

Economic Assessment of Betel Nut (Areca catechu) as Component in the Agroforestry (AF) Systems in Ifugao

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Abstract: *This study attempted to determine the economic importance of Areca catechu as an agronomic component in agroforestry systems. It sought to find out if betel nut is compatible as an agronomic crop in agroforestry. Respondents include: practitioners/owners of agroforestry farms, middle men, chewers and old folks who were chosen via purposive sampling in five municipalities of Ifugao. Specifically, the study was conducted to: a) study the socio-demographic profile of respondents in the selected study sites; b) determine the economic importance of betel nut (Areca catechu) as an agronomic component in agroforestry farming system, and; c) find out if betel nut is compatible to be an agronomic crop in agroforestry. The study used descriptive statistics. The primary data were taken through personal interview using structured questionnaires, and the secondary data were taken from the different municipalities and barangays covered by the study. The Betel nut (Areca catechu) fruit commonly known as “moma” in Ifugao is an indigenous fruit in the province. Betel nut gained attention as a substitute for smoking. It also served for various social, economic, and environmental purposes. Findings show that betel nut was grown for social, domestic, economic, and for environmental purposes. Betel nut was observed as randomly planted in almost all agroforestry farms in the province. Harvest is in staggered basis commencing from June to September. Fruits are sold in fresh forms or in dry nut (preserved) and are sold to middlemen and retailers. The study revealed that integrating betel nut in an agroforestry farm contributed an average additional income of five to ten thousand (Php5,000.00 to Php 10,000.00) Philippine pesos for every farmer. The presence of multiple agronomic species or crops along with betel nuts in the agroforestry crops are raised primarily for social, economic, and for environmental purposes. The study disclosed that production of betel nut is associated with indigenous cultural practices of Ifugaos aside from its potential economic and environmental values.*

Keywords: Areca catechu, Agroforestry System, Palayamanan, Nabutag, Ifugao

1. Introduction

Betel nut (Areca catechu) fruit, commonly known as “moma” in Ifugao, is an indigenous product in the said province. Betel nut is also found in other areas of the globe. Over South East Asia and thru Pacific areas, betel nut is common. Today, betel nut is gaining attention not only for consumption of betel nut chewers but also as replacement for smoking cigarette. It could serve as an astringent to remove bad breath and pain for people having problems with tooth decay and tooth ache. Folks used it as a purgative treatment to eliminate worms among children and even animals when the juice is properly extracted and applied at a correct dosage. In social relationships, betel nut can serve as a bridge to achieve a goal namely, peace and harmony and even man and woman

trying to be engaged as long as the color of their saliva matches together.

Betel nut plants were observed in all the farms of the respondents. Farmer respondents grew or plant along the highway, in the dikes of their rice field, intercropped with other crops in their kaingin, along boundaries, fences and pig pens, and in their backyard. It was observed to be a compatible agroforestry crop as it grows along with trees, fruit trees, and agronomic crops. It is a potential agronomic crop and is good for environmental conservation. Areca plant also served as a fence to determine boundaries because it can thrive for 50 years and remained productive.

Betel nut in Ifugao is a product that is sought and bought not only within but even outside the province. It was observed

during the study that localities in Ifugao like Kiangnan, Asipulo, Hungduan, Mayoyao, and Hingyon bring their sacks of betel nut to the market. Middlemen and/or businessmen of betel nut like it very much as they rush to negotiate for a good practice.

At this point, it is an occasion to show that betel nut is an ever living plant of various uses like for cultural, medical, social, environmental conservation and most importantly for economic purposes.

The study aimed to: a) study the socio-demographic profile of respondents in the selected study sites; b) determine the economic importance of betel nut (*Areca catechu*) as an agronomic component in agroforestry farming system, and; c) find out if betel nut is compatible to be an agronomic crop in agroforestry.

2. Methodology

This study was designed to be studied in two phases. The first phase was economic assessment as a baseline study as it was done and discussed in this paper. The second phase is an experimental study.

To draw the required information for the first phase of the study, the following strategies for data gathering was applied: a) reconnaissance survey to all the study areas, particularly Kiangnan, Asipulo, Hungduan, Mayoyao, and Hingyon to determine where betel nut is integrated to the agroforestry farming systems of farmers (Plate 2); b) identification of respondents. Identification was done with the help of secondary data provided by the Local Government Units (LGU) of Ifugao and actual visitation in the study areas; c) request letter were forwarded addressed to the municipal mayor and Barangay Chairman who has the jurisdiction over the study area to seek permission for data gathering, and; d) after approval by the Municipal Mayor, this was followed by personal interview/survey with guided questionnaire to all identified respondents. Unstructured personal interview was employed that gave chance for the researcher to document in-detail the responses of the respondents. Respondents include practitioners or owners of agroforestry farm, compradors or buyers, chewers or users of betel nut, and old folks. Old folks were included in this study for it is believed that they are repositories of knowledge that can shed light to the

significance of betel nut in the cultural life among Ifugaos. Prudent approach was done during the field study so as not to inhibit the target interviewees in providing necessary information about betel nut. The questionnaire was floated as a tangible evidence to help in the progress of this study. Compradors of betel nuts were interviewed because they contributed on the information on the volume of betel nuts that were produced in the locality through their commercial transactions with betel nut producers. The average number of betel nuts used was given by the everyday chewers/users of betel nut.

For the experimental study, this will be established in one hectare land of the Ifugao State University (IFSU) at Potia Campus, Alfonso Lista, Ifugao with an approximate budgetary requirement of P 252,750 for one year, and establishment period for planting betel nut seedlings in one instead of two different areas. The planting of betel nut will be established in an agroforestry type to allow the introduction of multiple crops and to maximize the land use of the experimental or research area.

One year after establishment, growth variables specifically height and diameter growth, will be measured and recorded. Same procedure shall be done the following year up to the productive period (fruiting stage) to compare the growth/development of the plants. This allows the experiment to compare the growth performance and compatibility of betel nut when grown in an agroforestry system. Height will be measured using tape measure or meter stick, while wood caliper will be used in determining the diameter growth.

The assessment of the economic value will be done when the betel nut reaches its full development and commence to bear fruit or nuts. This study projected that the betel nut will bear fruit or nut on the eighth (8th) year after establishment.

2.1 Study Site

For phase one of the study, the research was conducted in the five (5) municipalities composed of 31 barangays of Ifugao (Figure 1) where betel nut is grown and/or commonly found. Specifically, this study was conducted in the municipalities of Kiangnan, Asipulo, Hingyon, Hungduan, and Mayoyao.



Figure 1: Map of Ifugao showing the 11 municipalities

Phase two will be conducted in the research area of the University (IFSU) at Potia Campus, Alfonso Lista Ifugao.

Descriptive statistics and randomized complete block design (RCBD) were utilized to analyze the experimental study. Statistical tools or programs were used with the assistance of the experts. Computer-aided IEC preparations were made and presentations were made at the best language possible.

The research would greatly benefit farmers, foresters, agroforesters, researchers and business men, students, and community to have knowledge in the economic importance and compatibility of *Areca cathecu* as an agroforestry component.

3. Results and Discussion

3.1 Socio-Demographic Profile

3.1.1 Address

Among the five (5) selected municipalities for this study, Figure 2 shows that 28% (87) of the respondents came from Asipulo. This is followed by a decreasing number of respondents from Kiangnan, Hungduan, Hingyon and Mayoyao with percentage distribution of 25% (78 respondents), 17% (54 respondents), 15% (48 respondents) and 15% (48 respondents), respectively. While it is true that respondents from Hingyon and Mayoyao have the least number of respondents, this does not mean that there were fewer betel nut

chewers from these places. This only means that they have fewer established agroforestry farms with integrated or planted betel nut.

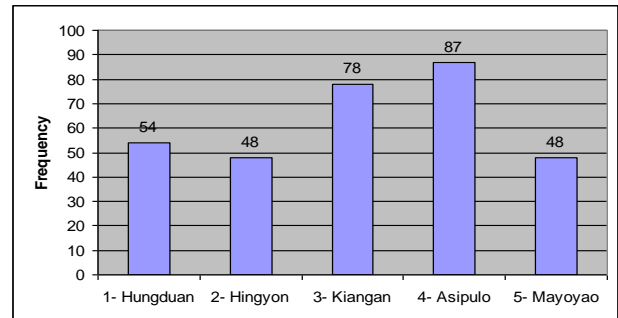


Figure 2: Municipal addresses of respondents

3.1.2 Age of Respondents in Years

Among the respondents of agroforestry practitioners with integrated betel nut, respondents aging 41-50 were the most active practitioners. They comprised the highest percentage, 30% (95 respondents) from the total respondents. This is followed in decreasing order by age bracket of 51-60, 61 and above and 31-40 with 21-30 years old as the least agroforestry practitioners with percentage distribution of 26% (83 respondents), 21% (65 respondents), 20% (60 respondents) and 3% (10 respondents), respectively (Figure 3).

