

BIBLIOGRAPHY

ANALYN B. GARCILIAN, November 2006. Agricultural Development in Bauko, Mountain Province. Benguet State University, La Trinidad, Benguet.

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ABSTRACT

Including the Highland Agricultural Development Program and non- Highland Agricultural Development Program covered barangays of Bauko, Mountain Province, the study determined the socio-economic and farming profiles of the respondents, the agricultural development interventions, the perceived degree of implementation of the agricultural development interventions, the existing agricultural practices of the farmers, and the perceived problems of the farmers.

The respondents range in age from 25 to 50 years, most are females, and almost all are married. The majority are high school graduates; have been farming for less than 25 years; and have other complimentary sources of income. A family has from one to 12 children. The respondents' educational attainment ranges from being in the elementary grade to college graduates. Their houses are made of either wood and galvanized iron or a combination of wood, concrete and GI materials. The water sources are mainly developed springs (tank and pipe). They have an electrical source of light and open pit to automatic water-sealed bowl for toilets. The majority have concrete bowl-type of toilet, and various electrical and electronics appliances. They plant mainly rice, vegetables or combination of rice and vegetables on a farm which area ranges from less than 500 to more than 5,000

square meter. They either own or rent the land they till through purely manual method in farming. The major farm inputs are fertilizers and pesticides.

On interventions the infrastructure support facilities, that includes farm-to- market roads, bridges, and pathways, are already sufficient and generally in good condition although a significant portion needs improvement and/or repair. They are mainly funded by the internal revenue allotments of the barangay, municipality and province. The agricultural facilities developed are greenhouses, storage houses, packing and waiting sheds, training centers, nurseries, dryers and irrigation systems. Manpower development activities include conducting of various seminar-workshops on farm management topics and food processing, and establishing farmers' field school (FFS). The credit facilities are loans from banks, cooperatives, government assistance program, and farmers associations. Farmers' products are sold in the municipality satellite markets and nearby provinces. Policy supports in the form of several barangay ordinances are implemented or proposed.

These agricultural interventions are perceived by respondents as either fairly or fully implemented. The leading agricultural practices of respondents under HADP are manual land preparation, soaking seeds overnight, selecting seeds based on experience and transplanting 1½-months-old rice seedlings. Those under non-HADP are tapping water from river/stream for irrigation and tending farm daily.

The agricultural technology adopted by the respondents in rice farming is the *gapas* system and the use of pedal-powered thresher and in vegetable production is the use of rainbird for irrigation and new varieties of crops planted.

The leading problems perceived as very serious in both HADP and non-HADP areas are low, and highly fluctuating, prices; vegetable importation; and high costs of inputs.



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INTRODUCTION

Background of the Study

In the Cordillera region, Benguet and Mountain Province are the known major producers of semi-temperate vegetables, fruits, and cutflower-ornamentals. They have a wide range of climatic conditions in these provinces, which include a cool climate in some areas, favor the production of these high-value crops. Benguet utilizes a larger land area for farming as compared to Mountain Province. In the latter, only the municipalities of Bauko, Tadian, and Sabangan are engaged in a commercial scale vegetable production.

Despite its mountainous and very rugged terrain, Bauko is one of the first municipalities to engage in commercial vegetable production in Mountain Province and in the Cordillera region. This municipality raises vegetables in its highland zones, and staple crops such as rice, corn, and legumes in its lower and warmer zones.

The municipality's unique location and varied climatic conditions have made diversified farming possible. Because of its production potentials, it is also one of the longest beneficiaries of the first major agricultural development interventions in the Cordillera, the Highland Agriculture Development Project (HADP) from 1987 to 1993, and the Cordillera Highland Agricultural Resource Management Project (CHARMP) from 1994 to 2004. It can be noted that HADP included infrastructural development such as the building of agri-infrastructure



and the improvement of road networks. CHARMP, on the other hand, focuses on social services such as livelihood projects and community mobilization. Both projects, along with the different programs of the local and national governments, aim to alleviate poverty by implementing various kinds of development interventions. This study aims to assess the agricultural developments in Bauko, Mountain Province, specifically the extent of implementation of agricultural development interventions, along with the socio-economic and farming profiles of the respondents.

