

BIBLIOGRAPHY

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ABSTRACT

This study was conducted to find out the evolution potato of the industry in Madaymen, Kibungan, Benguet. This includes the drivers of change and factors affecting production. A survey questionnaire was personally administered by the researcher to the respondents. This was conducted from December 2008 to February 2009.

The findings show that before the 1980's, farmers had been planting Native potato, Geneke, Morado, Greta, Conchita, Univita, Red Pontiac and Mexican. However, these varieties are not being planted by farmers nowadays. In the year 1981-20001, there were four varieties that were introduced in the area. These were the Granola, Montañosa, Igorota and Solibao. Since 2001 to the present, potato varieties such as Igorota and Granola are popularly being planted by the farmers in the area.

Having good quality products was the most reason of increasing consumer demand. The introduction of different potato variety was most causes of having competitive advantage and high productivity. On the other hand, decreasing consumer demand and decreasing productivity were the causes of the phase out of some varieties.

Before 1980's, the major problems faced by the farmers on production were rugged terrain, far source of production inputs and insufficient capital. On the other hand,

1981-2000, still the above mentioned was the major problems. In 2001-present, the, major problem faced by the farmers were insufficient capital, high acidity of soil, pest and diseases and lack of irrigation during summer season.



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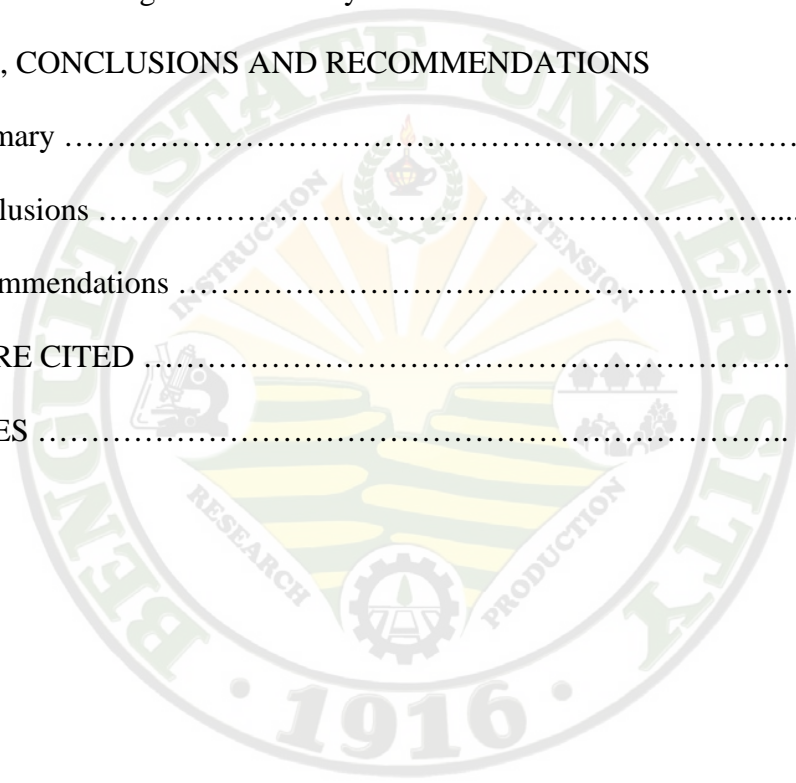
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INTRODUCTION

Background of the Study

Madaymen is the main vegetable crop producer of the Municipality of Kibungan which is located 72 kilometers away from Baguio City and takes two to three hours ride by bus taking the Halsema road from La Trinidad. It is bounded on the north by the Municipality of Bakun, on the south by Natubleng, Buguias, on the east by Sinipsip, Buguias and on the west by Poblacion, Kibungan.

According to Balusdan and Sangyoen (1999), this place was once known as Kada in the 1900's, meaning much forested area. Aside from the big trees and wild plants, soft grasses known as moss massively grew in the area. Moss abound the area because of the cold climate. This place has a very cold temperature due to its high elevation of more than 2,500 feet above sea level.

When early people settled in Napsong, sitio of Barangay Madaymen, it was believed that the present Madaymen was just a route where people used to pass by going to other places. The cold climate was not favorable for the early inhabitants to make kaingin or rice field. Thus, Madaymen only served as a way to the Municipality of Buguias and other places such as Tinoc in Ifugao and Bauko in Mountain Province. These were based on the stories about the movements and migrations of early settlers.

One day, a traveler passed by Kada but because of the very thick forest and clouds, the man got confused of the right way to follow. So frightened, he moved out his bowel under a big tree. As he tried to move out of the area several times, he always returned to where he moved out his bowel. So desperate because it was already dark, he decided to sleep in soft grasses which he called "Mandaydaymen".



The following day, other travelers found the man sleeping in the very soft moss. Then they helped and guided him to the right way getting out of the Kada. This experience of the man was told in Napsong and in other nearby places. Unconfirmed stories also revealed that several people passing in the Kada suffered the same experience as the man.

The first settlers came and put up their house in the place. They called this place not only Kada but Mandaydaymen. This name was very appropriate not only because of the stories about travelers who have seen the soft mosses, which were called Mandaydaymen in the native dialect, that massively grew in the area. Later, this place was called Madaymen.

Vegetable production began to flourish in Madaymen in the 1950's. People from the neighboring places were attracted to settle here. Some came from Napsong, Camiling and Palina in Kibungan. Others came from other places like Atok, Bakun and Mankayan in Benguet. Later, migrant families who profited from vegetable gardening bought lands from the original landowners.

It will be recalled that the Americans, who usually visit Baguio City as the summer capital of the Philippines, discovered that the Mountain Trail areas were favorable for temperate vegetables crops. Many Americans preferred to stay in Baguio during summer time. According to stories, this led the Americans together with some Filipino Chinese families to introduce vegetable production in the highland.

The discovery of the mountain trail areas as a suitable vegetable producer led the Americans to design and construct the Halsema highway, which then served as the main route of Baguio City to Northern Benguet and Mountain Province.



Madaymen often experience frost, locally called “Andap” which destroys vegetable farms. The temperature drop from December to February, the planting season of almost potato farmers in the barangay.

In this study, the evolution of potato industry will be done to find out the historical background of potato industry in Barangay Madaymen and the past and the present cultural practices of growing potatoes. Drivers of change and factors affecting the production of potato industry will also be considered in the study.

Statement of the Problem

1. How did the Potato Industry evolve in Madaymen, Kibungan, Benguet?
2. What are the drivers of change in the Potato Industry in the said place?
3. What are the factors affecting the Potato Industry in the said place?

Objectives of the Study

Specifically, the study aims:

1. To document the evolution of Potato Industry in Madaymen, Kibungan, Benguet.
2. To determine the drivers of change in the Potato Industry in the said place.
3. To determine the factors affecting the Potato Industry in the said place.



Importance of the Study

The result of the study would serve as a historical data of the potato industry in Barangay Madaymen.