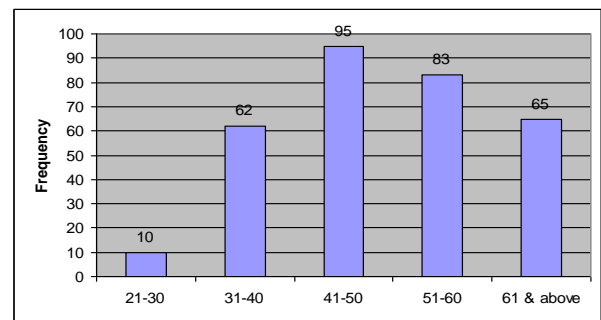


Figure 3: Age of Agroforestry Practitioners

3.1.3 Civil Status

In terms of marital status, 97% (304 respondents) of the agroforestry practitioners were married. Very few to none significant percentage distribution or 4% (11 respondents) for widowers and single (Figure 4).

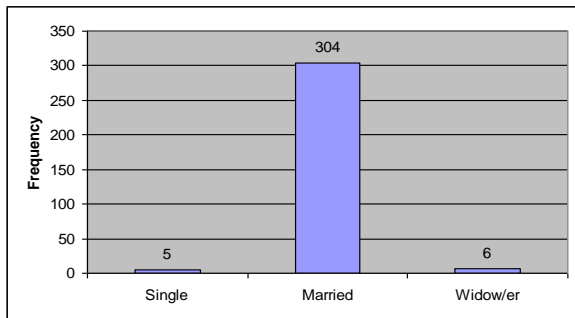


Figure 4: Civil Status of Agroforestry Practitioners

3.1.4 Gender

Agroforestry is a land management system combining food and agricultural crop and/or animal in the same unit of land either single or sequentially.^[1] Agroforestry is a farming system that combines the planting of agricultural and forestry crops. Agroforestry has always two or more outputs, i.e., for the purpose of conservation and socio-economic productivity.^[9] Plate 5 shows that the practice of agroforestry farming system in Ifugao was mostly adopted by male with 73% (230) adopters with lesser percentage of female adopters with 27% (85) distribution. This paper showed that male dominates over female in this type of agroforestry. This study conforms to the findings of Javier (2007)^[3] that men still assume the lead role to handle the heavier or more laborious task, while their wives are responsible for less strenuous work. In growing betel nut, women help in the maintenance, but the establishment of the farm is a male domain. While gender roles should guide any endeavor to develop agroforestry farm, it is evident that this study about economic assessment of betel nut as an agroforestry component in agroforestry farming system is positively male-dominated as shown in Figure 5.

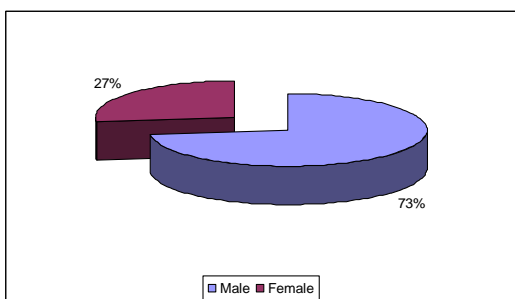


Figure 5: Gender of Agroforestry Practitioners

3.1.5 Educational Attainment

Agroforestry farming system is a long time practice by the Ifugaos since time immemorial. Citing for example, the Banaue Rice Terraces, Ifugao community had long practiced terracing as an example of agroforestry farming system. This is contributed by the topographic nature of the province where it is found in the mountainous region wherein agroforestry is most suited and scientifically suitable. Agroforestry has an environmental and economic capability – environmental in the sense that while producing crops and food, agroforestry at the same time preserves and conserves the soil, water and other important natural resources in-situ and ex-situ. This study as shown in Figure 6, states that majority, 35% or 122 of the respondents were grade school or in elementary level. This describes that the practice of agroforestry farming systems integrating betel nut as one potential crop does not require a higher level of training. This is followed by respondents with high school educational level with 26% distribution from among the total respondents.

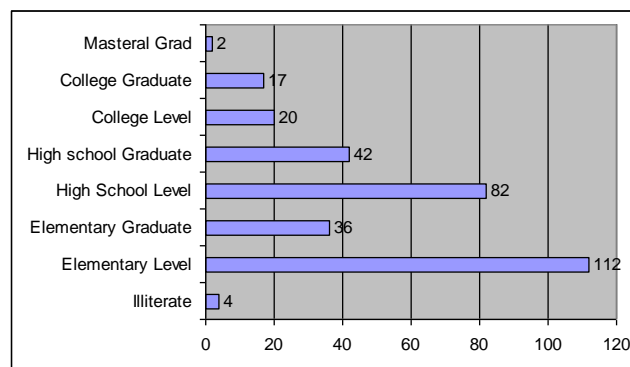


Figure 6: Educational Attainment of Agroforestry Practitioners

3.2 Place of Agro-forestry Farm

3.2.1 Asipulo

With equal periods of survey time, Asipulo have the most numbered agroforestry practitioners. Majority, 27% or 87 of the respondents were found in this area. This was followed by the municipalities of Kiangan, Hungduan, Hingyon and Mayoyao with percentage distribution 24% (77 respondents), 17% (54 respondents), 15% (48 respondents), and 15% (48 respondents), respectively (Figures 7, 8, 9, 10, and 11).