Statement of the Problem

To contribute information needed in the formulation and effective implementation of sustainable development programs or projects in Bauko, Mountain Province, this study was conceptualized to assess the agricultural development interventions in the municipality. It specifically sought the answers to the following questions:

1. What is the socio-economic and farming profile of the respondents?
2. What are the agricultural development interventions of government and non-government organizations in the municipality?
3. What is the extent of implementation of the agricultural development interventions ?
4. What are the agricultural practices in rice and vegetable production by the farmers?



5. What are the agricultural problems encountered by the farmers and their degree of seriousness?

Objectives of the Study

The objectives of the study are as follows:

1. To determine the socio-economic and farming profile of the respondents.
2. To determine the agricultural development interventions in Bauko in terms of:
 - a. Infrastructure support facilities
 - b. Manpower development
 - c. Market and credit facilities
 - d. Agricultural facilities
 - e. Policy support
3. To determine the extent of implementation of the agricultural development interventions.
4. To describe the agricultural practices in rice and vegetable production by the farmers.
5. To determine the agricultural problems encountered by the farmers and their degree of seriousness.



Importance of the Study

The role of the provincial, city and municipal governments in agricultural development has been greatly magnified by the Local Government Code of 1991. Through this code, all extension-related activities have been devolved to local government units. Today, the LGU's plan and implement most development interventions in their own jurisdictions.

The results of this study provide development planners, especially the LGU of Bauko Department of Agriculture, information relevant to sustainable development program/project formulation and implementation for the study area; can give project implementers ideas in properly monitoring and evaluating agricultural programs being implemented; can provide other concerned government agencies and non-government agencies about ways of implementing agricultural and related projects in communities with similar case as that of Bauko; and can serve as reference for researchers.

Scope and Delimitation of the Study

The study focused on the agricultural development interventions in Bauko, Mountain Province. Its scope is delimited to the socio-economic and farming profiles of the respondents; the agricultural development interventions; the extent of implementation of the agricultural interventions; the respondents' practices in rice and in vegetable production; and the problems encountered by the farmers in Bauko, Mountain Province.



REVIEW OF LITERATURE

Socio-economic Profile of Farmers

Mountain Province is one among the three provinces covered by the Cordillera Highland Agricultural Resources Management Project (CHARMP). Prior to the establishment of CHARMP, it was also one of the first beneficiaries of the Highland Agriculture Development Project in 1987, the first major agricultural development project in the Cordillera region. There are five municipalities of Mountain Province prioritized in the CHARMP Project: Bauko, Sabangan, Tadian, Bontoc, and Sagada. These municipalities are the major producers of commercially grown vegetables and agroforestry products.

Age. Based on the statistics derived from CHARMP Project Benefit Monitoring and Evaluation (PBME) Report, the great majority of the 360 project beneficiary-respondents in Mountain Province fall under the age bracket of 31-40, 41-50, or 51-60. The same pattern is observed in Abra and Benguet. This finding implies that the great majority of beneficiaries of the CHARMP are adults.

Primary occupation. In terms of occupation, Mountain Province respondents are mostly government employees (66.4 percent), quite a number (19 percent) are businessmen, and few (15 percent) are farmers. The same pattern is observed in Benguet where the great majority (78.1 percent) respondents are government employees; only 7.8 percent are farmers. Although the majority of the respondents in Abra (54.3 percent) are farmer-respondents, the overall results



show that the beneficiaries of this development project are concentrated on the literate population. Based on the foregoing figures, Project Benchmarking, Monitoring, and Evaluation (PBME) Report (2004) concluded that the respondents in said provinces have a subsistence nature of livelihood that is highly dependent on agriculture, especially for the respondents in Abra.

Tenurial status as farm operators. In the three provinces included in the survey made by CHARMP in 2004, most of the respondents are full owners of a particular parcel of land/farm area. In Abra, only a few have ancestral domain claims. In Benguet, the prevailing form of tenurial ownership is through tax declarations, and in Mountain Province, is being a lessee. These results indicate that the community households have a large control over their parcel of land.