The information from this study would serve as benchmark information to the Municipality of Kibungan, other researchers, government planners, and private agencies, who be interested to know the evolution of the potato industry in the said area.

Scope and Delimitation of the Study

The study was focused on the potato industry in a barangay level. Barangay Madaymen has 22 sitios, the study covered only these sitios that were considered as the major potato producing area, namely: Balangsayan, Tonguey, Masala, Nangayangan and Pakpakitan.

Time frames of the study were divided to three periods as follows; before 1980's, 1991-2000 and 2001-present. However, time periods before 1950's, 1951-1960, 1961-1970, 1971-1980, 1981-1990, 1991-2000 and 2001-present were specifically considered for the identification of the periods the different varieties were introduced into the study area.

Respondents were limited to farmers who were engaged in potato production for at least 25 years.



REVIEW OF LITERATURE

Evolution of Potato Industry

Potato originated from South America, in the Andes region of Peru and Bolivia, where the crop was cultivated long before the arrival of the Spaniards to the New World in the 16th century. It was introduced to Europe by the returning Spanish explorers and quickly spread throughout the continent. At first it was planted because of curiosity other than of cultivated crop. However, by the end of the century, potato became an important food crop throughout Europe (Swiader and Ware, 2002). Rasco (1997) added that potato cultivators were from the highland tropics (the Andes Mountains of South America).

As early as 1538, potatoes in Ecuador were referred to as “papas”. The word is said to be derived from the language spoken by the Incas and means “tubers”. It was later adopted by the Spaniards and today it is the word designating the potato through Latin America (Smith, 1977). Rasco (1997) reported that potato tubers were imported usually from Germany or Holland and multiplied over several generations in the high elevation areas of Benguet and Mountain Province

In Benguet province, seed piece may come from several sources: importers, farmers-cooperators of the Philippine-German Seed Potato Program, the Bureau of Plant Industry, and other farmers (Valmayor, 1982).

In the late 1950's, but more particularly in the 1960's and 1970's, there were regular imports of small quantities of variety. Red Pontiac have been made particularly from the USA. This cultivar is especially favored by growers in the lower, warmer and drier valleys particularly for the irrigated dry-season crop, December to March. Sporadic imports of a number of cultivars continued throughout the 1950's from various parts of



the world, but it was not until the early 1960's when two cultivars; conchita and greta were imported from Mexico, that any major change in cultivar use took place. Native potatoes were grown by planting tubers in the piles of ash resulting from burning grasses but they appear to have been used principally for domestic consumption. Farmers in the region recall growing considerable areas of "native" potato as recently as the late 1960's but it is no longer to be found. Another major cultivar grown in the wet season is cosima which accounts for approximately 17% of the crop (Albert, 1983).

In all provinces of Benguet covered, Granola is the most widely grown variety occupying 95% of the total land area planted to potatoes in the research sites. Growers and traders prefer this cultivar due to its availability, adaptability, good yield, high ratio of large tubers, resistance to pests and diseases, short maturity period, peel quality, and desirable shape (Foundation for Resource Linkages and Development, Inc., 1995).

Potato (*Solanum tuberosum*) belongs to the family *solanaceae* and grows well in the cool highland of tropical countries. History reveals that potato production started in Benguet sometime in 18th century. The temperature climate brought about by high elevation is 1200 to 2100 meters above sea level and rainfall of 2000mm explains the suitability of potatoes in the cordillera mountain ranges. At present, it produces 75% of the total potato production in the cordillera region. Potato is a prime agricultural product of six municipalities of Benguet namely Buguias, Atok, Bakun, Mankayan and Kibungan (Gayao and Sim, 1998).

Igorota and solibao potato varieties developed at BSU were products of a clonal evaluation process that involved the active cooperation of potato farmers and breeders. These are far better than the traditional cultivar called granola in terms. Igorota is the first



locally-bred highland potato variety in the Philippines. It has a maturity of 90 to 120 days. Solibao or BSU-P04, on the other hand, was developed tinkering with the genes of a planting material from India. It was introduced in the country through the International Potato Center. Like Igorota, it matures within 90 to 120 days and has an oblong-oval shape, brownish skin and cream-colored flesh (Consolacion et al., 1999).

Domestic Drivers

Domestically, consumer preferences continue to grow increasingly sophisticated as income rise due largely to the increasing number of dual income households. One of the most notable conclusions of proprietary consumer tests has been the realization the consumer prefer frozen potato products. Changes in consumer taste present opportunities for the development of new frozen potato products, e.g., flavored fries (Foundation for Resource Linkages and Development, Inc. 1997).

In the Philippines, the demand for potatoes continues to increase because of the growing population, rise in the number of fast food chains, hotels and restaurants, and presence of local potato-based snack food manufacturers. Aside from its use as an ingredient in many food preparations, potato is processed into numerous value-added products such as French fries, chips, strings, flour, among others, making it a high value cash crop (Foundation for Resource Linkages and Development, Inc., 1995). Rasco (1997) stated that among the lowland potato areas in the ASPRAD Region, it appears that the Philippine has the best opportunity to increase potato yield, based on reported yield from various trials and interviews with farmers.



Development in processing had a profound effect on the potato industry. Improvements in packaging frozen potato products, especially for the fast food chains and institutional markets was the major advancement (Foundation for Resource Linkages and Development, Inc., 1997).

In light of the government's thrust in promoting high value crops such as potatoes, a marketing appraisal of the commodity can shed light to its current status, needs for technological improvement and at the same time, asses its potentials for domestic and foreign markets.

The Philippine Council on agriculture and Resources Research and Development (PCARRD) in 1985 stated that cultivar selection is an important as seed piece selection. The best variety may fail if the seed piece is poor. On the other hand good quality seed may not compensate for a choice of cultivar. Using the right cultivar and the right king of seed pieces will ensure high yield and better quality of produce.

The development now days had great impact into the formation of new communities such as in Madaymen. In exchange for cash, people encouraged to produce vegetables mainly for the market. Madaymen was already integrated into the market economy in producing vegetables for the needs of the market namely potatoes, cabbage and others. These differences triggered a change not only in the mobility of people but also even in political set up of the barangay (Balusdan and Songyoen, 1999).

Factors Affecting the Production

Many farmers encountered many problems beginning from production to moving the products to market outlets. Delivery trucks sometimes are stranded because of



landslide, mechanical defect among others. These many problems prove that “bayanihan” is still existing and working where they help one another to overcome these problems.

One of the main production constraints of potato in Benguet is the inadequacy of capital. Some farmer are even forced to raise the crop without using much needed production inputs like fertilizers, pesticides, certified seed pieces, etc., at their recommended levels thus resulting to meager yields. It has been observed that great part of the seed potato produced locally are of poor quality of low varieties purity and are contaminated with seed-borne disease (Valmayor, 1982)

As stated by Omaweng (1995), the major problems faced by farmers on production were soil degradation followed by pest and diseases as well as weather fluctuation. A very serious financial problem was the insufficiency of capital. In marketing, rugged road followed by dominance of middlemen in price decision were the most pressing problems. PCARRD (1987) added that losses are incurred between harvesting and final utilization of the produce due to pest, improper handling techniques and physiological changes. The (Foundation for Resource Linkages and Development, Inc., (1995) revealed that the growth and sustainability of potato production system largely depend on appropriate and adaptable varieties suited to the tropical agronomic environments in the country

Marketing

The marketing of the potato crop has now developed into a highly complex and sophisticated system, which is allied closely to the financing of the crop. It has been described in detail by (Albert, 1983).