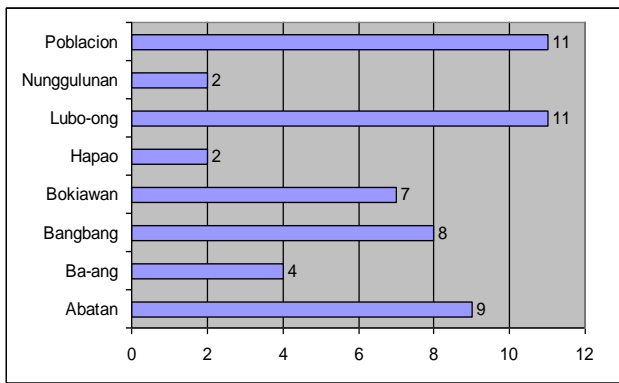


Figure 7: Place of Agroforestry Farm in Asipulo with 87 respondents

3.2.4 Hingyon

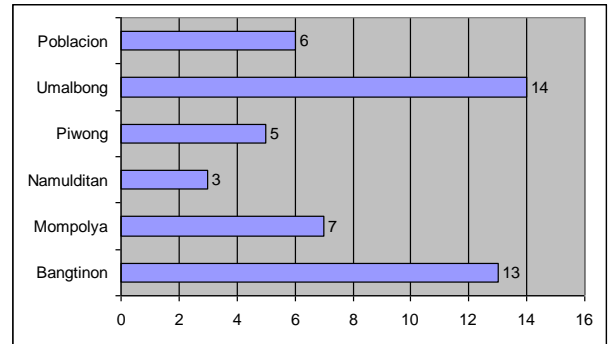


Figure 10: Place of Agroforestry Farm in Hingyon with 48 respondents

3.2.2 Kiangnan

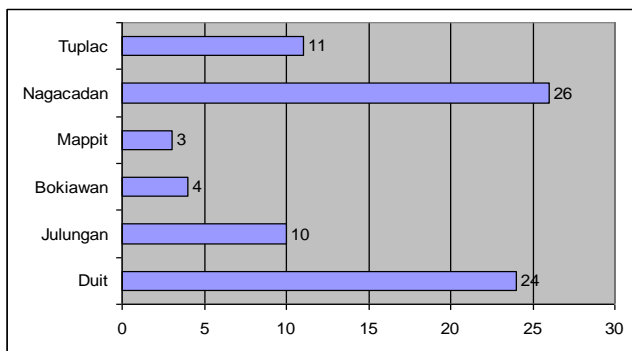


Figure 8: Place of Agroforestry Farm in Kiangnan with 77 respondents

3.2.5 Mayoyao

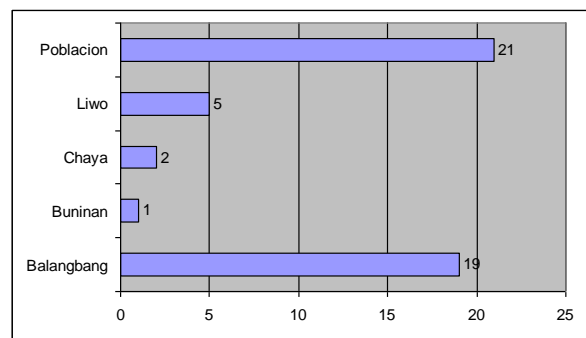


Figure 11: Place of Agroforestry Farm in Mayoyao with 48 respondents

3.2.3 Hungduan

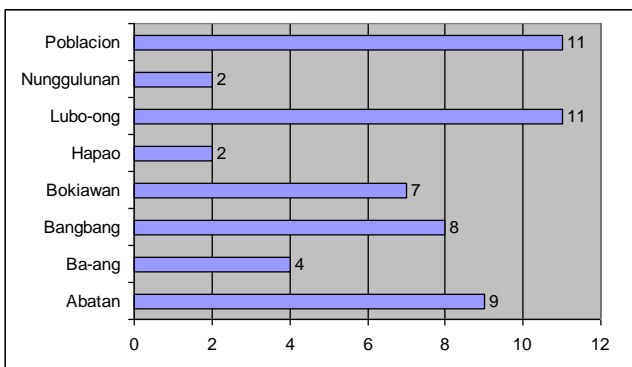


Figure 9: Place of Agroforestry farm in Hungduan with 54 respondents

3.3 Economics of Betel Nut

3.3.1 Farm Size

Majority of the farm size of the respondents has one half hectare (0.5 ha) to one hectare (0.5-1.0 ha) with percentage distribution of 42% (132) and 39% (122), respectively. Only 3% (9 respondents) agroforestry practitioners have an area of one hectare to one and a half hectares (1-1.5 ha). Very few have more than two (2) hectares agroforestry farm lots. The average farm size of this study as shown in Figure 12 is comparable to that of other previous scientific studies. Corales (2008) ^[2], on her study on the adoption of Palayamanan¹, found that average farm size is 2.97 hectares. ^[2] Likewise, Latap (1996) revealed to have 2.43 hectares as average farm size in adopting Certificate of Stewardship Contract. ^[4]

¹ Palayamanan is a land use concept where it has 4 components like: (i) palay or rice (ii) animal, (iii) vegetable, (iv) fish that are integrated or found on the same unit of land for the purpose of maximizing the utilization and production of the land.

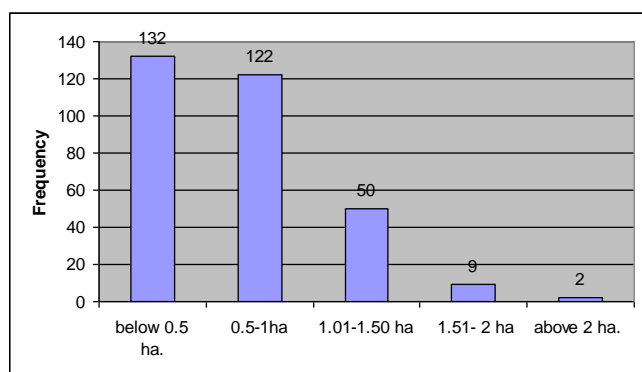


Plate No. 12: Farm size of Agroforestry Farm (in Hectare),
 Average= 0.57ha

3.3.2 Fruit-bearing betel nut exists in the agroforestry farm

Betel nut is an agronomic crop found in the agroforestry farm. Farmers normally integrated betel nut in their farms along their boundaries as land mark of ownerships from adjacent lot. They integrate with coffee plants of different species like *arabica*, *excella*, and *robusta*. In this study, betel nut, integrated with different coffee varieties, existed and are grown with compatibility. Agroforestry farming systems were observed in the province. The simultaneous growing of coffee under pine forest existed in the upper portion of Ifugao, Benguet, and Mountain Provinces as reported in the study of Latap et al. (2008).^[5] Betel nut with coffee and forest crops was observed in several study sites in the province especially in Asipulo and Kiangan. Betel nut is found along dikes of individual agroforestry farms. Today (2015), betel nut is commonly observed as randomly found or planted in almost all agroforestry farms in the province. It even existed or planted nearby houses, along pig pens, poultry house and/or in the home backyard for economics, consumption and as ornamental plant, sources of chewing nuts, and sold as sources of additional income. Betel nut plant cannot duplicate the forest in terms of its ability to protect the environment, but the introduction of other agroforestry crops would greatly enhance the productive ability and therefore, productivity of upland farms. Plate 13 shows that 37% (115) of the agroforestry farmers have more than 51 and above betel nuts found/planted in their farms. Though majority 63% (160) of the agroforestry farms has less than 50 planted betel nuts. Betel nuts were found to be important socially and economically. This popularly made betel nut planted and now found in almost all agroforestry farms. Depending on the objective/s of

the farmer whether it be a source of chewing nut, betel nut is planted in small number in the farm or in the backyard garden. If for commercial purposes, it is planted in the farm with more number.

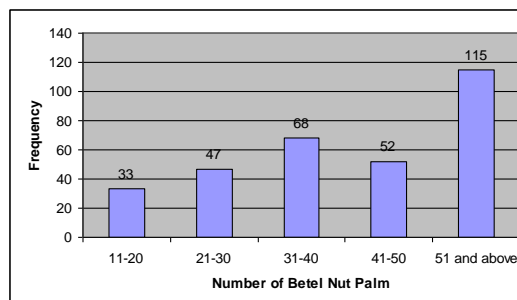


Plate 13: Number of fruit bearing betel nut in the agroforestry farm, Average= 41

3.3.3 Age of fruit bearing betel nut

Majority, 87% (697) of the betel nuts were fruit bearing. This has been observed in all the study areas. The study revealed that, 65% (205) were above 41 years old. This revealed that the source of matured nuts of betel nuts used or chewed in the province were the fruits of old age betel nuts. These findings of the present study, as shown in Table 1, confirmed to the actual observation during the study that nuts were becoming smaller in size and in weight. It was further shown in Table 2 that majority, 82% (259) of the agroforestry farmers, harvested twice instead of three or more times a year. Likewise, 88% (276) or majority of the betel nut plant can only produce one can (19 liters capacity) or lesser (Table 3) of matured nuts per harvest season per plant as compared to more than one can supposedly harvest when the size of nuts is bigger.

Table 1: Age of fruit bearing betel nut in the agroforestry farm

Age (Year)	Frequency	Percentage (N=315)
10 & below	102	32.38
11-20	141	44.76
21-30	169	53.65
31-40	182	57.78
41 & above	205	65.08

Average= 28 years

Table 2: Frequency of harvest of betel nut fruits in the Agroforestry Farm/year

Frequency of Harvest in a Year	Frequency	Percentage (N=315)
Once	42	13.33
Twice	259	82.22
Thrice	105	33.33
4 Times & above	14	4.44

Table 3: Average number of fresh fruits harvested per betel nut plant

Average harvest of 1 betel nut (can)	Frequency	Percentage (N=315)
0-0.5 can	26	8.25
0.5-1 can	276	87.62
1.5- 2 cans	8	2.54
2- 2.5 cans	2	0.63
2.5-3cans	3	0.95

Average = 0.73can

3.3.4 Marketing of Betel Nut

Table 4 transforms the number of betel nuts into pieces. This reveals that marketing of betel can be by piece and/or packed into small bags containing 10 pieces or a dozen per pack. Marketing such like this is observed in the retail stores as it is often liked by betel nut chewers as they could easily handle while joining in a social group or when in travel. Table 5 shows that majority, 81% (256) of the respondents sold their nuts in dried form (preserved) which they call as “nabutag” in Ifugao. This was observed in the market places where wholesalers and retailers mode of selling nuts. Once the product (betel nut) reached the public market for marketing nuts in a sack which are bought/sold in a can (19 liter-capacity), retailers repack the bulks into smaller bags with 10 to 12 pieces nuts per bag. These numbers of pieces are packed in small package to make it readily available and affordable to betel nut chewers. Only few, 4% (12) of the betel nut growers, sell in fresh form. This study showed that majority, 91% (288) of the betel nut owners/growers sell their nuts to wholesalers or *compradors* and lesser 7% (23) to retailers (Table 6). Betel nut growers sell their nuts in the farm or bring them to the market depending on the price at the time of selling. This showed, for economic reasons, that plenty betel nut are sold either fresh or in preserved form depending on the current price. The practice of selling nuts in a preserved form would

mean that Ifugaos as practitioners were economically stable because they could postpone selling their nuts in a preserved form.