Farming as main source of income. The majority of the respondents for the three provinces reported that farming is their main source of income. This response validates earlier reports that these provinces are highly dependent on agriculture for subsistence. Hence, there is a need to concentrate more on the development of agricultural components.

Participation in training activities to increase farm production. Abra respondents have a high level of participation in agricultural training activities, which indicates their willingness to adopt agricultural innovations. Conversely, those from Benguet and Mountain Province have a very low level of participation in the trainings given. The leading reasons are that there is lack of information



dissemination, there is lack of incentive for them to attend and learn, they cling to the traditional means of farming, and they are unwilling to adopt new technologies.

Seminars and trainings attended for the last three years. Most of the respondents from Benguet and Mountain province have not attended agri-related seminars for the past three years as indicated by the survey results. In Abra, most of the respondents have attended commercial and crop production seminars.

Awareness on DA-CHARMP sponsored trainings. The respondents in Abra are aware that DA-CHARMP has sponsored trainings (75.7 percent). In Benguet and Mountain Province, the majority of the respondents are either not aware of trainings conducted or are not able to attend any of these trainings.

Awareness on government, NGO, and private-sponsored trainings. Most of the respondents in the three provinces have answered that they are not aware of any government or non-government organization conducting trainings in their area for the last three years. This finding indicates that these organizations employ a poor information dissemination scheme. Their response is quite unusual because a number of GOs and NGOs, who are mandated to conduct agri-related trainings, operate within the area. In regard to private organizations, the respondents also claim that they are not aware of any trainings conducted.



Topographic Profile of Bauko, Mountain Province as a Farming Community

In 1911, Bauko was already a separate municipality of the old Mountain Province, together with Benguet, Bontoc-Lepanto, Amburayan, Ifugao and Kalinga-Apayao. Act Number 82 dated provided January 31, 1909 provided for the creation of the municipality. When the province was politically subdivided in 1967, Bauko remained a part of Bontoc, Mountain Province.

Bauko municipality has an area of 17,819.4 hectares and a population density of 156 persons per square kilometer. It is located in the southwestern corner of Mountain Province, and is bounded by the municipalities of Sagada in the north, Sabangan in the east, Tadian in the west and by the Provinces of Ifugao and Benguet in the south. This territory is located at 17 degrees latitude and 121 degree longitude, stretching several kilometers along the Bontoc - Baguio City national road.

Bauko's topography could be divided into three ecological zones: the highlands, the midland slopes, and the valley (Gaioni ,1994).

Highlands. The highlands are comprised by the Mt. Data plateau region as the center, the villages of Sinto and Paktil, which are on slopes with elevation of as high as 2,280 meters above sea level, and down to the village of Maba-ay, which has average elevation of 1,850 meters above sea level. The area is best characterized by the imposing, impressive and sacred twin waterfalls, that are named Inudey and Ampasit. The latter, also known as Pusnawan, cascades from



Mount Data plateau unto the green valleys below. Local Igorot religious folklore and etiological beliefs attest to the century-old importance of this waterfall as source of irrigation for agriculture. The area is damp and misty at night and in the early hours of the morning.

The remaining patches on what was once dense rain forest in Mount Data plateau are protected by law. However, the primeval forest in the plateau is almost totally stripped through repeated slash-and-burn activities and subsequent conversion of cleared areas into vegetable gardens. Even the remaining woods around the plateau are fast disappearing due to continuous timber extraction that the DENR grossly neglected to regulate. The never-ending demand for lumber by the booming population and by the gold and copper mining activities in the neighboring municipalities, compounded by the gross negligence of authorities led to the devastation of the forests in the area. The main agricultural crops on these forests turned vegetable gardens are potatoes, cabbages and sweet peas, which are cultivated on a rotation basis with widespread use of chemical pesticides and fertilizers.