According to Albert (1983) an increasing number of farmers now have their own transport, a truck, and take their own produce to market in Baguio City or in the case of larger farmers, by truck to Manila; the ultimate destination for most of the potato crop. Along the cordillera itself, where transport is readily available, produce seed is collected directly from the farm, but in more remote areas it first has to be carried to a main road, usually by hired laborers known as “convoy laborers” or “kargadores” It is usually taken to Baguio by bus for small consignments or by truck for larger loads.

Potato growers in Benguet usually transport and sell their produce to assembler-wholesalers and wholesalers at the La Trinidad trading post and Dangwa area. Assembler-wholesalers and wholesalers commonly intercept farmers along Halsema highway to be assured of supply particularly during December which is the peak selling period (Foundation for Resource Linkages and Development, Inc., 1995).

Over the past decade, major changes have been observed in the organization of marketing channels, as new supply chains based on relation management, rather than marketing functions, institutions and transactions, have emerged (Lewis, 1995).



Definition of Terms

Andap. Refers to frost due to cold climate.

Demand. The amount of a particular economic good or service that a consumer or group Evolution. Change in the inherited traits of a population of organisms from one generation to the next.

Farmer. A person who grows field crops, and/or manages orchards or vineyards, or raises livestock or poultry. Their products are usually sold in a market or, in a subsistence economy, consumed by the family or pooled by the community.

Market. Any one of a variety of different systems, institutions, procedures, social relations and infrastructures whereby persons trade, and goods and services are exchanged, forming part of the economy.

Sanggap. Material used for planting potatoes. It is plat metal or wood.

Variety. Low-level taxonomic rank below that of species and signifies members of different populations can interbreed easily.



METHODOLOGY

Locale of the Study

The study was conducted in Barangay Madaymen, Kibungan, Benguet specifically at sitios Balangsayan, Tonguey, Masala, Nangayangan and Pakpakitan. The said sitios are the major potato production areas in the said barangay.

The study was undertaken from December 2008 to February 2009.

Respondent of the Study

The respondents of the study were the elder farmers who were potato growers in the locality, for significantly long period of time.

The study involved 50 respondents, 10 respondents came from each of the five identified sitios.

Research Instrument

Data was gathered through survey questionnaire and an interview schedule which was administered personally by the researcher.

Data Gathered

The data gathered include the socio-economic profile of the respondents. Their ideas regarding the evolution of the potato industry from previous to current period Furthermore, information regarding the drivers of change and factors affecting the potato industry were also dealt with.



Data Analysis

The data collected were tabulated and analyzed using descriptive statistics such as frequencies and percentages.



RESULTS AND DISCUSSION

Respondents Socio-economic Profile

The profile of the respondents included sex, age, civil status, educational attainment, numbers of years engage in potato farming and farm size.

There were 50 respondents interviewed and majority of them were males (62 %). As to age, all the respondents were adults with no one below 41 years old with an even significant 10% were more than 80 years old. This analysis reveals that most respondents are in their older years. As to civil status, it shows that majority (68%) were married, 22% widowed, and 8% single.

Educational attainment. As shown in table 1, most (92%) had a formal education with a significant 20% even reaching college level. The 38% reached elementary level and 26% reached high school level.

Number of years in potato farming. All the respondents were engage in potato farming in the study area for at least 20 years and above. A significant 38% and 32% were in the 47-55 and 38-46 years brackets, respectively. It can be noted further that 20% were even in the 56-64 years bracket. This finding implies that the respondents have at least sufficient background about the potato industry in their barangay, which is vital in this study.

Farm size. The respondents farms were categorized according into the following land areas; small (1.0 hectare and below), medium (1.1 hectare-2.0), big (2.1 heactare-3.0) and large (3.0 hectare and above). The majority of the farms fall under big (42%) and medium (36%) sizes



Table 1. General profile of the respondents

CHARACTERISTICS	FREQUENCY	PERCENT
Sex		
Female	19	38
Male	31	62
TOTAL	50	100
Age		
41-50	8	16
51-60	15	30
61-70	13	26
71-80	9	18
81-90	3	6
90-100	2	4
TOTAL	50	100
Civil Status		
Married	34	68
Single	4	8
TOTAL	50	100
Educational Attainment		
Non-formal education	8	16
Elementary level	19	38
High school level	13	26
College level	10	20



CHARACTERISTIC	FREQUENCY	PERCENT
Number of Years in Farming		
29-37	2	4
38-46	16	32
47-55	19	38
56-above	13	26
TOTAL	50	100
Farm Size		
Small (1.0-below hec)	8	16
Medium (1.1-2.0)	18	36
Big (2.1-3.0)	21	42
Large (3.1-above)	3	6
TOTAL	50	100

categories. This finding shows that the respondents were operating at significantly wide areas for their potato production.

Introduction of Different Potato Varieties in the Area

Before the 1950's, there were only two potato varieties being grown in the area. These were the native and the geneky varieties. For the native variety, most (86%) of the respondents claimed that their families were already planting it during the said period.

Though they were not aware of its origin, experts believed that it probably reached the area through the seed dispersal programs of the Bureau of Plant Industry (BPI). For the geneky variety, 24% claimed that their families were already planting them



before the 1950's, while the majority (76%) claimed that they started planting them on the succeeding decade (1951-1960). This indicates that the native variety was more popular farmers during the period.

As to source of planting materials, the native varieties were produced by local seed producers. On the other hand, most (84%) of the gencky variety came from farm suppliers (importers). This collaborates the findings of Valmayor in 1982. Only few (16%) were produced by local seed producers who propagated it themselves. Both varieties were introduced and popularized in the area through the gayagaya system in which some farmers followed to plant the same as to what others had planted.

In the years 1951-1960, there was a shift of farmer's preferences. More farmers (76%) planted the gencky variety. Three new varieties were introduced in the area during this period through importers. This collaborates the finding of Valmayor in 1982 and Albert in 1983. These new varieties were the morado, greta, and conchita varieties. The morado and greta varieties were introduced to the farmers through the seminars sponsored by concerned agencies which are attended by some farmers. On the other hand, the conchita was introduced both through seminars and media (radio). The said three varieties were popularized through the gayagaya system

These three varieties had been planted by farmers in the area until the succeeding decade, 1961-1970; the time when the native and the gencky varieties became instinct (reasons were presented in Table 11). It can be noted that the three varieties were equally popular during this period.