Table 4: Average Number of Fresh Fruits harvested per betel nut plant

Number of betel nut (Pieces)	Frequency	Percentage (N=315)
100-200 pieces	2	0.63
201-300 pieces	15	4.76
301-400 pieces	61	19.37
401 and above	287	91.11

Average= 423 pieces

Table 5: Forms of selling betel nut fruits

Forms of selling nuts	Frequency	Percentage (N=315)
1- preserved (nabutag) ²	256	81.27
2- fresh (nadulo)	12	3.81
3- both	47	14.92

Table 6: Buyers of betel nut

Buyers	Frequency	Percentage (N=315)
Comprador/whole seller	288	91.43
Retailer	23	7.30
both	4	1.27

3.3.5 Number of People who harvested

Plate 14 shows that harvesting of matured betel nut starts on the month of February. More people (20) were involved in harvesting, as more betel nut ripens on the succeeding months of March to July. Harvesting continued till the month of October. The graph shows a year round or continuous harvest because the ripening characteristics are per bunch. The graph further shows that July is the peak season of harvest. Thus, great number of people becomes involved in harvesting as matured fruits increases. As the last bunches ripens, flowering of betel nut plants starts again.

²Preservation of betel nuts in this study does not mean, treating the nut with chemical. The method is a traditional preservation. The betel nut (plane without sack or wrappings) is dug deep into the soil for around a meter in depth. The nut remained even up to a year. Nabutag is an Ifugao (tuwali) term.

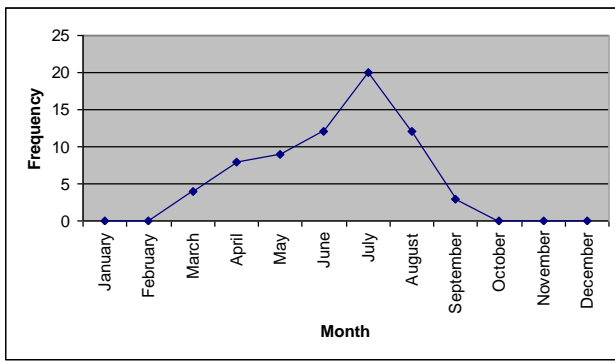


Plate 14: Number of people involved in harvesting

3.3.6 Average Price per Month

The prices of fresh betel fruits have significant difference to that of the preserved betel fruit. Preserved betel fruit commands a higher price than in fresh form (Plate 15). Betel nut begins to ripen at start the month of February when the price is high. This is also the initial month where there is very few harvest, thus low in supply. Following this month or after March of the year, greater supply is observed, thus prices tends to decrease. This is observed until the end of May. After these periods, the second bunch of betel fruits begins to ripen. The prices gradually increases a little bit on the months of June and July then it drops as more bunches ripens on the month of August and a slight increase on the month of September. The price drops after September due to unavailability of freshly ripened betel fruits. It was observed that the practice of storing nuts after harvest among betel growers made prices of betel nuts low. The stored nuts were brought out and use for their own consumption.

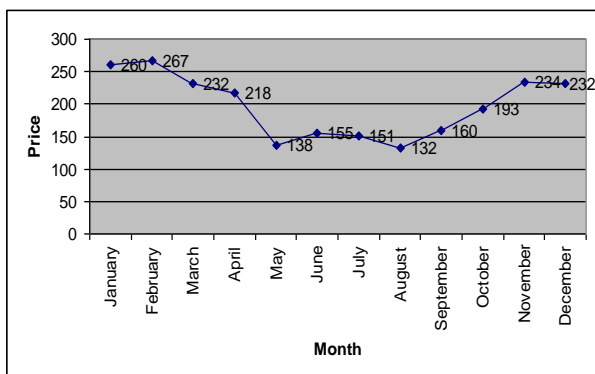


Plate 15: Average price per month

3.3.7 Harvest and Income Derived from Betel Nut

Table 7 shows that majority of the respondents revealed that agroforestry farmers with betel nuts harvested 5 to 26 cans of

fresh nuts. If this harvest is translated into a sack with 4 cans capacity, a farmer can produce ranging from 1.24 to 6.5 cans or an average of four (4) cans. Majority, 29% (92) of the respondents produced this amount every year which is equivalent to an average of 6.5 cans per year. These were especially those farmers whose farm size is more than two (2) hectares. Table 7 further illustrates the volume of harvest per farmer. Farmers' success in terms of volume of production were contributed by three factors such as: a) area or farm size as in Plate 12; b) number of betel nut plants as in Plate 13; and c) age of fruit bearing betel nut as illustrated in Table 1. The situation revealed that these three factors contributed on how much a farmer can sell or harvest per year from their crops (betel nut) as shown in Table 8 and income derived from sales as shown in Table 10. This also means that there is higher income derived from betel nut when farmers harvest more nuts from their productive betel nuts plants planted in their wider farm size. Tables 5 illustrated that more people preferred selling preserved betel nut than fresh nuts. Majority, 81% (256) sold their betel nut in preserved form. The study showed that this is contributed by storing betel nuts out of their harvest. Preserved nuts by some betel growers used for their own consumption. Table 10 shows that majority, 57% (178) of the farmers derived an income ranging from Php 5,000 to Php 10,000. A good number of them, 22% (69) of the respondents experienced to have Php10,000 to Php15,000, while some, 8% (25) of them earned an income of above Php 15,000. This study revealed that integrating betel nut in an agroforestry farm contributed an average additional income of Php 5,000 to P 10,000 for every farmer. Palma & Nagtalon (2007)^[9] similarly shown that income derived from agroforestry farms had increased by as much as Php5, 576.66/year. Farmers reveal that there is an income derived from betel nut. Farmer engaged in intercropping betel normally sells 10 cans and above as shown in Table 8 of this study. This is also further shown in Table 7, where majority of the betel nut farmer sold more than 10 cans of fresh nuts for year 2008. The study does not, however, reflect if this harvest is the same from the previous years.

Table 7: Average harvest of fresh nuts harvested for year 2008 (in can)

Harvested Nuts (can)	Frequency	Percentage (N=315)
5-10	44	13.97
11-15	62	19.68
16-20	54	17.14
21-25	30	9.52
26&above	92	29.21

One can (1) is equivalent to 19 litters of nuts

Table 8: Average fresh fruits of betel nut sold in 2008 (in can)

Sold nuts (cans)	Frequency	Percentage (N=315)
10	31	9.84
11-20	18	5.71
21-30	2	0.63
31-40	15	4.76

Table 9: Number of cans preserved during the year

Preserved nuts (cans)	Frequency	Percentage (N=315)
10 and below	71	22.54
11-20	79	25.08
21-30	26	8.25
31-40	25	7.94
41& above	29	9.21

Table 10: Income derived from betel nut/year

Income derived (pesos)	Frequency	Percentage (N=315)
5,000 and below	47	14.92
5,000- 10,000	178	56.51
10,000- 15,000	22	6.98
15,001 and above	25	7.94

3.3.8 Expenditures of Raising Betel Nut

A great percentage, 93% (Table 11) of the respondents revealed to have no expenditures in tending betel nut plants until fruiting stage. As a common silvicultural practice, betel nut fruit which falls from the ground germinates and are just transplanted or left to grow and mature and bear fruits. Likewise, raising betel nut is not labor intensive as there are not much pests or diseases that affect the plants.

Table 11: Estimated expenditures in raising betel nut from seedling stage until fruit bearing

Estimated Expenditure (Pesos)	Frequency	Percent
No expenditure	294	93.33
Below 500	11	3.49
500 – 1,000	3	0.95
1,001 – 2,000	2	0.63
2,001 and above	5	1.59

3.3.9 Cost of hiring laborers in planting and gathering betel nut per year

Comparing Tables 12 and 13, the tables reveal that most of the betel nut growers do not hire laborers to plant and grow the nuts to maturity. Thereby, they do not spend much in hiring workers. Only a nil percentage of expenditures, 6% of the total cost, are incurred for paying laborers for gathering fruits from the old age towering betel nut plants. Tables 12 and 13 revealed that growing betel nut is not labor intensive but economically contribute to farmers as it does not require the full attention of the betel nut growers. Labor incurred in raising the betel nut plant from seedling to production is dominantly (94%) contributed by family labor.