Midlands. The midlands could be described as transitional ecological zone and are comprised by the second level of slopes of the Mt. Data eco-system. These areas include the portion of Maba-ay, which are below 1,850 meters in elevation, Guinzadan, which is 1,400 in elevation, and Abatan Junction where the Bauko Municipal Hall and District Hospital (Luis Hora Memorial Hospital) which



has an elevation of 1,450 m. Guinzadan, the largest and most populated with 3,557 inhabitants (Provincial Health Office 1989). The climate in this midland zone is mild and more pleasant than that in the other zones. This zone is devoid of tropical rain forests but it has scattered clusters of secondary forests, mainly the conifer species. The area is undergoing a significant agricultural change. There is significant decrease of irrigated ricefields as some are converted into vegetable gardens. Maize, coffee, beans, fruit trees and other traditional home garden crops are being cultivated. Guinzadan stands apart from other villages of the municipality because a large number of houses (*binatang*) are made of traditional thatched roofs.

Valley. The valley constitutes areas with elevations ranging from 1,400 down to 1,150 meters above sea level, or the lowest part of the Mt. Data ecological complex. This zone includes the lower barangays of Bauko. The climate here is much warmer than that of the higher elevations, both during the day and night. Large patches of pine forests remaining are mainly found in Bila, Otucan, Banao and Bagnen. Due to growing scarcity of lumber, cash and food, as population constantly increases, the villagers are often at odds over the exact boundaries with other barangays. Cutting of timber is mainly for house construction rather than for commercial purposes. The disputed land areas are usually for slash-and-burn activities. Village elders and barangay officials cannot always control individual behavior in their attempt to enforce inter-village



agreements regarding land use and exploitation of natural resources. The valley's ecological zone is still largely and mainly utilized for wet rice agriculture, but the impact of cash economy is evident as shown by more rice terraces being turned into vegetable gardens each year. Maize, coffee, several varieties of beans, sugarcane, sweet potato, taro, peanut, pineapple and many species of tropical fruit trees are also grown in this area.

Agricultural Development Intervention

Rural development was viewed synonymously with agricultural development. The agricultural sector was considered the foundation of rural economy. Thus most rural development programs/projects were designed to increase agricultural productivity, generate employment opportunities and improve basic facilities and services in health and education. Rural development programs are thus essentially designed to promote livelihood and self-reliance for rural population (Villacorta and Gaon, 1986).

The first major agricultural development project in the Cordillera is the Highland Agricultural Development Project, which was implemented in 1987. The project was funded by a loan from the Asian Development Bank (ADB) and International Fund for Agricultural Development (IFAD), with a counterpart from the Government of the Philippines. It covered five municipalities in Mountain Province and eight municipalities in Benguet with a total area of 486,973 hectares.



HADP is considered the first major agricultural development intervention in the Cordillera. Its Phase II, known as CHARMP, which is implemented from 1994 - 2004, set the direction of agriculture development in the region, especially in Benguet and Mountain Province.

The HADP Completion Report (1994) summarized the three major project components, as follows: road, irrigation and agricultural-support services. These components served as the starting point for development in the selected areas where infrastructure and agricultural support services were wanting.

Infrastructure. Prior to the implementation of the HADP in 1987, the roads of the municipalities of Bauko, Bontoc, Sabangan, Sagada, and Tadian in Mountain Province and the other eight selected municipalities of Benguet were extremely rugged, and cultivation was limited to narrow valleys and terraces constructed along mountain slopes. Water supply sources are small springs and streams. Since most of the irrigation systems are old, traditional practices of subsistence rice growers still prevail.

Beyond Baguio, the road networks to these Project areas were rugged and poorly maintained. Halsema highway, the major artery for transporting agricultural inputs and outputs of highland vegetables, is in poor condition, and all provincial and barangay roads are only accessible to four-wheel drive vehicles.

After six years of implementation, access was improved through the construction of 88 kilometers of new roads, rehabilitation of 125 kilometers of



roads, and the construction of 241 meters road-bridges, and 490 meters of footbridges.

In Mountain Province, a total of 126.79 kilometers of barangay roads was constructed or rehabilitated, and 402.07 meters of road bridges, and 361 meters of footbridges were constructed.

Furthermore HADP facilitated establishment of sprinkler and drip-irrigation installations on a 20-hectare farm that served as a demonstration model for modern and efficient application of irrigation water.