On the other hand, another three new varieties namely red pontiac, mexican, and univita were introduced in the area during this period (1961-1970). Although they were



not as popular as the three older varieties, it can be noted that it was the Mexican variety that was more preferred since 42% of the respondents had been planting them during this period.

The red Pontiac was introduced to the farmers through seminars (10%) and gayagaya system. For the Mexican and univita varieties, they were introduced through seminars (6% and 12%); others heard it from radio (16% and 12%). Said varieties were popularized through gayagaya.

As to the source of planting materials for the three varieties, majority was from farmer suppliers and the rest were from the local seed producers.

For the period 1971-1980, there was again a shift in the type of potato varieties planted by farmers. The varieties that were introduced in the previous decade became more popular than the older varieties. The conchita variety was not even planted by the farmers in the area, during this period. (Reasons were presented in Table 11).

It was also during this period that the two new varieties, namely the granola and motañosa varieties were introduced in the area. They were initially introduced in the area through seminars (14% and 16%) others heard it from the radio (32% and 20%). The majority then followed suit as the original farmers adapted the said varieties. As to seed source, originally the granola seeds came from the Bureau of Plant and Industry (BPI) while motañosa seeds came from the Benguet State University (BSU). As they propagated said seed varieties, this also served as source of seeds to other farmers.

For the period 1981-1990, the trend followed that of the previous decades. The granola and the motañosa varieties were also popular among the farmers (64% and 46%,



respectively). Only 28%, 14% and 2% had planted the univita, red pontiac, and mexican varieties, respectively.

In this period, two new varieties were introduced in the area, namely the Igorota (BSU PO3) and solibao (BSU PO4) varieties. Just like the other varieties that were introduced in the previous decades, the said new varieties were not very popular among the farmers, as only 20% and 14%, respectively had planted them. It can be noted that a few learned of the two varieties through seminars (14% and 6%), others heard it from the radio (20% and 16%), the majority (66% and 78%) had them through gayagaya system.

Just like the previous periods, 1991-2000 also marked a shift in the varieties preferences of farmers. Although a significant 42% and 21% planted the granola and montañosa varieties, the igorota and solibao varieties were already more popular among the farmers (62% and 50%, respectively).

Igorota and solibao varieties were developed by the Benguet State University (BSU) through the National Potato Root Crops Training Center (NPRTC). It was introduced to them through seminars (6%), through the radio (12%), and the rest (82%) through gayagaya system.

In year 2001-present, igorota and granola were widely planted in the area. The other varieties which were introduced earlier were not already planted. Other varieties produced by the Benguet State University were known by the farmers but not planted such as tamid, gloria, gansa, and Bengueta Batatas. Farmers claimed that the varieties were not suitable to the area.



Table 2. Potato varieties grown in the area, year introduced and groups responsible in its introduction

PARTICULARS	Potato Varieties Grown in the Area															
	Native Potato		Geneky		Morado		Greta		Conchita		Red Pontiac		Mexican		Univita	
Period introduced	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
Before 1950	43	86	12	24	0	-	0	-	0	-	0	-	0	-	0	-
1951-1960	7	14	38	76	17	34	12	24	11	22	0	-	0	-	0	-
1961-1970	0	-	0	-	33	66	30	60	29	58	10	20	21	42	4	8
1971-1980	0	-	0	-	0	-	8	16	10	20	40	80	29	58	32	64
1981-1990	0	-	0	-	0	-	0	-	0	-	0	-	0	14	28	
1991-2000	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
2001-present	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
TOTAL	50	100	50	100	50	100	50	100	50	100	50	100	50	100	50	100
Source of planting materials																
Supplier	0	-	42	84	50	100	50	100	50	100	38	76	45	90	33	66
Farmer	50	100	8	16	0	-	0	-	0	-	12	24	5	10	17	34



Table 2. Continued.....

PARTICULARS	Potato Varieties Grown in the Area															
	Native Potato		Geneky		Morado		Greta		Conchita		Red Pontiac		Mexican		Univita	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
Source of planting materials																
BSU-Root Crops	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
BPI-Baguio	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
TOTAL	50	100	50	100	50	100	50	100	50	100	50	100	50	100	50	100
Mode of introduction																
Seminar	0	-	0	-	3	6	3	6	2	4	5	10	3	6	6	12
Radio	0	-	0	-	0	-	0	-	6	12	0	-	8	16	5	10
Gaya-gaya	50	100	50	100	47	94	47	94	42	84	45	90	39	78	39	78
TOTAL	50	100	50	100	50	100	50	100	50	100	50	100	50	100	50	100
Still existing/ currently being planted	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
Not being planted	50	100	50	100	50	100	50	100	50	100	100	100	100	100	50	100



Table 2. Continued.....

PARTICULARS	Potato Varieties Grown in the Area							
	Granola		Montañosa		Igorota		Solibao	
Period introduced	F	%	F	%	F	%	F	%
Before 1950	0	-	0	-	0	-	0	-
1951-1960	0	-	0	-	0	-	0	-
1961-1970	0	-	0	-	0	-	0	-
1971-1980		0		0		-	0	-
1981-1990	43	86	29	58	0		0	
1991-2000	7	14	21	42	41	82	32	64
2001-present	0	-		-	9	18	18	36
TOTAL	50	100	50	100	50	100	50	100
Source of planting materials								
Supplier	21	42	0	-	0	-	0	-
Farmer	16	32	0	-	0	-	0	-



Table 2. Continued.....

Potato Varieties Grown in the Area								
PARTICULARS	Granola		Montañosa		Igorota		Solibao	
	F	%	F	%	F	%	F	%
Source of planting materials								
BSU-Root Crops	13	26	50	100	50	100	50	100
BPI-Baguio	0	-	0	-	0	-	0	-
TOTAL	50	100	50	100	50	100	50	100
Mode of introduction								
Seminar	7	14	8	16	7	14	3	6
Radio	16	32	10	20	10	20	8	16
Gaya-gaya	27	54	32	64	33	66	39	78
TOTAL	50	100	50	100	50	100	50	100
Still existing/currently being planted	50	100	0	0	50	100	0	0
Not being planted	0	-	100	100	0	-	100	100



Past and Present Cultural Practices of Potato Growers

Land preparation. Before the 1980's, farmers in the area operated their farm manually with the use of any sharpened objects and later on employed spading fork and grab hoe in loosening the soil and removing the weeds.

In the year 1981-2000 and 2001 up to present, there is no significant change in the tools employed by the farmers. The use of agricultural machineries like tractor such as koliglig and araro were very rare to farmers due to the small terraces of farm and because the land areas are rocky which could cause the tractor to malfunction or even be damaged.

Planting of potato seed-piece. From the previous to the present, there were no significant changes in the tools employed in their planting. They have been using the “sanggap”.

Fertilizer application. Farmers in the area have used both inorganic and organic types of fertilizers. Before the 1980's, ashes (56%) and compost (44%) were widely used as organic fertilizers in the area. Chicken dung was not yet known and was not being used in the area. For the inorganic fertilizers, the vigoro (76%) was commonly used. Fertilizers like urea and the corona were also used.

