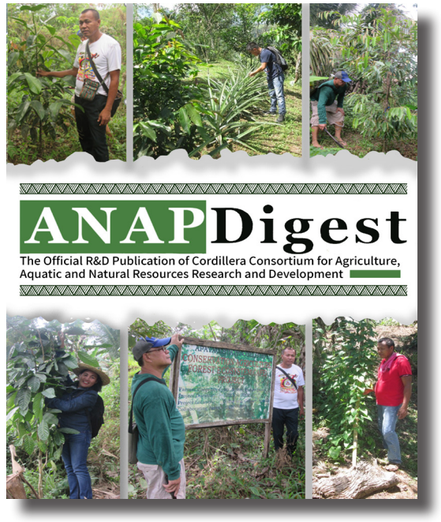
ANAP Digest

The Official R&D Publication of Cordillera Consortium for Agriculture, Aquatic and Natural Resources Research and Development

ABOUT THIS
COVER



This cover unfolds as a visual narrative of the Cordillera's living knowledge systems. From the earth emerge orphan crops, quiet pillars of food security, biodiversity, and resilience nurtured by generations of indigenous communities who understand the land beyond seasons and yields. Interwoven with these are the intricate loom patterns of the Cordillera, where mathematics is not written but felt, expressed through symmetry, repetition, and balance passed down through skilled hands and collective memory.

Encircling these stories is the forest–farm landscape, where conservation agriculture transforms upland ecosystems into productive, sustainable spaces. Here, science complements tradition, integrating trees, crops, and livelihoods in ways that protect watersheds, sustain communities, and strengthen climate resilience. Together, these elements form a tapestry of research and heritage, illustrating how innovation in the Cordillera is deeply rooted in culture, and how development thrives when knowledge, nature, and people grow in harmony.

WHAT'S
INSIDE

Page

EDITORIAL
BOARD

ANAP
NOTES

As the second release of the 2025 ANAP Digest, this issue aims to showcase IKS involving locally available plants to textile designs to forest conservation. It rests on indigenous knowledge systems where the uses are practical and enduring in selected indigenous peoples communities.

From the various research results, this issue focuses on popularizing researches from Abra, Apayao and Ifugao. The integrative role of IKS in a the context of fast diminishing resources that results from a market oriented system , climate challenges that have already been felt decades ago – is highlighted in this issue.

Conducted in Apayao, the so called 'last frontier of nature's richness' is an attempt to show what is remaining but also to recover traditional practices of forest conservation with the integration of crops as possible income source. Known as CAFÉ or the Conservation Agriculture in Forest Ecosystem, the project showcased the development of demonstration area for forest trees where cash crops are cultivated as understories. The canopy of trees serve as shade plants allowing for diversity.

On the other hand, the so-called 'orphan crops' because the crop is 'lesser known' in the mainstream society are now gaining importance. Crops grown among Kalanguyas in Tinoc Ifugao have been rediscovered because of its endurance and its nutritional value and resilience to climate change. The Kalanguyas have been maintaining different kinds of tuber roots, corms and leafstalk vegetables. These crops are either cultivated or are left to grow in the wild and the rediscovery of its contribution to food security and nutritional even medicinal values command increasing attention, especially in the context of R&D.

Figures and designs found in the textile products of San Juan and La Paz in the province of Abra are showcasing different patterns. Different designs are revealing of the richness of 'ethnomathematics' as embedded in these materials. The mathematics behind the patterns, shapes and figures shown in woven textiles is a big contribution to the pursuit of IP education that is relevant and sensitive to what is cultural. As mentioned by advocates of ethnomathematics, the assumption is that a subject matter integrating ethnomathematics in the curriculum will motivate students to recognize math as part of everyday life. This way, students might find connections and deepen appreciation and understanding of all forms of math.

Documenting, practicing and researching about IKS is an effort to preserve and celebrate and even defend identities. These research and development efforts in IKS are potent instrument for education benefitting everyone the fact that the modern day societies are already looking back to what is 'indigenous' or traditional. The frieze and crystallographic patterns for instance are original in particular cultures – and this has to be recognized and safeguarded as an expression of identities amid mass production of textiles with designs that attempt to mimic works from its original creators. Because traditionally known plants have been overwhelmed by commercial crops, their re-valuation in R&D investment is important for these plants or even tree crops remain critical in agricultural resilience.

The ANAP Digest is an annual publication of the Cordillera Consortium for Agriculture, Aquatic and Natural Resources Research and Development (CorCAARRD) intended to showcase promising R&D product and results produced by its Consortium Member Institutions (CMIs) in the region. This is an evolution and popular version of the Anap Journal which has published winning papers from its annual regional R&D Symposium from 2004-2015.

ORPHAN CROPS

OF THE KALANGUYA IN TINOC, IFUGAO : A CHARACTERIZATION

By Jennifer Madonna G. Dait & Elpidio B. Basilio, Jr.

Speed Read:
- Orphan crops serve important roles in sustaining food security of Tinoc, Ifugao
- There are fifteen (15) orphan crops identified
- Orphan crops are categorized according to their habitat; and use and extent of production

Up in the mountainous parts of Tinoc, Ifugao, indigenous crops such as taro, yam and green leafy vegetables are household staples.