Agricultural support services. Before the implementation of the HADP, farmers in the project areas were already engaged in commercial production of semi-temperate vegetables. Their principal crops were potato, cabbage, Chinese cabbage, green pepper, pole bean and garden pea, with smaller areas planted to lettuce, carrot, and other vegetables. Vegetable production advancement involve considerable use of raw organic fertilizer and imported inputs including seeds, fertilizers, pesticides and fungicides.

Agricultural research is provided by HARRDEC, and agricultural extension is primarily the responsibility of the Provincial and Municipal Agricultural Offices of Benguet and Mountain Province.

In terms of farm supplies, the private sector supplies fertilizers and pesticides to the farmers. A small amount of fertilizer is used in subsistence rice



and other foodcrops but fertilizer and pesticide usage on commercial vegetable crops is high. Vegetable seeds are imported.

In terms of marketing, agricultural produce is sold wholesale in La Trinidad and Baguio before some produce are bulked for shipment to Manila. Vegetables usually pass from four to seven channels before they reach the consumers.

Financing for vegetable production is usually provided by informal money lenders who charge a high interest in a credit-marketing tie-up. Formal credit is made available only by Land Bank starting in 1990.

To improve these existing agricultural support services, HADP included research and extension (R & E) component, marketing, and agri-infrastructure. The R & E components seek to improve production and contribute to crop diversification through agricultural extension in soil conservation establishment of demonstration farm project, soil analysis, establishment of agricultural nurseries, farmers trainings/education.

The HADP marketing assistance program (MAP) provides the construction of the following agri-infrastructure: barangay and municipal markets and loading platforms; barangay nurseries; and seedpotato storages. The marketing assistance programs include price monitoring and dissemination through billboards and radio broadcast; and crop production programming.



CHARMP practically continued the HADP projects. When CHARMP was concluded in 2004, it was able to deliver a total of PhP 240,689,505.46 worth of projects in rural infrastructure development, agricultural support services, and community mobilization and natural resource management in Mountain Province. Its beneficiaries were the municipalities of Bauko, Bontoc, Sabangan, Tadian and Sagada.

Implementation of Agricultural Development Interventions

The role of provincial, city and municipal governments in agricultural development is greatly magnified by R.A. 7160 or the Local Government Code of 1991. Under this law, most extension-related activities were devolved to the local government units; hence, today, most of the planning and implementation of development interventions are done by the personnel of the local government units (DA-CARFU Information Kit, 1995).

Section 36 of the Local Government Code states that local government units may, through the local chief executives and with the concurrence of the Sangunian Bayan members concerned, provide assistance, financial or otherwise, to people's organizations and NGO's for economic, socially oriented, environmental or cultural projects to be implemented within their territorial jurisdiction.



Generally, with the LGU, agricultural intervention may come in two phases. First is the agricultural support facilities and the second is the capability building or training that comes with the former. Former Department of Agriculture Secretary Eduardo Angara emphasized in DA Action Plan for 2000 that capability building is one of the most important concepts to be integrated along with the establishment of agricultural support facilities such as road, irrigation, post-harvest facilities, and improved seed varieties.

Capability building can be achieved through extension services in the form of farm visit, informal group discussion, formal group meeting, demonstration, local verification trial, expository tour, and farmer's training course. The major objective of these services is to help establish and sustain income-generating projects (Dalog, 2002).

The study conducted by Dalog (2002) showed that the municipalities of Bauko, Sabangan, and Bontoc, of Mountain Province have strong support from local government units in terms of agricultural support activities such as the provisions of loans, establishing strong linkage with other institutions like CHARMP, TESDA, DTI, and DA, and providing active agricultural development staff.

Strong linkages with government and non-government organizations have greatly helped in accelerating the overall development of Bauko. For instance, it was reported in DA-CHARMP Mt. Province Project Profile (2004) that in the



ten-year project of CHARMP, which was concluded in 2004, a total of PhP 45,882,736.44 was spent for rural infrastructure development, which included the construction of farm-to-market access, foot bridges, domestic water supply, CIP/CIS, and calamity projects; agricultural support services, which included adaptive research services projects, extension support services projects, and integrated pest management project; and community mobilization and natural resource management, which included reforestation projects.