In 1981-2000, chicken manure was introduced in the area and became the most widely used (80%) organic fertilizers by the farmers. The rest (20%) made use of the ashes. The use of composts became rare to farmers up to current period. An inorganic fertilizer like the T-14 was introduced and subsequently was commonly used by the farmers. The vigoro and urea were still used but not the corona anymore.



Table 3. Organic and in-organic fertilizer used

PARTICULARS	BEFORE 1980's		1981-2000		2001-PRESENT	
	F	%	F	%	F	%
ORGANIC FERTILIZER						
Compost	22	44	0	-	0	-
Ashes	28	56	10	20	5	10
Chicken manure	0	-	40	80	45	90
TOTAL	50	100	50	100	50	100
IN-ORGANIC FERTILIZER						
Corona	5	10	0	-	0	-
Vigoro (6-10-4)	38	76	17	34	7	14
Urea (46-0-0)	7	14	12	24	15	30
14-14-14	0	-	21	42	28	56
TOTAL	50	100	50	100	50	100

For the current period (2001-present), the chicken manure is the most widely used among the organic fertilizers. Few farmers used ashes. On the other hand, T-14 continues to dominate inorganic fertilizers application (56%) followed by the urea (30%). The once popular vigoro only accounted for 14%.

Irrigation system. Before 1980's, farmers in the area made use of improvised cans such as large can of sardines to irrigate their plants. This was widely practiced by the farmers.



In 1981-2000, rain birds became more popular than watering cans. It can be noted in the table that majority (66%) of the respondents are using it.

For the current period (2001-present), rain bird is now the only tool of irrigation being used by the farmers. As they claimed, it is more economical and efficient than the other methods. Watering cans are rarely used by the farmers for irrigation.

Weeds control. In the period before 1980's, majority (64%) of the respondents controlled weeds by the use of some tools such as the grab hoe, sanggap, and sickle. They also remove weeds with their bare hands. Few (20%) of them used herbicides like the round-up and power. Others preferred to control weeds through hilling up (16%).

For the second period (1981-2000), herbicides were introduced in the area. The table shows that majority (54%) of the respondents were using it. Hilling up and the use of grab hoe has significant 12% and 28%, respectively.

In the period (2001-present), there was a significant increased in the utilization of herbicides (64%). This includes gramaxon, clear out and slash. On the other hand, manual weeding and hilling up significantly decreased. Farmers claimed that the use of herbicides lessens effort and time in their work, thus leading to the shift in weeding practices.



Table 4. Methods of irrigation system and weeds control

PARTICULARS	BEFORE 1980's		1981-2000		2001-PRESENT	
	F	%	F	%	F	%
IRRIGATION						
Using watering cans	50	100	17	34	0	-
Rain birds	0	-	33	66	50	100
TOTAL	50	100	50	100	50	100
WEEDS CONTROL						
Manual	32	64	14	28	12	24
Herbicides	10	20	27	54	32	64
Hilling-up	8	16	9	18	6	12
TOTAL	50	100	50	100	50	100

Pest and diseases control. The respondents in the area were practicing both spraying pesticides and fungicides and rouging to minimize the spreading of pest and diseases of the plants.

Before the 1980's, majority (66%) of the farmers were spraying pesticides and fungicides which include sumicidin and tamaron, manzate, curzate and dethane. The rest applied rouging.

In the year, 1981-2000, rouging was not already applied by the farmers because farmers are occupying big farm size which was shown in table 1. Farmers widely used pesticides and fungicides such as magnum, siga, brodan, manager, dithane 45, leadomil



Table 5. Methods of controlling pest and diseases and method of harvesting

PARTICULARS	BEFORE 1980's		1981-2000		2001-PRESENT	
	F	%	F	%	F	%
PEST AND DISEASES						
Spraying pesticides and fungicides	33	66	50	100	50	100
Roguing	17	34	0	0	0	0
TOTAL	50	100	50	100	50	100
HARVESTING						
Manual	50	100	50	100	50	100
Machine	0	-	0	-	0	-
TOTAL	50	100	50	100	50	100

and many more. As they claimed, it is more economical and efficient than the other method.

Harvesting of potato products. Harvesting tools used in the previous years up to the current periods doesn't have significant change in the tools employed in harvesting. They have been using "kali".

Transportation system. Before the 1980's, farm to market roads in the area was not cemented. Accessibility to market was quite difficult for the farmers. Farmers in the area transport their harvested products in different ways. Few (10%) of them hired car and most (84%) farmers transport their harvested product through Public Utility Vehicle specifically Dangwa transportation corporation. Only 6% of the respondents have car.



In 1981-2000, few (34%) farmers have their own tracks and majority (60%) of the respondents were hiring car to transport their products. As a result, using PUV significantly decreased. Farmers claimed that using PUV cannot accommodate all their harvested products, thus leading to have their own car.

The same as trend followed in the third period (2001-present).

Seed-piece storage of potato. Before the 1980's, majority (70%) of the respondents were storing their seed-piece in sacks beside and at the back of their house, others (20%) stored them in their bodega, the rest (10%) stored them underground.

During the succeeding periods, 1981-2000, there was a shift in the farmer's practices. Few respondents (26%) already put up bodegas for storage and 30% respondents in underground. Farmers claimed that storing them in their bodegas and in undergrounds, give more protections to their seeds from pest and diseases, rodents and sun green.

The same trend followed during the third period (2001-present)

Table 6. Medium of transportation system

PARTICULARS	BEFORE 1980's		1981-2000		2001-PRESENT	
	F	%	F	%	F	%
TRANSPORTATION						
Owens transport facility	3	6	17	34	21	42
Hire transport facility	5	10	30	60	29	58
Through PUV	42	84	3	6	0	-
TOTAL	50	100	50	100	50	100



Table 7. Methods of potato seed-piece storage

PARTICULARS	BEFORE 1980's		1981-2000		2001-PRESENT	
	F	%	F	%	F	%
SEED-PIECE STORAGE						
In sacks beneath the house	35	70	12	24	7	14
Stored underground	5	10	15	30	20	40
Bodiga	10	20	23	46	23	46
TOTAL	50	100	50	100	50	100

Marketing. Before the 1980's, majority (66%) of the respondents market their products at Baguio City Hangar Market, few (26%) of them directly retailed their products in the lowland area, some (8%) preferred to market their products in different sari-sari stores. The La Trinidad Vegetable trading post was not yet known.

In 1981-2000, La Trinidad Vegetable trading post was known where most (82%) farmers market their products. Market in the Baguio City Hangar Market and some part of lowland area significantly decreased. Farmers claimed that the La Trinidad trading post is more efficient than the other.

In the current period (2001-present), there was no significant changed used by the farmers in marketing. The La Trinidad Vegetable trading post was the most widely used. Few (6%) were using Baguio City Hangar Market and sometimes they used Palma Vegetable trading when oversupply of vegetables occurs.