The constant integration of these “orphan crops” in their diet enhances food security and nutritional diversity.

In the study of Ifugao State University researchers, Jennifer Madonna G. Dait and Elpidio B. Basilio Jr., the abundance of orphan crops in the area offers limitless potentials.

FAST FACTS ABOUT ORPHAN CROPS

1. Most **orphan crops** are **resilient to environmental extremes and harsh weather conditions** brought about by climate change. Orphan crops are therefore an assurance to food and livelihood security (Kumar and Bhalothia, 2020).
2. Orphan crops require **low farming inputs,** because most are resilient to pests and diseases
3. These are reliable **alternative source of food** when cultivated crops are reduced in production
4. In poor and developing nations prone to natural disasters, **orphan corps are fallback options for survival** (Mabhaudhi, et al., 2019; Tadele, 2018; Talabi, et al., 2022)
5. Orphan crops remain **essential food source for food-insecure families** in many developing countries (Verbeecke, et al., 2023).
6. Since nutrition security demands the consumption of variety of foods, orphan crops **provides access to food supply that contain enough nutritional value** (Tadele, 2019).
7. Orphan crops have **essential roles in agricultural biodiversity and agro-ecosystems** – which are critical for long-term sustainability of food and agricultural production.

ORPHAN CROPS OF THE KALANGUYA IN TINOC, IFUGAO

Based on the findings of Dait and Basilio (2024), there are fifteen different kinds of tuber roots, corms and leaflets identified by the research respondents. These include three root crops, dive tuber crops, three form crops and four leafstalk vegetables.

Root crops grown in the area are the following:

KAMOTE (SWEET POTATO)

Sweet potatoes are sometimes staple food among the Kalanguya people. It varies in different colors, sizes and shapes. Their kamote or ubih are sweet in taste.

Scientific Name | *Ipomea batata*
Local Kalanguya Name | Kamote, Ubih

KAHOY (CASSAVA)

Casssava grown in the area are used in various ways. The Kalanguya people consume it either whole, grated or processed into flour to use in preparation of baked goods such as bread and crackers.

Scientific Name | *Manihot esculenta*
Local Kalanguya Name | Kahoy

YACON (YACON)

Yacon is devoid of starch, therefore is consumed uncooked by the Kalanguya

Scientific Name | Pacchyrizhus spp.
Local Kalanguya Name | Yacon

Further, the tuber crops grown are greater yam and smaller yam, canna, and arrowroot.

UBIH (GREATER YAM)

Greater yams are primarily cultivated by the Kalanguya people.

Scientific Name | *Dioscorea alata*
Local Kalanguya Name | Ubih

TUGUI (LESSER YAM)

Smaller yams are also primarily cultivated by the Kalanguya people.

Scientific Name | *Dioscorea esculenta*
Local Kalanguya Name | Tugui

AWING (ARROWROOT)

Considered as volunteer crop, arrowroot is usually not intentionally planted but these have propensity to re-gore in fallowed fields. After it has been sown, arrowroot grows perpetually on its own.

Scientific Name | *Maranta arundinacea*
Local Kalanguya Name | Awing

AWWING (CANNA)

Canna is considered to be domesticated crop.

Scientific Name | *Cannaceae*
Local Kalanguya Name | Awwing

KAMOTE (SWEET POTATO)

The Kalanguya people also cultivate a variety of potatoes.

Scientific Name | *Ipomea batata*
Local Kalanguya Name | Kamote, Ubih

Meanwhile, there are three types of corm crops grown by the Kalanguya people.

TARO - is used in various ways such as staple food, a vegetable dish, animal fodder, as cash crop for some.

Scientfic Name | *Colocasia esculenta*
Local Kalanguya Name | Gabi, Aba

TANNIA and **GIANT TARO** - are grown as crops for staple food, but some consider galyang as wild plant or volunteer crop.

(TANNIA) Scientific Name | *Xanthosoma sagittifolium (white); Xanthisima violaceum (purple)*
Local Kalanguya Name | Galyang

(GIANT TARO) Scientific Name | *Alocasia macrorrhiza*
Local Kalanguya Name | Bila

The Kalanguya also grown several leafstalk vegetables, which are ferns, wild spinach, black nightshade and sweet potato tops.

APPAKU (FERN)

Ferns are growing wildly especially during the colder months.

Scientific Name | *Diplazium esculentum*
Local Kalanguya Name | Appaku

KALUNAY (WILD SPINACH)

Wild spinach, black nightshade and sweet potatoes are either boiled and dipped in fish sauce, or sautéed and consumed as viand.

Scientific Name | *Chenopodium album*
Local Kalanguya Name | Kalunay

KALUNAY (BLACK NIGHTSHADE)

Scientific Name | *Chenopodium album*

Local Kalanguya Name | Kalunay

KAMOTE TOPS (SWEET POTATO LEAVES)

Scientific Name | *Ipomoea Batatas*

Local Kalanguya Name | Kamote tops

HABITAT OF ORPHAN CROPS

The root and tuber crops are intentionally planted, except for Canna (Awwing). Three are wild plants that are domesticated, and the root crops are cultivated. Table 5 shows the habitat category, and use and extent of production of orphan crops. Sweet potato and cassava are planted crops. These are produced and consumed in small to large amounts. Meanwhile, yacon is classified as planted crop and volunteer plant, which is produced and consumed in small to many amounts.