Table 12: Frequency of hiring labor in planting and gathering betel nut

Labor	Frequency	Percent
Not hiring	296	93.97
Hire labor	19	6.03

Table 13: Average cost spend for hiring laborers in planting and gathering betel nut per year

Average cost of hiring labor (Pesos)	Frequency	Percent
Family labor	296	93.96825
500 and below	8	2.539683
501 – 1,000	5	1.587302
1,001 – 1,500	3	0.952381
1,501 and above	3	0.952381

3.3.10 Cost of transporting betel nut

Table 14 shows that 47% or 148 of the respondents out of 315 do not hire vehicles in transporting betel nut fruit. Respondents claimed that some compradors or middle men go to the

farmers' place to buy betel nut fruits. Farmer-seller spends less on their marketing transportation because they send their products (nuts) to other farmer-sellers or through the jeepney drivers. This is sold along with other crops sold in the market or on the trading post outside the province. On the other hand 53% or 167 respondents hire a vehicle or pay fares for their betel nut fruit. They hire when in big volumes or pay fares along with the passengers jeepney when in small quantity.

As compared to Table 14, Table 15 shows that 48% of the respondents do not hire for the following reasons: a) the farm to market place is hiking distance; b) small farm sales, and; c) some owned a car while 53% did not have any reason. As discussed in the earlier part of this study, farmer-respondents claimed that *compradors* or middlemen go to their place to buy betel fruits.

Table 14: Hire transport to deliver harvested betel nut

Transportation	Frequency	Percent
Not hiring	148	46.98
Hiring	151	47.94
Either not hire or hire	16	5.08

Table 15: Reasons of not hiring transport to deliver harvested betel nut

Reasons of not hiring transport	Frequency	Percent
No reasons stated	167	53.02
Hiking distance	92	29.21
Farm sale	61	19.37
Own car	2	0.63

3.3.11 Cost of transporting betel nuts

The cost of transporting betel nut per sack varies as shown in Table 16. The costs vary based on the distance from farmer's house to the market place where the nuts are sold. The payment ranges from Php 10 to Php 51 pesos per sack, Php10 to Php20 when sold within the town and Php31 to Php 40 per sack when sold at the neighboring towns, Php 40 to Php 51 when they market their products outside the province like Bambang, Nueva Vizcaya.

Table 16: Cost transporting/ marketing betel nut fruits/sack

Cost of transportation / marketing (Pesos)	Frequency	Percent
No transport cost	148	46.98
10 -20	95	30.16
21 -30	54	17.14
31 - 40	13	4.13
41 - 50	6	1.90
51 and above	19	6.03

Table 17 illustrated that majority, 62% (196) of the respondents disposed their nuts within the locality.

Table 17: Place where farmers sell their betel nuts

Place of selling nuts	Frequency	Percent
Within the locality	196	62.22
Within the province	99	31.43
Outside the province	28	8.89

This study revealed as shown in Table 18 that betel nut farmers were harvesting from aging betel nut plants. The table revealed that 96 % or almost all the sources of nuts where more than 50 years old. This also confirmed as shown in Table 1 that the present average age of their betel nut plants as of 2008 is 41 years old. This reminds the betel nut growers to replant in order to sustain their nut production.

Table 18: Life span of betel nut plant

Life span of betel nut (years)	Frequency	Percent
20 – 30	7	2.22
31 – 40	2	0.63
41 – 50	2	0.63
51 years and above	304	96.51

3.3.12 Compatibility of betel nut as an agroforestry component

Agroforestry offers diverse land management options for producing income at the same time protecting natural resources with proper planning; a multiple products can be produced at different time intervals. This can effectively use space and efficiently recycle nutrients. In this study, there are various crops that were integrated aside from betel nut. The frequency of other crop is 97% which is very high as shown in Table 19. The observed crops as arranged from the higher to lower order were: a) 93% for tree crop; b) 91% for fruit crops,

and; c) 70% for agronomic crops (Table 20). The presence of tree crops were likewise arranged in priority order: d) Table 21 for the listings of tree crops like: Acacia, g-melina, mahogany, adawe, dalakan, bakuwog, bakan, banallu, narra, molave, anabiong, anablon, aliguyon, alnus, bahug, palayon, tuai, bangtinon, dapdap, kuldadannum, tabangawon, kalantas, ipil, alim, yakal, balite, gutmo and laun; e) Table 22 for the listings of fruit crops mixed with betel nuts like: avocado, santol, rattan, mango, oranges, lansones, guava, star apple, nangka, rambutan, chesa, coconut and other wild fruit trees like bignai, and; f) Table 23 for the listings of various agronomic crops that were likewise planted and are frequently observed as follows; rice, taro (galyang and gabi or bila in Ifugao), beans (Baguio beans), squash, pepper, cabbage, tomato, sayote, sweet potatoes (camote) eggplant, cassava, onions, patchay, ginger and lima beans.

The presence of multiple agronomic species and crops along with betel nuts in the agroforestry crops are raised primarily for economics and environmental purpose. Respondent-farmers in the study sites practiced terracing as a form of conservation. This practice has been practiced since time immemorial. It existed more than 2000 years ago.^[10] Terraces were man-made and were established by their fore parents which were maintained by the present farmers (children). The beauty of the landscape remained until the present time. Accordingly, Ifugao people are environmental conscious. It is their belief that the presence of multiple crops like trees, fruit trees, and agronomic crops is a way to sustain productivity of their farm. Trees for example, protect soil erosion that would preserve soil productivity. Fruit and agronomic crops served as cash crops which are readily convertible into cash. These crops like trees, fruits, and agronomic crops contributed an additional income to farmer's respondents.

Further, acacia (*Samanea saman*) as observed played an important source of raw material for wood carving. Wood carving is one of the livelihoods of the Ifugao people, [6, 7]. The introduction of fast growing tree species by the respondents of this study like gmelina, alnus and mahogany served as source of lumber for home construction and for sale. This again contributed an additional income to farmer respondents of this study. Aside, naturally growing indigenous hardwood tree crops were an important source of lumber for home construction, furniture and woodcarving. Examples of these species were: dalakan, bakan, molave, narra, and lauan. Today, as

observed in this study, almost all the tree species in every agroforestry farm of the farmer respondents were protected. Hence, they have species like: anabiong, dapdap, aliguyon, and alim. These species were previously cut to waste but farmers discovered the usefulness of the timber as for lumber.

The presence of edible fruit bearing trees and agronomic crops as mentioned in Tables 22 and 23 were of great help in terms of socio-economics. The Department of Agriculture in Ifugao (DA- Ifugao) was of great help in the introduction of high yielding varieties. This encouraged farmer respondents to integrate a number of fruit trees and high yielding agronomic crops along with betel nuts. Agronomic crops like rice and corn existed in almost all the respondents' farms in Ifugao. This conforms to one of the studies of PCARRD (2006) that rice is a dominant agroforestry crops.^[10] This is likewise the Philippine condition that rice is a staple food among the Filipinos. Corn is an additional source of food, but it is the main source of feeds for animals. The productive condition of rice as was observed in this study also implied an environmental change. This means that the temperature in Ifugao is getting warmer. Palay (*Oryza sativa*) grows well in warm condition. Likewise, the presence of high valued agronomic crops like beans, pepper, cabbage, tomato, and onions were introduced by DA-Ifugao. Beans were long time popularly grown in Ifugao as early as 1970's. This was introduced by a private Association for Cultural Minorities (PANAMIN) which was first introduced in Kiangan, Ifugao in the early 80's. It grows productively and economically appreciated by the farmers till the present time. Farmer-respondents raised other high valued agronomic crops because they have seen an economic return. Farmers from the neighboring provinces like Benguet and Mt. Province shared the technology of growing these crops. This again served as an additional source of income to farmers respondents. Root crops, mostly sweet potato (*Ipomea batata*), existed in almost all the respondents farm because this was the original crops raised by farmers as source of food. Respondents of this study gave value to all these tree crops, fruit trees, and agronomic crops.