Table 8. Market outlet

PARTICULARS	BEFORE 1980's		1981-2000		2001-PRESENT	
	F	%	F	%	F	%
MARKETING						
Trading post	0	-	41	82	47	94
Baguio hanger market	33	66	6	12	3	6
Sari-sari store	4	8	0	-	0	-
Lowland area (manila)	13	26	3	6	0	-
TOTAL	50	100	50	100	50	100

Trends and Drivers of change of Potato Industry in Madaymen, Kibungan, Benguet

Increase potato consumer demand. Before the 1980's, most (92%) of the respondents said that producing good quality products was the cause of increasing consumer demand of potatoes. This was followed by increasing population (22%). Entry of fast food chains such as Jollibee, Mc Donald, KFC and Chow king contributed to the increase in consumer demand of potato. The entry of institutions such as supermarket, Liwayway, Universal Robina Corporation, and hotel and restaurant were known for their contributions to the increase in potato consumer demand.

In 1981-2000, the entry of institution (12%) was known for their contributions towards increasing consumer demand of potatoes. Good quality products, increasing population and entry of fast food chains significantly increased.

The same trend followed during third period (2001-present).



Table 9. Drivers of increasing consumer demand

PARTICULARS	BEFORE 1980's		1981-2000		2001-PRESENT	
	F	%	F	%	F	%
INCREASE CONSUMER DEMAND						
Good quality products	46	92	43	86	47	94
Increasing population	11	22	9	18	11	22
Entry of fast food chains	4	8	7	14	8	16
Entry of institutions	0	-	6	12	7	14

Introduction of different potato varieties. Before the 1980's, majority (74% and 56%) of the respondents claimed that having competitive advantage in potato varieties and good productivity were the reasons to reproduce new variety. Entry of fast food chains and consumer exposure were not claimed.

In the succeeding years, 1981-2000, media exposure and entry of fast food chains were known for its contribution (24% and 8%), respectively. Having competitive advantage and high productivity were significantly increased. Potato variety was known to farmers through the gayagaya system, seminars and media like radios.

In the current period, 2001-present, there was a significant increased than the previous years (1981-2000). The Benguet State University and Bureau of Plant Industry were contributed also to the entry of different potato variety.



Table 10. Drivers of introduction of different potato variety

PARTICULARS	BEFORE 1980's		1981-2000		2001-PRESENT	
	F	%	F	%	F	%
INTRODUCTION OF DIFFERENT POTATO VARIETIES						
Competitive advantage	37	74	36	72	43	86
High productivity	28	56	34	68	41	82
Media exposure			12	24	21	42
Entry of fast food chains	0	-	4	8	7	14

Some varieties of potato were phased out. Before the 1980's, farmers in the area mentioned that decreasing production capability of a potato variety was mostly (90%) the reason for them to minimize reproduction. Few (8% and 16%) farmers mentioned of having poor quality harvested products and decreasing consumer demand.

In 1981-2000, few (16%) farmers mentioned that lack sources of seeds were the reason of not reproducing the variety. On the other hand, decreasing production and consumer demand and susceptibility to pest and diseases were mentioned significantly increased.

The same trend followed during the third period (2001-present).



Table 11. Causes why some variety was phase out

PARTICULARS	BEFORE 1980's		1981-2000		2001-PRESENT	
	F	%	F	%	F	%
SOME VARIETIES ARE FACE OUT						
Decreasing consumer demand	4	8	19	38	24	48
Decreasing productivity	45	90	50	100	50	100
Susceptibility to pest and diseases	8	16	21	42	45	90
No source of seeds	0	-	8	16	9	18

Factors affecting potato industry

Production. Before the 1980's, rugged terrain of farm to market road became the farmer's problem which caused the decrease in the potato production during the following years (1981-2000). Luckily, the rugged road was improved by government projects in the current period (2001-present).

As to quality of seeds, few (8%) farmers encountered the problems before the 1980's. In the following period, 1981-2000, few (20%) farmers encountered the problems. Majority (68%) of the farmers encountered the problem in year 2001-present. Farmers claimed that the production power and insusceptibility to pest and diseases decreased.

On the other hand, before the 1980's, most (92%) farmers have problem on the climate change especially in the month of December to January due to "Andap". In the year, 1981-2000 and 2001 to present, there was a significant decrease in the climate



change. Farmers claimed that temperature in the past is colder compared to the present climate conditions.

Summer became farmers' problem. Before the 1980's, few farmers encountered water shortage which greatly affected their potato production. Supply of water was not a problem during rainy seasons. Springs were available to supply water for irrigation. However, due to excessive cutting of trees, springs are not abundant source of water. In the year, 2001- present, the problem in water for irrigation became complicated causing the farmers to buy water pump for irrigation.

Before the 1980's, plant pests and diseases such as cutworm, aphid, early blight and black leg were not (2%) common problems in the area. However, there was a significant increase in the year 1981-2000. The same trend followed in the year 2001-present. Farmers claimed that outbreak of different kinds of pest and diseases was due to changes of the environment.

In the production inputs, before 1980's, most (94%) farmers were experiencing far source of production inputs such as chicken manure and other inorganic fertilizers. Farmers badly needed cars to transport from lowland areas. In the year 1981-2000 and 2001-present, most farm supply establishments were put up near the area. This resulted to significant decrease in experiencing the problems. Consequently, most (86%) farmers were experiencing problem in high acidity of soil in the present time. This marked the effect of club roots to different kinds of crucifer's plants that also resulted to soil acidity.

Before 1980's, 1981-2000 and 2001-present, most farmers were experiencing problem in the insufficiency of capital. Farmers experienced difficulties in borrowing some amount from financing institution such as Rural Bank, Land Bank, Credit



Table 12. Factors affecting the production of potato variety

PARTICULARS	BEFORE 1980's		1981-2000		2001-PRESENT	
	F	%	F	%	F	%
PRODUCTION						
Rugged terrain remote areas	50	100	42	84	10	20
Lack of quality seeds	4	8	10	20	34	68
Climate change	46	92	43	86	39	78
Lack of irrigation	23	46	43	86	44	88
Plant pest and disease	2	4	34	68	44	88
Far source of production inputs	47	94	16	32	5	10
Soil ph	0		0		43	86
Insufficient capital	43	86	45	90	50	100

Cooperatives and private lender such as auntie, uncle and some suppliers. Guarantors and titled properties were needed.

Marketing. Before the 1980's, most (90%) of the respondents experienced problems in marketing due to lack of information regarding price of potato. Farmers claimed that they just inquire prices from their neighbors. Fortunately, in 1981-2000, modernization brought the farmers to more faster and convenient communication. In the year 2001-present, use of new technology products such as radios, cell phones and computers were much helpful to every respondent.

Before the 1980's, Halsema and other provincial road were not cemented. Trucks and jeepneys easily malfunctioned and even destroyed which sometimes led to accidents.



This was the problems experienced by the farmers even in the other areas. The problem was minimized in the succeeding decade (1981-2000) because of road constructions until this time (2001-present).