Greater yam (Ubih) and lesser yam (Tugui) are planted crops with production and consumption as small to many amount.

Only canna (Awwing) is the domesticated wild plant, therefore only a few is consumed. Arrowroot (Awing) is a planted crop and volunteer plant and is therefore produced and consumed in small to few amounts.

Potato is a planted crop and is produced and consumed in small to large amounts.

Sweet potato and cassava are planted crops. These are produced and consumed in small to large amounts. Meanwhile, yacon is classified as planted crop and volunteer plant, which is produced and consumed in small to many amounts.

Greater yam (Ubih) and lesser yam (Tugui) are planted crops with production and consumption as small to many amount.
Only canna (Awwing) is the domesticated wild plant, therefore only a few is consumed. Arrowroot (Awing) is a planted crop and volunteer plant and is therefore produced and consumed in small to few amounts.

Potato is a planted crop and is produced and consumed in small to large amounts.

According to the Kalanguya people, the root and tuber crops are purposefully planted, except for Canna. Three are wild plants that are domesticated, and all root crops are planted. These are cultivated on swidden farms, wet farms, irrigated paddies, home gardens, and even riverbanks.

Cassava, sweet potato, larger yam, lesser yam, taro, and tannia are planted by each and every one of the research participants. As a result of the climate of Tinoc, ferns typically grow in an uncontrolled manner there.

Wild spinach are domesticated together with black nightshade and sweet potato leaves.
Canna, on the other hand, is a cultivated plant while arrowroot, lesser yam, and tannia are often grown as volunteer crops.

Volunteer plants may be discovered in abandoned and newly established farms, along roads and streams, in backyards and along riverbanks. One may find wild plants in the woods, on abandoned swidden farms, and in the undisturbed areas of the land that are located close to farms, paths, and streams.
There are instances where wild plants are cultivated on swidden farms or transplanted into private gardens. Orphan crops that are able to flourish in a variety of habitats and settings in terms of height, climate, and vegetation (Tannia, Lesser Yam, Yacon, arrowrot, Canna, Giant Taro, fern, black night shade and wild spinach).

The agricultural landscape of Tinoc, Ifugao, has long been characterized by its integration of traditional and indigenous farming systems, particularly the cultivation of orphan crops. These are often neglected by mainstream agricultural development efforts, yet have sustained local communities by providing food security, promoting biodiversity, and supporting sustainable livelihoods. The recent development plan for orphan crops in Tinoc represents a significant step toward harnessing their full potential, both as a cultural asset and economic opportunity.

ETHNOMATHEMATICS

EMBEDDED IN THE LOOM WOVEN CLOTHES:OUR ANCESTOR'S LEGACY

By Jonathan P. Zales

Do you often define MATH as Mental Abuse To Humans? Or Mental Activation To Higher-order thinking? Do you often ask about the life relevance of your infinite search for values of x, and navigating signs, numbers, patterns, and figures?

Many math haters, particularly students, challenge the science's usefulness to everyday life. Yet, Math remains to be important in various aspects of our lives. Interestingly, mathematics has existed way back then and has been practiced in arts and crafts by our ancestors.

In particular, it is applied in loom weaving. It is a tradition of craftsmanship passed on from generation to generation. It is a means of sustenance for the day-to-day living of each family alive. It is also a keepsake from great grandparents and other ancestors that binds the community.

It is a means of sustenance for the day-to-day living for families involved in loom weaving. It is also a keepsake from great grandparents and other ancestors that binds the community of different generations.

In an ethnomathematics study, it appears that behind its formulaic stance, math is actually playing important roles in the cultural heritage of Abra people. Specifically, the crystallography and ethnomathematics that stay in every Abel Clothes (Loom Woven Clothes) woven with numerous patterns and astonishing designs shows relationship between mathematics and culture. Ethnomathematics is often associated with "cultures

without written expression", or "the mathematics which is practiced among identifiable cultural groups". While crystallography is a branch of geometry that deals with indefinitely repeating and arrangements of patterns (Abbacan-Tuguic & Marnag, 2016).

The study of Vasquez, Valera, Zales (2020) of Abra State Institute of Sciences and Technology rendered interesting results. With the title "Crystallographic Pattern Analysis of the Loom Woven Clothes of Abra," the study focused on different designs and patterns of the woven cloth of Bulbulala, La Paz, and Lumubang, San Juan, Abra.

From the findings, the Abel clothes binakul, laylayon/stripes, piningitan, and sungka exhibited geometric concepts such as points, lines, and planes. But for them, these undefined terms in geometry are associated with rivers, animals, beauty, happiness, the sun, and stars which they believed as God, gifts, blessings, and reincarnation of their ancestors. And some line colors serve as as sign of feeling or mood and path of journey.