Table 19: Presence of other crops aside from betel nut in your agroforestry farm

Presence of other crops	Frequency	Percent
No other crops found	10	3.17
Presence of other crops	305	96.83

Table 20: Listings of crops integrated in the agroforestry farm

Classification of integrated crops	Frequency	Percent
Tree crops	294	93.33
Fruit crops	287	91.11
Agronomic crops	222	70.48

Table 21: Listing of tree crops intercropped with betel nut plants in the agroforestry farm

Com Name	Scientific Name	F	%	Rank
Acacia	<i>Samanea saman</i>	18	5.71	14.5
Gmelina	<i>Gmelina armoria</i>	147	46.67	1
Mahogany	<i>S. microphylla</i>	99	31.43	3
Coffee	<i>Coffea excelsa</i>	125	39.68	2
Adawe (Ifug) ³	<i>Vernonia arborea</i>	18	5.71	14.5
Dalakan (Ifug)	<i>Ardisia sp.</i>	24	7.62	12
Bakauan-gubat	<i>Carallia brachiata</i>	33	10.48	5.5
Bakan (Ifug)	<i>Litsea philippinensis</i>	17	5.40	16
Banallu (Ifug)	<i>Thespesia populnea</i>	0	0.00	34.5
Narra	<i>Pterocarpus indicus</i>	51	16.19	4
Yakal	<i>Shorea astylosa</i>	2	0.63	26.5
Analdung (Ifug)	<i>Parasponia rugosa</i>	4	1.27	22
Anabiong	<i>Trema orientalis</i>	2	0.63	26.5
Alim	<i>M. multiglandulosus</i>	1	0.32	30.5
Alnus	<i>Alnus japonica</i>	29	9.21	7.5
Bahug (Ifug)	<i>Hibiscus tiliaceus</i>	1	0.32	30.5
Palayon (Ifug)	<i>L. jordanae</i>	9	2.86	17.5
Tuai	<i>B. javanica</i>	33	10.48	5.5
Bangtinon	<i>Toona calantas</i>	6	1.90	48
Bagaybayen	<i>Radermachera sp.</i>	0	0.00	34.5
Dapdap	<i>Erythrina orientalis</i>	5	1.59	21
Kuldadannum	(for identification)	9	2.86	17.5
Tabangawon (Ifug)	<i>Weinmannia hutchinsonii</i>	27	8.57	9.5
Bamboo	<i>Bambusa vulgaris</i>	27	8.57	9.5
Ipil	<i>Instia bijuga</i>	26	8.25	11

Tibig	<i>Ficus nota</i>	6	1.90	19.5
Banutan (Ifug)	<i>Hopea plagata</i>	6	1.90	19.5
Balite	<i>Ficus balete</i>	3	0.95	24
Gutmu (Ifug)	<i>V. whitfordii</i>	1	0.32	30.5
Ha-o	(for identification)	1	0.32	30.5
Bang-I (Ifug)	<i>Caryota cumingii</i>	1	0.32	30.5
White lauan	<i>Shorea contorta</i>	1	0.32	30.5

Table 22: Listing of fruit crops planted in the agroforestry farm

Common name	Scientific Name	F	%	Rank
Avocado	<i>Persea americana</i>	22	6.98	6
Santol	<i>S. koetjape</i>	20	6.35	7
Rattan	<i>Calamus</i>	154	48.89	2
Pineapple	<i>Ananas comosus</i>	13	4.13	12.5
Mango	<i>Mangifera indica</i>	48	15.24	3
Oranges	<i>Citrus sinensis</i>	206	65.40	1
Lansones	<i>L. domesticum</i>	15	4.76	11
Guava	<i>Psidium guajava</i>	19	6.03	8
Star apple	<i>C. cainito</i>	17	5.40	9
Nangka	<i>A. heterophyllus</i>	16	5.08	10
Rambutan	<i>N. appaceum</i>	0	0.00	23
Banana	<i>Musa sapientum</i>	46	14.60	4
Tiesa	<i>P. campechiana</i>	4	1.27	16.5
Kalawag	<i>C. domestica</i>	2	0.63	19.5
Coconut	<i>Cocos nucifera</i>	13	4.13	12.5
Papaya	<i>Carica papaya</i>	4	1.27	16.5
Sugarcane	<i>S. officinarum</i>	12	3.81	14
Bignay	<i>Antidesma bunius</i>	3	0.95	18
Corn	<i>Zea mays</i>	2	0.63	19.5
Bili (Ifug)	<i>Ficus odorata</i>	5	1.59	15
Pomelo	<i>Citrus grandis</i>	1	0.32	21.5
Cucumber	<i>Cucumis sativus</i>	1	0.32	21.5

³ Ifug as used in this study means Ifugao as used in Tables 21, 22 and 23

Table 23: Listing of agronomic crops planted in the agroforestry farm

Common name	Scientific Name	F	%	Rank
Palay	<i>Oryza sativa</i>	123	39.05	1
Taro	<i>Alocasia macrorrhiza</i>	44	13.97	3
Beans	<i>Phaseolus vulgaris</i>	39	12.38	5
Squash	<i>Cucurbita maxima</i>	16	5.08	8
Pepper	<i>Capsicum frutescens</i>	4	1.27	14
Cabbage	<i>Brassica oleracea</i>	3	0.95	15.5
Tomato	<i>L. esculentum</i>	9	2.86	12
Sayote	<i>Sechium edule</i>	35	11.11	6
Camote	<i>Ipomoea batatas</i>	40	12.70	4
Lima beans	<i>Phaseolus lunatus</i>	6	1.90	13
Aba	<i>Colocasia esculenta</i>	11	3.49	10
Ginger	<i>Zingiber officinale</i>	21	6.67	7
Eggplant	<i>Solanum melongena</i>	13	4.13	9
Cassava	<i>Manihot esculenta</i>	2	0.63	17.5
Onion	<i>Allium cepa</i>	1	0.32	19
Hapid	<i>Piper betle</i>	10	3.17	11
Petchay	<i>Brassica chinensis</i>	2	0.63	17.5

3.3.13 Income generated from crops intercropped with betel nut income

The meaning of income in this study is the income derived from the sales of betel nuts by agroforestry practitioners integrating *Areca cathecu* in their agroforestry farms. The income was calculated from the values of sales of harvested nuts from the respondents of agroforestry farms. Income derived from sales of betel nut sold by respondents showed that majority (57%) of the respondents derived an income of P 5,000 to P 10,000 out of sales from their betel nut. This additional income derived exclusively from betel nut. Result is compared to previous agroforestry studies and it revealed to be within the range. The income derived from betel nut as revealed in this study is being added from the income derived from other crops like tree crops, fruit crops, and agronomic crops integrated with the betel nut as shown in Tables 24, 25 and 26.

The income derived from betel nut among the agroforestry practitioners was computed by way of simple economic analysis based from the answers of the farmer-respondents. The economic analysis used is cash flow that is equal to the total sales less the expenses incurred. However, this computation is not accurate since farmers do not show records of their inputs and sales. Results, however, give picture on the economic return of betel nut that may serve as guide to betel nut researchers.

Table 24: Income generated from tree crops intercropped with betel nut

Income derived from tree crops (pesos)	Frequency	Percent
5,000 and below	197	62.54
5,001 -10,000	102	32.38
10,001 -15,000	14	4.44
15,001 and above	2	0.63

Table 25: Income generated from fruit crops intercropped with betel nuts

Income derived from fruit crops (pesos)	Frequency	Percent
5,000 and below	148	46.99
5,001 -10,000	155	49.21
10,001 -15,000	10	3.17
15,001 and above	1	0.32

Table 26: Income generated from agronomic crops intercropped with betel nut

Income derived from agronomic crops (pesos)	Frequency	Percent
5,000 and below	204	64.72
5,001 -10,000	82	26.03
10,001 -15,000	21	6.67
15,001 and above	5	1.59

3.4 Comprador

3.4.1 Gender

Plate 16 reveals that majority, 78% (245) of the buyers (*compradors*) are female. This situation is a reverse case to that of the agroforestry practitioners as illustrated in Table 5 of this study where it shows that majority, 73% (230) are male. This situation was also observed by Javier (2007) ^[3],

where male assumes the lead role to handle the heavier or more laborious task while their wives are responsible for less strenuous work. It likewise shows that majority of the *compradors* are female for they possess the marketing techniques like sales talk. Male prefers to go in the field rather than engaging in marketing.