Before the 1980's, lack of market outlet was the most (86%) problem of the respondents in the first period. In the succeeding years, 1981-2001 few farmers encountered lesser problems because of the construction of La Trinidad trading post and also the Palma trading.

Before the 1980's, competition among farmers was not serious. On the other hand, there was a significant increase in the succeeding years, 1981-2000. Farmers claimed that increasing population and immigration led to competition. The same trend followed in year 2001-present generation.

Table 13. Factors affecting the marketing system

PARTICULARS	BEFORE 1980's		1981-2000		2001-PRESENT	
	F	%	F	%	F	%
MARKETING						
Lack of information about price	45	90	12	24	0	-
Rugged road	50	100	23	46	2	4
Dominance of middlemen	4	8	14	28	3	6
In price decision						
Market outlet	43	86	21	42	3	6
Competition among farmers	0	-	17	34	47	94



SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The study investigated the evolution of the potato industry in Madaymen, Kibungan, Benguet. Particularly, it determined the evolution, the drivers of changes and the factors affecting the potato industry in the study area.

The study was conducted in Madaymen, Kibungan, Benguet. Fifty (50) respondents were purposively chosen from whom the source of data and information were elicited. The study covered three periods particularly: before the 1980's, 1981-2000 and 2001 to the present. Data were gathered through a survey questionnaire and personal interview which were supplemented with field visits and observation.

Native potato and geneky were the first varieties grown in the study area before the 1950's. Of these two, the native was popular and commonly grown. This was followed by geneky variety. The two varieties were popularized through gaya-gaya system. Experts believed that probably these varieties reached the area through the dispersal programs of Bureau of Plant Industry (BPI). Succeeding planting materials for the native variety came from local seed producers while for geneky they came from farm suppliers. In 1951-1960, three new varieties were introduced in the area through importation. These were the morado, greta, and conchita varieties. These new varieties were introduced in the area through seminars; others heard about them in the radio and later on were popularized through the gaya-gaya system. The three varieties were planted in the area until 1961-1970.

In 1961-1970 another three varieties were introduced in the area namely red pontiac, mexican and univita. These potato varieties were known by majority of the



respondents through gaya-gaya system, although initially, few were informed about the variety through seminars and through radios. The three varieties were produced by farm suppliers and some were produced by local seed producers. These were popularized in the year 1971-1980. In 1981-1990, two new varieties, the granola and montañosa were popularized in the area. As to seed source, the granola seeds came from the Bureau of Plant Industry (BPI) while montañosa seeds come from the Benguet State University (BSU). These were initially introduced into the area through seminars conducted by the concerned institutions that developed the said varieties, others heard about them from the radio and later popularized through the gaya-gaya system. In 1991-2000, igorota (BSU PO3) and solibao (BSU PO4) were also introduced in the area through the National Potato Root Crops Training Center (NPRTC). Others learned from the radio. These were initial groups embrace the said varieties and later on were popularized through the gaya-gaya system. Currently, only the granola and igorota varieties were being planted in the area, almost all of the other varieties were not already being grown. For their cultural practices, land preparations were done manually with the use of any sharped objects and later on with spading forks and grub hoes. Agricultural machines are not applicable in the area thus they are not being employed. The use of “sanggap” in planting was also the major tool from the earlier periods up to the present. In terms of fertilizer application the farmers were using both organic and in organic fertilizers. Organic fertilizers used in the periods before the 1980’s were compost and ashes. For the succeeding time periods, there was a continuous use of ashes although at decreasing rates. On the other hand, compost was not already being applied. Chicken manure was only introduced in the succeeding area but became the commonly applied organic fertilizers up to the present period. For



the inorganic fertilizers, corona, vigoro and urea were common inorganic fertilizers used by the farmers before the 1980's. The most popular of this was the vigoro. The succeeding periods, marked the extinction of corona and the introduction of triple 14. The once popular vigoro started and continued to decline while urea and T-14 became more and more popular.

In terms of irrigation, watering cans that were commonly used in the periods before the 1980's up to the 1981-2000 were not already being planted. They were substituted by rain birds, which were initially introduced after 1980. Weeds were controlled manually, through hilling-up, and with the used of herbicides. Herbicide application is the more practice for the current period.

Pest and diseases were controlled with the use of pesticides and fungicides. Roguing that were employed before the 1980's is not anymore employed by farmers

In the past and in the present periods harvesting was manually done using "kali". Seed piece were mostly stored in a "bodega". Some stored them in underground and sacks behind their houses.

Before the 1980's, most of the respondents transported their products through the PUV's. Few of them were hiring private trucks. In 2001 up to the present, almost half of them had their own car. Majority of the farmers market their products in La Trinidad Trading Post, only few markets at Baguio Hangar Market in the present generation (2001-present). In the previous decades, before 1980's, majority (66%) of them directly market their products to Baguio Hanger Market and few market their products in lowland areas.



From the previous to the current period, the increase of demand of specific potato varieties were primarily caused by the good quality of newly introduced products, increasing population, entry of fast food chains, and other institution buyers. Popularity of specific potato varieties were caused by competitive advantage, high productivity, media exposure that eventually led to the gaya-gaya system among the farmers. Meanwhile, some varieties were phased out or not being planted anymore because of decreasing demand, decreasing productivity of the varieties, susceptibility to plant pests, and diseases and lack of sources of seeds.

From the earlier period up to the current period, many problems were encountered by the farmers in potato production. These include the rugged roads, lack of source for irrigation, far source of production inputs, plant pests and diseases, high production cost, fluctuating temperature, low productivity, soil erosion, soil ph, and insufficient capital. Lack of information about price, and dominance of middle men in price decision, lack of market outlet and high level competition among the farmers also contributed to the problems encountered by the respondents in marketing their products.



Conclusions

Based on the results of the study, the following conclusions were derived:

1. potato farming in Madyamen, Kibungan, Benguet was already a common practices of farmers even the 1950's;
2. potato varieties were commonly introduced to the farmers through seminars and radio sponsored by the Bureau of Plant Industry (BPI), farm suppliers-importers, and latter by the Benguet State University (BSU) who were also the original sources of planting materials;
3. varieties were popularized through the gaya-gaya system among the farmers.
4. most varieties were either already extinct or not favored anymore by most farmers due to decreasing productivity, susceptibility to pests and diseases, and decreasing consumer demand;
5. institutions like the BPI and BSU played a key role in the development of potato varieties currently planted in the area;
6. subsequent supply of planting materials were farm suppliers and local seed producers;
7. drivers of popularization of the different varieties include competitive advantage, high productivity and media;
8. the entry of major markets like fast foods, processors, and other institutional buyers generally keyed the commercialization of potato production resulting to more profits among the farmers that led to their improved economic status;
9. land preparation, crop maintenance, and harvesting did not significantly changed, farmers still rely on manual operation;



10. from watering cans, farmers shifted to rain birds;

11. there was a significantly shift from organic to inorganic production; inorganic fertilizers, pesticides, fungicides, and herbicides are now being currently applied;

Recommendations

Based on the above conclusions, the following are recommended:

1. potato farmers should organize themselves into an association like cooperative for a possible source of operating capital, stronger voice in airing concerns as well as linking with concerned institutions;

2. the local government and other concerned institutions should educate and encourage farmers to revert back to organic production in order to solve their problems on soil acidity as well as pest and diseases; this would surely initially lessen their productivity but would eventually result to higher profit in the long run;

3. the farmers are also encouraged to test other varieties produced by the BSU-NPRTC such as dalisay, benguet batatas, watawat, tamid and gloria kamaptengan.