CRYSTALLOGRAPHIC PATTERNS ANALYSIS OF THE LOOM WOVEN CLOTHES OF ABRA

FIGURE A *WOVEN CLOTH OF LA PAZ SHOWS GEOMETRIC CONCEPT SPECIFICALLY POINT*

Sungkat having zigzag patterns

FIGURE B *WOVEN CLOTH SHOWS GEOMETRIC CONCEPTS ON LINES*

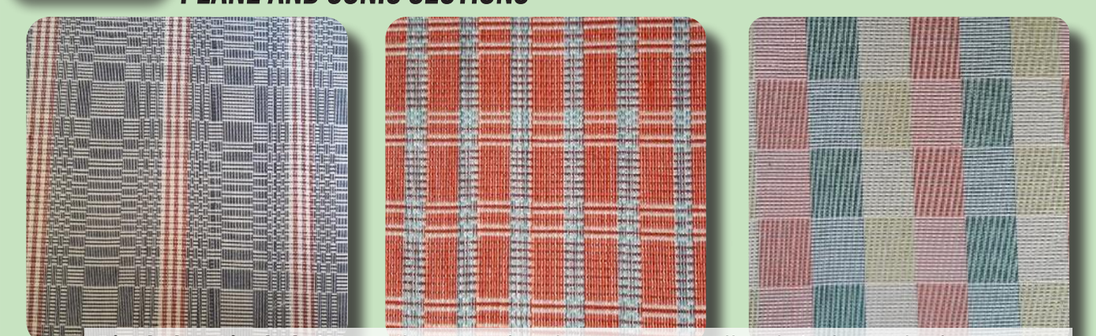
Method used | *Gan-ay*
Name of Thread | *Ur-ay*

Source : Vasquez, R., Valera, N., & Zales, J. (2020). Crystallographic pattern analysis of the loom woven clothes of Abra. International Journal of Innovation, Creativity and Change, 14. https://www.ijicc.net/images/Vol_14/Iss_3/14323_Vasquez_2020_E_R.pdf

FIGURE C *BAHAG SHOWS TRANSVERSAL, PARALLEL AND INTERSECTING LINES*

Laylayon kantarinis - combination of a yellow, blue, red, and white strips which are arranged vertically

FIGURE D *FROM (L-R) KUSIKOS, IK-IKAMEN, KINKINELLENG SHOWS PLANE FIGURES, PLANE AND CONIC SECTIONS*



Binakol or Binakul - is a textile pattern handwoven or a small scale in Ilocos also known as binakel, binakael, binakol, or binakul

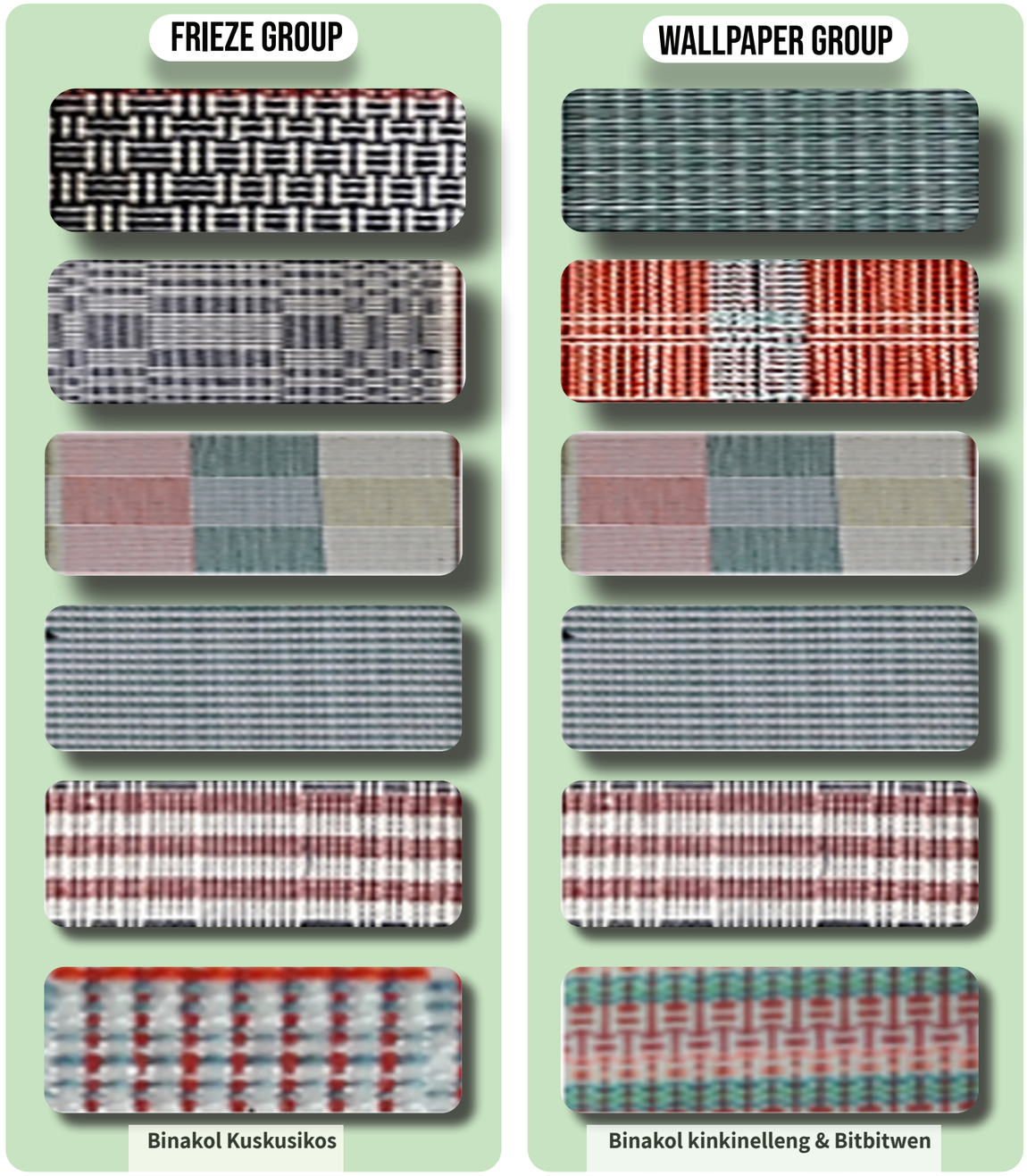
Source : Vasquez et al., 2020. Crystallographic Pattern Analysis of the Loom Woven Clothes of Abra. IJICC, 14.