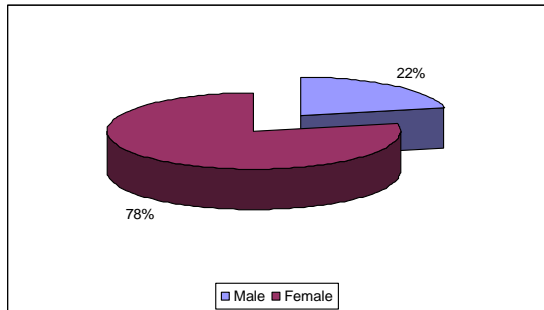


Plate No. 16: Gender of buyers of betel nut

3.4.2 Age

Buyers of betel nut belonged to the middle ages as it revealed in Plate 17. Majority, 48% of the *compradors* were aging 36 to 45 years old. These stages were of their potential stage. They could carry the weight of the nuts packed in a sack weighing almost 40 kilos and they could walk/hike traversing the mountain ranges reaching the farmers place where there are betel nuts. The ages of buyers as it revealed in this study were almost exactly the same to that of the farmer-respondents. Plate 4 shows that 95% of the farmer-respondents belonged to ages ranging from 41 to 50 years old.

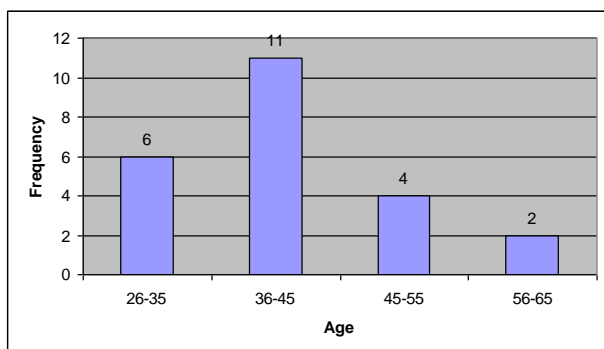


Plate No. 17: Age of buyers of betel nut, Average=40.81 years old

3.4.3 Civil Status

The study shows that *compradors* engaged in buying and selling of betel nut are all married. They travel in almost all

the barangays of the 5 municipal study sites as shown in Table 27 and Plate No. 18. The study, however, reveals that more, 50% of the *compradors* engage their transactions in Asipulo over the other four (4) study sites.

Table 27: Table showing the barangays were *compradors* buys betel nuts

Barangay	Frequency	Percent
Nunggulunan	1	4.35
Poblacion Hungduan	2	8.70
Pula	4	17.39
Amduntog	1	4.35
Antipolo	5	21.74
Haliap	1	4.35
Pannubtuban	1	4.35
Nagacadan	1	4.35
Duit	2	8.70
Tuplac	2	8.70
Poblacion Mayoyao	1	4.35
Namulditan	1	4.35

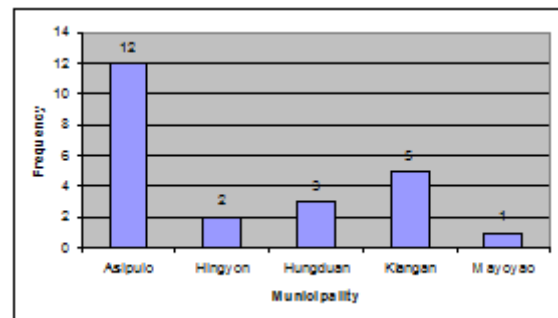


Plate No. 18: Distribution of *compradors* of betel nut

Table 28 reveals that *compradors* engaged in this form of business have already been *compradors* for more than five (5) years. This implies that *compradors* of this product (betel nut) know very much on the business cycle like: ripening or maturity of the nut, price, distance or accessibility of the places, and characteristics of the farmers.

Table 28: Number of years when *compradors* started to buy betel nut

Commencement of buying	Frequency	Percent
Less than a year ago	1	4.35
1 – 2 years ago	4	17.39
3 – 4 years ago	5	21.74
Engage for more than 5 years	13	56.52

The study reveals that majority, 47% of the farmers are engaged in the hands of the *compradors*, as revealed in Table 29. Farmer-respondents sold their nuts within their locality. This conformed to the result of the “no to less” transportation cost incurred by farmer-respondents because the *compradors* reached out to the farmers place.

Table 29: Places where comprador buys betel nuts

Vendor/seller of betel nuts	Frequency	Percent
Within the farmers locality	23	47.83
Within the province of Ifugao	11	34.78
Outside the province of Ifugao	4	17.39

It was observed that selling of betel nut is on per can basis when transacting between farmer-seller and the comprador. This is the traditional way of measuring unit of sales and found practiced since time immemorial.

3.4.4 Fresh Fruits

The study shows that betel nut is sold in an average price of Php 90 per can (Plate No. 19). This is a price at farm gate given to *compradors*. *Compradors* commence on the month of February to seek to buy betel nut going to the barangays. Business continues up to the month of October (Plate 20). The peak of the business transaction is in the months of May, June, and July. Averages of 12 compradors were engaged in this type of business. The selling of betel nut from among the *compradors* likewise commence on the month of February to October. The buying period is exactly the same to that of the selling business transactions (Plate No. 21). This implies that compradors immediately disposed what they have bought from the farmer-respondents realizing profits gained in buying and selling of this product. The irony is that, compradors disposed the product ranging from Php 120 to Php 200 per can. This again explains that a comprador gained an average Php 100 pesos marked-up per can (Plate No. 22).

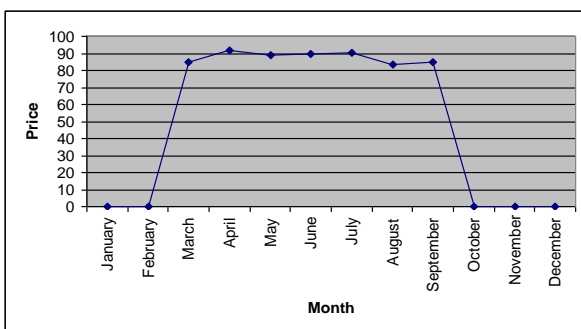


Plate 19: Average Price of Fresh Betel Nut

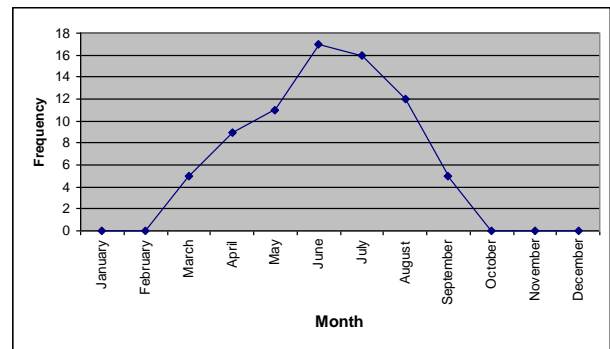


Plate No. 20: Number of comprador engaged in buying fresh betel nut

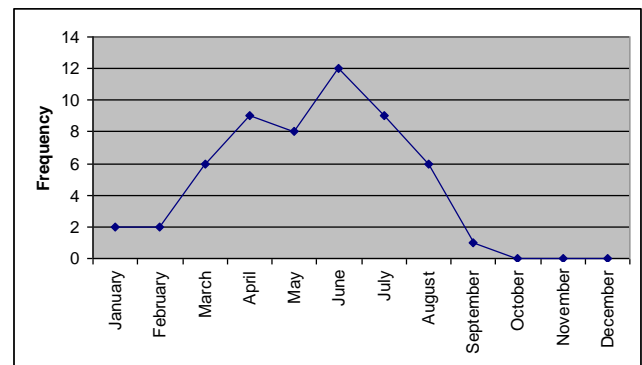


Plate No. 21: Number of comprador engaged in selling fresh betel nut

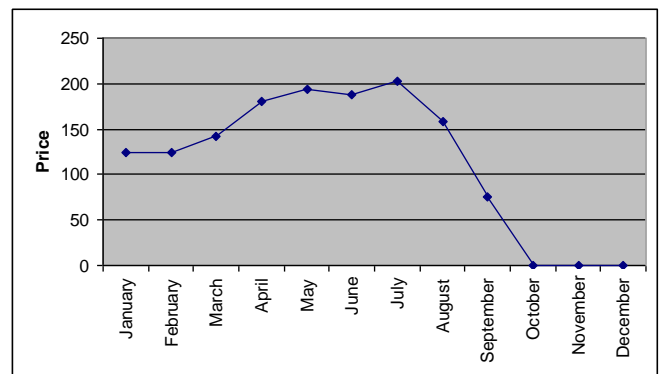


Plate No. 22: Average Price of selling fresh betel nut

3.5 Preserved Betel Nuts

As compared to compradors engaged in buying fresh nuts where in commence on the month of February and ends on the month of October, comprador engaged in buying preserved nut commence one month earlier. Buying of preserved nuts by compradors commence on the month of January and is observed year-round (Plate No. 23). This implies that farmer-respondents have long known the preservation technology of betel nut that makes preserved nuts available throughout the year. Besides, preserved nuts command a

higher price. It ranges from Php 140 to Php 280 per can (Plate 24). When computed, it can reach up to three times (3x) higher than when sold in fresh form. The practice of preserving betel nut and selling it during any period of the year makes cash (money) available to the farmer-respondent. This again economically helped farmer-respondents in their daily needs.