LITERATURE CITED

- ALBERT, W.V. 1983. On-farm Potato Research in the Philippines. The International Potato Center. Philippine Journal of Potato Research. Pp. 43, 53, 71
- BALUSDAN, C.D. and A.M. SONGYOEN. 1999. Brief Documentation of the Results of Interview Conducted in Napsong, Madaymen, Kibungan, and Benguet in relation to the Research on the History of Madaymen. (Unpub.). Pp. 13-16.
- BLALOCK, C.D. 1997. The Potato, Frozen Food Report, the Frozen Potato Products Institute. Unpublished Report. (FPPI). Pp. 28-31.
- CAYABAS, J.D. 2003. Survey and Assessment of Major Disease Affecting Potato Production in Benguet, Mountain Province and La Union. BS Thesis (Unpub.). Benguet State University. P.1.
- CONSOLACION, C.C., R.D. COLTING, L.L. TANDANG. 1999. BSU Potatoes: Best for Chips and Fries. Benguet State University Research Digest. Vol. 1. P. 4.
- FOUNDATION FOR RESURCE LINKAGES AND DEVELOPMENT, Inc. (FFRLD), 1995. The Potato Marketing System in Major Production and Demand Areas in the Philippines. Pp. 1-9.
- LEWIS, J.A. 1995. The Connected Corporation. New York, NY. Business-To Business Relationship by Categories of Suppliers in the Marketing Channel. Dynamics in Chain and Networks. Wageningen Academic Publishers. Pp. 532-537.
- OMAWENG, C.N. 1995. Economics of Vegetable Production in Bauko, Mountain Province. BS Thesis (Unpub.). Benguet State University. P. 47.
- PHILIPPINE COUNCIL FOR AGRICULTURE AND RESOURCES RESEARCH AND DEVELOPMENT (PCARRD). 1987. Highland Potato Techno guide. Pp. 2, 28
- RASCO, E.T. 1997. The Potato in Tropical Asia. Tropical Publishing Center. Pp. 34-36.
- SMITH, O.A. 1977. Second Edition. Potatoes: Production Storing Processing. American Journal of Potato Production. P.3-4.
- VERMEULEN, S.B. and F.J. PROCTOR. 2008. Chain-wide Learning for Inclusive Agri-food Market Development: A guide to Multi-stakeholder Processes for Linking Small-scale Producers with Modern Markets. Wageningen Academic Publishers. Pp. 19-25.
- VALMAYOR, R.V. 1982. Benguet Techno guide for Potato. Techno Publishing Center, Inc. Pp. 3-4.



APPENDIX A

SURVEY QUESTIONNAIRE

I. Socio-economic Profile

A. Respondents

1. Name (Optional) _____ 2. Sex ____ 3. Age ____
 4. Civil Status _____
 5. Educational Attainment _____
 6. No. of years engaged in potato farming _____
 7. Farm size (hec) _____

II. Introduction of Potato Varieties in the Area

QUESTIONS	Potato Varieties (please check)												
	A	B	C	D	E	F	G	H	I	J	K	L	M
Period introduced													
Before 1950													
1951-1960													
1961-1970													
1971-1980													
1981-1990													
1991-2000													
2000-present													
Source of planting materials													
Supplier													
Farmers													
BSU-root													
crops													
BPI-Baguio													
Others													
Mode of introduction													
Seminar													
Radio													
Gaya-gaya													
Others													
Still existing/ currently being planted													
Not being planted													



Legend:

A. Native potato	F. Red Pontiac	K. BSU PO3/Igorota/LBR
B. Geneky	G. Mexican	L. BSU PO4/Solibao
C. Morado	H. Univita	
D. Greta	I. Granola	
E. Conchita	J. Montanosa	

111. Past and Present Cultural Practices of Potato Growers

CULTURAL PRACTICES	BEFORE 1980'S	1981- 2000	2001- PRESENT
Land Preparation			
a. Manual			
b. Araro			
c. Tractor			
Seed-piece Storage			
a. In sacks beneath the house			
b. Stored underground			
c. bodiga"			
d. Others (specify)_____			
Planting			
a. By hand			
b. By machine			
Organic fertilizer			
a. Compost			
b. Ashes			
c. Chicken Dung			
In-organic fertilizer			
a. Vigoro			
b. Urea			
c. Triple 14			
d. Others (Specify)_____			
Irrigation			
a. Furrow irrigation			
b. Using watering cans			
c. Sprinkler irrigation			
d. Rain bird			



CULTURAL PRACTICES	BEFORE 1980'S	1981- 2000	2001- PRESENT
Weed Control			
a. Manual			
b. Herbicide			
c. Hilling-up			
d. Mulching			
Pest and Diseases			
a. Spraying of pesticides/fungicides			
b. Roguing			
c. Others (Specify) _____			
Harvesting			
a. Manual			
b. Machine			
Transporting			
a. Own transport facility			
b. Hire			
c. Through PUV			
Marketing			
a. Trading post			
b. Baguio Hanger Market			
c. Sari-sari store			
d. Other (specify) _____			



IV. Trends and Drivers of Change of Potato Industry

TRENDS AND DRIVERS OF CHANGE	BEFORE 1980'S	1981- 2000	2001- PRESENT
Increase consumer demand			
a. Good quality products			
b. Increasing population			
c. Entry of fast food chains			
d. Entry of institution			
e. Others (Specify) _____			
Introducing of different potato varieties			
a. Competitive Advantage			
b. High productivity			
c. Media exposure			
d. Entry of fast food chains			
e. Others (Specify) _____			
Some cultivars are face out			
a. Decreasing consumer demand			
b. Decreasing productivity			
c. Susceptibility to pest & diseases			
d. No source of seeds			
e. Others (Specify) _____			



V. Factors Affecting Potato Industry

FACTORS	BEFORE 1980'S	1981- 2000	2001- PRESENT
Production			
a. Rugged terrain of remote areas			
b. Lack of quality seeds			
c. Climate			
d. Topography			
e. Lack of irrigation			
f. Plant pest and disease			
g. Far source of production inputs			
h. Soil pH			
i. Insufficient capital			
j. Others (Specify) _____			
Marketing			
a. Lack of information about price			
b. Rugged road			
c. Dominance of middlemen in price decision			
d. Market outlet			
e. Competition among farmers			
f. Others (specify) _____			