Further, they display symmetry analysis and uncover the crystallography on frieze and wallpaper patterns. Frieze patterns make use of rotations, reflections, and translations which create repetitive pattern used as decorative geometrical art.

To the Abrenians, these patterns are meant to confuse the malevolent spirits in exacting misfortune on the deceased and their family. It is also associated with the wheel of life if today they are at the bottom and in the latter be on top. Wallpaper patterns on the other hand are two-dimensional patterns that are repeated in two directions. To the Abrenians, these symmetries are associated with fields as sources of income and living, plentiness and abundance of harvest, flower as love or maidenhood, horse patterns as endurance and resilience, and frogs for fertility and time for planting.

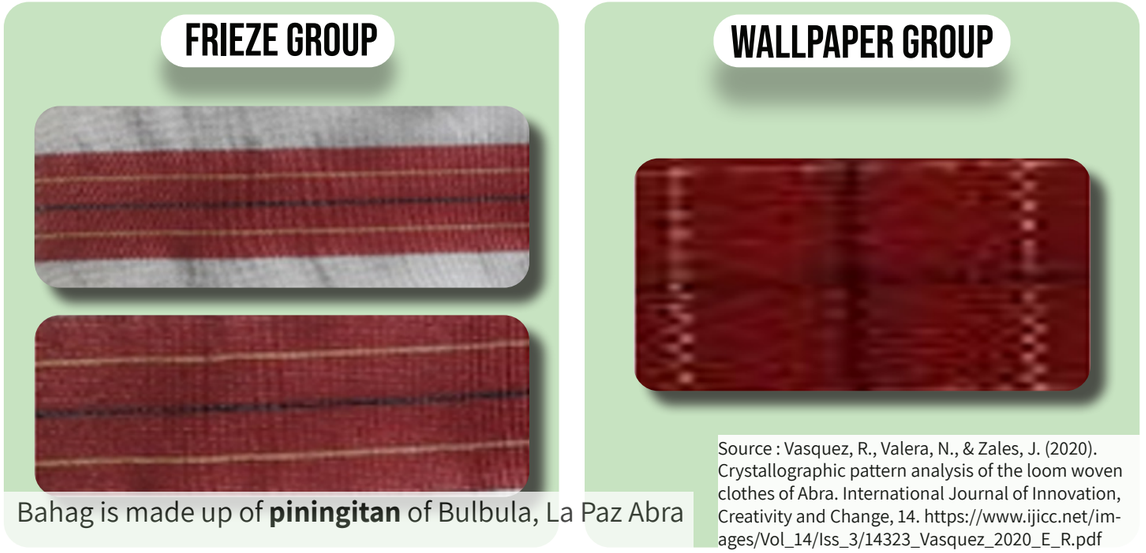
The woven clothes from La Paz and San Juan, Abra have shown similar classification under frieze patterns and wallpaper patterns. The commonly used design in Bulbulala, La Paz, Abra was binakol while in Lumubang San Juan Abra was sungkat. In sungkat, they usually used objects to represent their designs.

CRYSTALLOGRAPHIC PATTERNS IN THE *BINAKUL/BINAKOL* OF BULBULA, LA PAZ ABRA ALONG THE FRIEZE AND WALLPAPER GROUPS



Source : Vasquez et al., 2020. Crystallographic Pattern Analysis of the Loom Woven Clothes of Abra. IJICC, 14.

CRYSTALLOGRAPHIC PATTERNS IN THE *PININGITAN* OF BULBULA, LA PAZ ABRA ALONG THE FRIEZE AND WALLPAPER GROUPS



Bahag is made up of **piningitan** of Bulbula, La Paz Abra

Source : Vasquez, R., Valera, N., & Zales, J. (2020). Crystallographic pattern analysis of the loom woven clothes of Abra. International Journal of Innovation, Creativity and Change, 14. https://www.ijicc.net/images/Vol_14/Iss_3/14323_Vasquez_2020_E_R.pdf