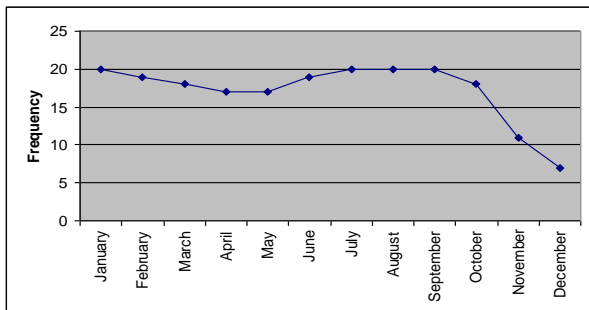


Plate No. 23: Number of comprador buying preserved betel nut

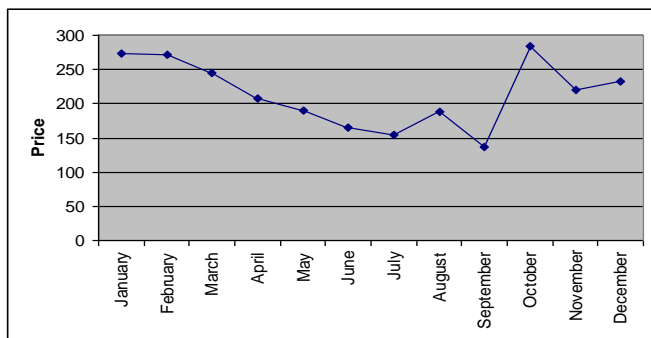


Plate No. 24: Average price in buying preserved betel nut

3.5.1 Selling of Preserved Nuts

Since there is an availability of preserved nut throughout the period of the year, *compradors* likewise are engaged in buying throughout. Plate No. 25 shows that more, 20 compradors were engaged during the months of January. This number is sustained but a little bit declined to 16 compradors during the month of May but again increased the following month and sustained till September of the year then declines to less than 10 compradors during the month of December.

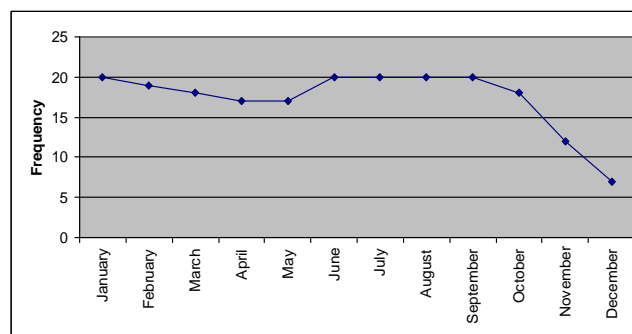


Plate No. 25: Number of comprador selling preserved betel nut

As illustrated on the prices of fresh fruits which sold in a higher price by compradors as compared to buying price, the situation is similar to the price given by compradors when they sell the preserved nut they bought. The price ranges from Php 200 to Php 350 per can (Plate No. 26). The price trend tends to go down during the harvesting periods on the months of April to October and has the lowest price during the month of August. This month is exactly the peak harvesting periods where there is higher supplies of fresh nuts available in the market.

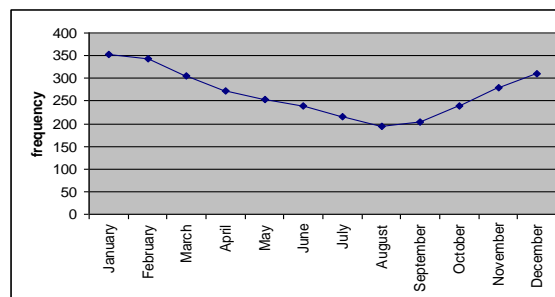


Plate No. 26: Average price in selling preserved betel nut

Previous graphs (Plate No. 23, 24, 24 and 26) of this study shows that *compradors* were active in their business venture throughout the year. Table 31 shows that a comprador could buy preserved nut from one can to more than thirteen (13) cans. It shows that majority, 65% of the *compradors*, can buy thirteen (13) cans of betel nut per week. Likewise, *compradors* can dispose the same volume, thirteen (13) cans per week as shown in Table 32. This transaction allowed the comprador to realize a net gain ranging from Php 3,000 to Php 9,000 in a year time (Table 33). *Compradors* mostly bear the transport cost as it revealed in Table 16 because compradors reach the farmers place to buy their betel nut. Table 34 shows that comprador spend an average of Php 35 sack in transporting what has been bought to be sold just the same within the

province (Table 35). To augment the *compradors'* income while engaging in buying and selling of betel nuts, they engage in other businesses like selling fruits and vegetables, dry goods and wood carving which in turn adds additional income of Php7,720 per year.

Table 31: Average number of cans bought per week

Nuts bought (can)	Frequency	Percent
1 – 4 cans	4	17.4
5 – 8 cans	2	8.7
9 – 12 cans	7	30.4
13 cans and above	15	65.2

Table 32: Average number of cans disposed per week

Nuts sold (can)	Frequency	Percent
1 – 4 cans	4	17.4
5 – 8 cans	3	13
9 – 12 cans	7	30.4
13 cans and above	18	78.3

Table 33: Net gain in buying and selling betel nut in a year

Gain (pesos)	Frequency	Percent
3,000 and below	2	8.7
3,001 – 6,000	2	8.7
6,001 – 9,000	1	4.35
9,001 and above	18	78.3

Table 34: Amount spent in transporting betel nut per sack

Cost of transportation (pesos)	Frequency	Percent
10 – 20	3	13.04
21 – 30	9	39.13
31 – 40	12	52.17
41 – 50	11	47.83
51 and above	11	47.83

Table 35: Place where betel nut are sold

Selling place of nuts	Frequency	Percent
Within the locality	2	8.70
Within the province	19	82.61
Outside the province	13	56.52

Table 36: Other business engaged by the comprador other than buying and selling betel nut

Other business engagement	Frequency	Percent
Sari sari store	3	13.04
Fruits & vegetables	13	56.52
Dry goods	16	69.57
Wood carving	3	13.04
Gardening	1	4.35
Labor	1	4.35

Table 37: Average net gain derived from other business aside from buying and selling betel nut

Gain derived from other business engagement	Frequency	Percent
1,000 – 3,000	2	8.70
3,001 – 5,000	1	4.35
5,001 - 6,000	1	4.35
6,000 and above	19	82.61

Average: PhP 7,720.00

4. Conclusion and Recommendation

4.1 Conclusions

Betel nut farmers were: a) distributed in all the Barangays of the five municipalities, and; b) majority of them came from Asipulo aging from 41 to 50 years old and mostly married male with elementary grade educational attainment.

Betel nut, commonly known as “moma” is an indigenous plant in Ifugao. It thrives and is well distributed in the province. It gained popularity because of its social and medicinal values, environmental uses, economic contributions, and political importance. It contributed an average amount of Php 5,000 to Php 10,000 among farmers while Php 3,000 to Php 9,000 is added among *compradors* in the locality.

The study proved that integrating betel nut in agroforestry farm is compatible as it existed with other crops like: a) tree crops, b) fruit crops and c) agronomic crops. The potentials of betel nut are shown in terms of socio-economic contribution and environmental conservation.

4.2 Recommendations

Since the abundance of betel nut is highly associated with socio-demographic profile of respondents and anchor on the cultural and economic activities of the selected study sites, it is recommended that expansion of betel nut intercrop in agroforestry be maintained.

Since the crop has high demand in the locality and in the neighboring provinces, then marketing chain should also be developed to encourage more farmers to venture in the same product.

Entrepreneurship and Marketing: While this betel nut is growing as seen to be a potential agroforestry product, farmer-respondents should be taught on the basic entrepreneurship for them to gain knowledge in marketing their unique product (betel nut). In this way, farmer-respondents could appreciate the income derived from their plant. This would as well encourage farmer-respondent to establish wider and plant more number of betel nut as source of additional income. LGU led by the DENR personnel should have to establish a special nursery for betel nut that people in the province may avail free or subsidized price to promote the planting of this crop. Fund allocation should be provided for package technology in the promotion of this crop like: a) planting, b) preservation, c) marketing, and d) genetic technology.

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