CRYSTALLOGRAPHIC PATTERNS IN THE *LAYLAYON STRIPES* OF BULBULA, LA PAZ ABRA ALONG THE FRIEZE AND WALLPAPER GROUPS

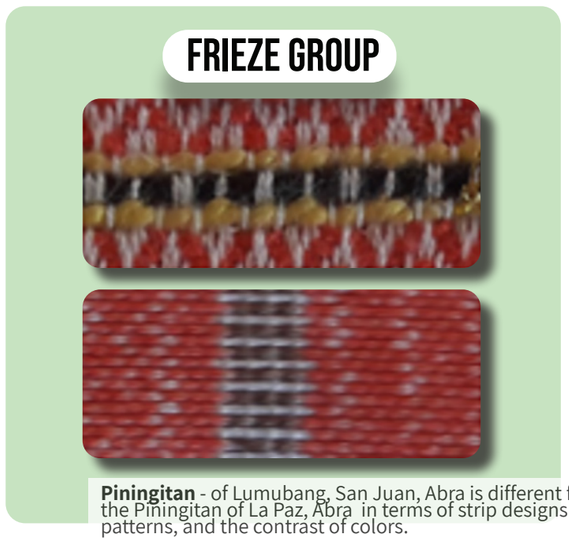
Laylayon kantarinis La Paz Abra

THE *SUNGKAT* OF LUMUBANG, SAN JUAN, ABRA ALONG THE FRIEZE AND WALLPAPER GROUPS

Sungkat - trademark of Lumubang, San Juan, Abra. The pattern, textiles and contrasting colours emphasise their sungkat design.

Sungkat patterns - sabsabong pattern, diamond-like pattern, and wavy pattern

THE *PININGITAN* OF LUMUBANG, SAN JUAN, ABRA ALONG THE FRIEZE AND WALLPAPER GROUPS



Piningitan - of Lumubang, San Juan, Abra is different from the Piningitan of La Paz, Abra in terms of strip designs and patterns, and the contrast of colors.

Source : Vasquez et al., 2020. Crystallographic Pattern Analysis of the Loom Woven Clothes of Abra. IJICC, 14.

A study of by Suyam (2011), entitled Frieze Patterns of the Traditional Tattoos of the Elders of the Mountain Province, explores Cordilleran Ethnomathematics. It was found out that in traditional tattoos, the artistic blending of ink in the skin of Cordilleran women exhibit frieze patterns specifically those from Mountain Province. These patterns emphasize the periodic and symmetrical copies of a long line of a single figure of a block called motif.

On the other hand, a student who was interviewed, exclaimed that even if mathematics is no good for her, she was amazed upon reading this kind of indigenous knowledge and practice and agreed that math itself is mysteriously beautiful. She admitted that it didn't even cross her mind that mathematics is embedded in culture since she has the impression that this Math is not connected to practical ways and means of living of Cordillerans.

Loom weaving, deeply rooted in Cordillera communities like those in Abra, produces diverse textiles that embody rich heritage and cultural identity. These practices, though varied in symbolism and meanings, showcase distinct cultural identity and reflect ethnomathematical knowledge. Despite limited recognition of its mathematical basis, loom weaving has significantly shaped our culture through its symbolic patterns, revealing the historical presence of mathematics in traditional crafts.

With the continuing underappreciation of Math lingers, we should not forget that our ancestors who are utilitarian in nature, with no formal education in the four walls of a classroom, are the great mathematicians in indigenized context and approach. By just appreciating and acknowledging the mathematics embedded in our loom woven clothes is an essential act to preserve not only the distinct Cordilleran culture but continuing craftsmanship passed on from generation to generation with the ethnomathematics appreciation.

Reference:

Vasquez, R., Valera, N., & Zales, J. (2020). Crystallographic Pattern Analysis of the Loom Woven Clothes of Abra. International Journal of Innovation, Creativity and Change. Www.ijicc.net, 14, 2020. https://www.ijicc.net/images/Vol_14/Iss_3/14323_Vasquez_2020_E_R.pdf

CONSERVATION AGRICULTURE IN FOREST ECOSYSTEM (CAFÉ) PROJECT:

DEVELOPMENT OF DEMO AREA FOR FOREST TREES, FRUIT TREES AND CASH CROPS IN THE UPLANDS

By Nathaniel T. Llamelo

Dubbed as "Cordillera's Last Frontier of Nature's Richness," Apayao province is known for its luscious beauty from towering peaks habituated by cauliflower-like canopies of forest trees.

These forests cover serve as watershed to numerous river systems supporting life to various life forms and irrigation to farmlands in low lying areas not only in the province but also to nearby provinces. Besides, these canopies are also important carbon sink or those that absorb more carbom from the atmosphere such as plants, the ocean soil. However, the danger in the preservation of the remaining forests is observed for the past years. These are brought by upland migration and increasing population of people who slash and burn agriculture resulting to uncontrolled deforestation making the uplands fragile and vulnerable to climatic changes.

Addressing this concern, the Research Development and Extension Unit of Apayao State College established the Conservation Agriculture in Forest Ecosystem (CAFÉ) project, a one (1) hectare upland forested area located in Brgy. Guina-ang, Conner, Apayao was developed. The project aims to develop appropriate farming system model through integration of fruit trees and cash crops in forest-based ecosystems in mid-elevation areas of Apayao.

Lay-outing and Utilization of the CAFÉ Project.

The forest trees were rouged down sparsely to at least 20% of the utilized area, another 20% was allocated for the introduced fruit trees (Lanzones, Mangosteen, Durian, Guyabano, cacao, coffee and banana), and 10% for the access roads and other infrastructures such as the shade house, access roads and water reservoir. The other 50% was intended for the integration of cash crops such as black pepper, pineapple, ginger, yam, mungbean and tannia. The one-hectare CAFÉ Project was divided into eight (8) subdivisions with an area of around 1,250 m2 and the profile presented below:

PROFILE OF THE SUB-PLOTS IN THE CAFE PROJECT

SUB-PLOT 1

SLOPE
35-50^0 facing NE

SOIL COLOR/TYPE
Brown/Sandy Loam

pH
5.56

Exposure to Sunlight
Receives sunlight at 10:00 AM to sunset

Microclimate
Generally warm with little forest trees

SUB-PLOT 2

SLOPE
35-50^0 facing N-NE

SOIL COLOR/TYPE
Brown/Sandy Loam

pH
5.75

Exposure to Sunlight
Receives sunlight at 8:00 AM to sunset

Microclimate
Generally cool with forest trees scattered in the sub-plot

SUB-PLOT 3

SLOPE
20-25^0 facing S

SOIL COLOR/TYPE
Black/Clay Loam

pH
6.45

Exposure to Sunlight
Receives sunlight from sunrise to sunset

Microclimate
Generally cool as bannas some forest trees abounds in the area

SUB-PLOT 4

SLOPE
25-40^0 facing NW

SOIL COLOR/TYPE
Brown/Sandy ClayLoam

pH
6.20

Exposure to Sunlight
Receives sunlight from sunrise to sunset

Microclimate
Generally cool as forest trees were scattered in the area

SUB-PLOT 5

SLOPE
15-25^0 facing NW

SOIL COLOR/TYPE
Brown/Sandy Clay Loam

pH
5.85

Exposure to Sunlight
Receives sunlight at 8:00 AM to sunset

Microclimate
Generally cool as forest trees were scattered in the area

SUB-PLOT 6

SLOPE
10-15^0 facing NW

SOIL COLOR/TYPE
Brown/Sandy Clay Loam

pH
5.60

Exposure to Sunlight
Receives sunlight at 8:00 AM to sunset

Microclimate
Generally warm as lesser forest trees were found in the area

SUB-PLOT 7

SLOPE
10-20^0 facing N

SOIL COLOR/TYPE
Brown/ Sandy Clay Loam

pH
5.80

Exposure to Sunlight
Receives sunlight from sunrise to sunset

Microclimate
Generally cool as forest trees were scattered in the area

SUB-PLOT 8

SLOPE
15-20^0 facing S

SOIL COLOR/TYPE
Brown/Sandy ClayLoam

pH
5.62

Exposure to Sunlight
Receives sunlight from sunrise to sunset

Microclimate
Generally cool as forest trees were scattered in the area

Procurement of Seedlings, Seed pieces, and Planting materials

Grafted seedlings of the fruit trees were procured from a registered nursery in the locality, while seed pieces and planting materials of the different cash crops were sourced out from the farmers and agricultural stores in the locality. To maintain the planting of cash crops, succeeding production cycles of pineapple, yam, tannia, ginger came from previous harvest in the CAFÉ Project.

Planting of Cash Crops

Mungbeans. Four (4) varieties of mungbeans: NSIC Mg 05 – Pag-asa 11, NSIC Mg 12 – Pag-asa 19, NSIC Mg 09 – Pag-asa 15, and NSIC Mg 17 – Pag-asa 17 were planted in experimental set up in the least shaded areas of the CAFÉ project. Although the yield of the mungbeans in the CAFÉ project was statistically lower than the average yield of the same variety in a conventional production system, the integration of mungbeans during the earlier years of the CAFÉ can provide substantial income for the household.

Figure 1 :
Mungbeans at their vegetative stage

Figure 2 :
The harvested mungbean pods

Ginger. Planting of ginger tubers (native variety) was done on the onset of rainy season during the months of May-June and harvested on December. Planting was done on designated cropping combinations on 1-meter furrows along contour lines with hill distance 25-30 centimeters apart. The gingers have height of 68.80 cms; 11.90 tillers; 15.10 leaves; 22.80 cms leaves; rhizome length of 24.2 cms.; and 45.50 kgs harvested rhizome per 150 linear meters. Part of the harvested tubers are pre-sprouted and utilized as planting materials for the succeeding year.

Figure 3 :
Ginger plants in contour lines

Figure 4 :
Harvested ginger rhizomes

Yam. Sprouted tubers of yam (Ramayan, Padihot, and Sampero) from farmers in the locality were initially planted on the month of May around the base of forest trees which was utilized as live trellis materials for the yams. The senesced (refers to the lasts stage of aging & reproduction) Yams were harvested from December to February on the following year. The varieties Ramayan (Figure 6) and Padihot (Figure 7) showed most promising with number of tubers at 2.45 and 3.25; average tuber diameter of 18.00 cms and 14.80 cms; and average tuber length of 22.40 cms and 30.80 cms, respectively. On the succeeding years, tubers left out in the CAFÉ Project were dug and cut into 100-150 grams setts, dipped in wood ash and subjected to sprout in a cool, dark humid place.

These sprouted tubers were planted again around the base of the different forest trees to complete the cycle of production.

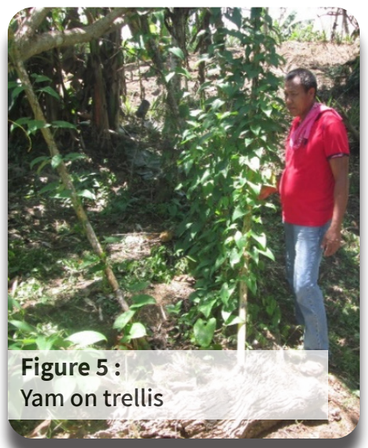


Figure 5 :
Yam on trellis

Figure 6 :
Ramayan Yam

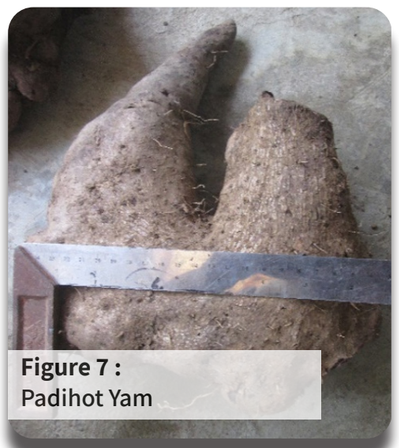


Figure 7 :
Padihot Yam

Pineapple. Slips of pineapples (variety Smooth Cayenne) were procured from a farmer in the locality to ensure that the pineapples were adaptable in the local climate. They were planted in contour lines and spaced in hills 40-50 centimeters apart. After 2 years, pineapple fruits were harvested with average fruit diameter of 13.83 cms.; average fruit length of 15.67 cms.; average weight of 720 grams. The pineapple fruits harvested on the months of June-July were either sold as fresh fruits or utilized as raw material for product development study involving pineapple fruits like wine, vinegar, jam and jelly by the farmer-cooperator, Mr. and Mrs. Romeo E. Banco. The slips from the fruited pineapples were gathered to serve as additional planting materials for the establishment of the more pineapple contour lines in the designated cropping combinations.

Figure 8 :
Rows of pineapple plants

Figure 9 :
Harvested sweet cayenne pineapples

Tannia. Tannia plants were added in the cropping combinations as more open space was available as effects of the Tropical Storms Lawin and Ompong in 2016 and 2018 respectively. White fleshed Tannia tubers were used and were planted in 25-30 cm deep holes and in contour rows 1 meter apart between hills in designated cropping combinations in the months of June to July and harvested in the months of December. Succeeding planting was done using the old stumps of Tannia. The harvested tubers were sold to market stall owners and/or to some producers of Taro chips in the locality.

Figure 10 :
Tannia with pineapple contour line

Figure 11 :
Tannia plants in single contour lines

Black Pepper. Initially, black pepper cuttings were secured from a local farmer and were rooted in different media using coco coir, sieved sand, garden soil and floral foam. The rooted black pepper cuttings were planted in different forest trees (tibig, ipil-ipil and agandung) in 2016.

However, only those planted in Tebbeg trees survived the lack of soil moisture during the summer of 2017 and 2018. As of 2025, the black peppers showed robust growth and produced big bunches of pepper corns.

Figure 12 :
Black pepper on Tebbeg trees

Planting of Fruit Trees

The fruit trees integrated as component of the CAFÉ project were Lanzones (*Lansium domesticum*); Mangosteen (*Darcinia mangostana*); Guyabano (*Anona muricata*), and Durian (*Durio zibethinus*). Some hills of Rambuan (*Nephelium lappaceum*) and Pomelo (*Citrus grandis*) were planted to add variety on the fruit trees, while *Psidium guajava, Syzygium lineatum* and *Antidesma bunius*, had grown on the area naturally. Furthermore, the industrial crops *Musa sapientum*, *Coffea spp.* and Theobroma cacao were planted as part of the research in the CAFÉ Project.

Figure 13: Fruit trees planted in the CAFÉ project: Durian, Lanzones, Mangosteen

Ways Forward

Since its inception in 2016, the project is still in place as a demonstration area for agroforestry in the development of technologies to integrate cash crops and fruit trees in a forest-based ecosystem. This also serves as mechanism to deliver quality instruction especially in laboratory, research and extension services as well as production.

There were also eleven (11) research outputs packaged from the data gathered in the project which were presented in Institutional, Regional, National and International fora.
From the outputs in the project, the farmer-cooperator sees an opportunity to engage in wine and vinegar production using banana, bignay, and pineapple and jam and other delicacies from Ube.

With the aid of Department of Trade and Industry who provided the necessary trainings, the products developed registered high acceptability and it opened a livelihood venture for the household.

ANAP Digest

The Official R&D Publication of Cordillera Consortium for Agriculture, Aquatic and Natural Resources Research and Development

The ANAP Digest is an annual publication of the Cordillera Consortium for Agriculture, Aquatic and Natural Resources Research and Development (CorCAARRD) intended to showcase promising R&D product and results produced by its Consortium Member Institutions (CMIs) in the region. This is an evolution and popular version of the Anap Journal which has published winning papers from its annual regional R&D Symposium from 2004-2015.