Based on the CHARMP project profile which reflected the budget allocation in the five project sites in Mountain Province, Bauko is the third highest in project expenditure. Thus, it can be said that the LGU of Bauko is very active in facilitating the implementation of such projects as indicated by its long-term partnership with HADP in 1987, then later with CHARMP.

Dalog also found that the LGUs in Bauko, Sabangan, and Bontoc perform their role and function of providing extension services as embodied in the Local Government Code of 1991; and that the LGUs are highly committed in performing their role and function that do not involve big financial cost.

Gomez and Pacardo (2004) found in their study on the Ifugao Rice Terraces that more farmers perceived government agencies to be extending aid to them. They further noted that the DA-CECAP is the most strongly-felt development program in the Cordillera because it involved construction of various infrastructure projects such as pathways, repair of irrigation systems, and



distribution of fruit tree seedlings to be planted as part of its natural resource management component. They further found that the LGU-MAO's were perceived to have provided credit/loan, technical information, trainings and infrastructure.

Agricultural Practices in Rice and Vegetable Production

While modern science and technology is spreading, the vast majority of people in the world still survive through the material and intellectual sustenance from their own indigenous traditions. COMPAS programme, an international network that called this system "endogenous knowledge," zeroes in on the potentials and limitations of traditional and indigenous agricultural practices; however, few efforts have been undertaken to test and improve them on the basis of the worldview of the people involved (Upawansa, 2005).

Based on the COMPAS framework, indigenous knowledge, practices and leadership are not assumed to be all positive. As with other knowledge systems, indigenous knowledge of different cultural backgrounds does not have all the answers to the present-day problems. However, the need to understand this endogenous concept is a major requirement in facilitating development in a community, especially if such knowledge exists like in the case of the Cordillera.

People of the Cordillera Region, amidst the many agricultural interventions and new technologies introduced to its farmers, still perform many



of its traditional and indigenous farming practices. Colting (2006) prefers to call the IP's sustainable practices of "indigenous technologies" to emphasize their importance. These indigenous technologies include the *kaingin* system, multistory system, homelot/homegarden, and terrace-woodlot system. The *kaingin* system or the slash-and-burn agriculture is a common practice in the Cordillera. There are two types of *kaingin* systems: settled type and shifting type.

The multistory system involves planting crops with differing growth characteristics on the same piece of land. This practice increases diversity in crop species or vegetable types and increases the variety of farm products as well. The system employs mixed or row intercropping to produce different layers of canopy or plant heights, resulting in a multistory effect. Examples are: coffee + pine (2-storey) and vegetable + citrus + alnus (3-storey).

Maintaining a homelot/homegarden is also common in the Cordillera. The open spaces near household settlements are planted to a mixture of fruits/horticultural crops, root crops, vegetables, fodder, medicinal plants, fuel wood, and timber species.

The small individual homegardens range from a few square meters up to a 0.5 hectares, but occasionally may range from up to 5 hectares. Two very common types of homegardens in Benguet are (1) coffee under pine, and (2) *Alnus spp.* plus coffee. In Mountain Province, the homegarden is composed of Benguet pine (*Pinus kesiya*) and banana or fruit tree combination with poultry



and/or livestock. In Abra, the narra or acacia/rain tree, combined with coffee and other crops, is a common type of homegarden. In general, most home gardens are established in a multistory or mixed cropping system.

The terrace and woodlot system is another traditional practice in the Cordillera. Terraces in the region may be either irrigated or rainfed. These terraces are constructed across very steep mountainsides to provide some planting areas for a range of agricultural crops. The woodlot is located upslope and serves as watershed from which irrigation water is obtained. The watershed is managed through to customary laws.

Traditional agricultural cycle. This sustainable agricultural system in the Cordillera is best practiced in Bontoc, Mountain province. To illustrate, the Bontoks follow an agricultural cycle throughout the year that consists of three periods: the first period is from November to February (*chinamey*), the second is the dry period, from February to March (*chakhon*), when rain is scarce and food is insufficient; and the third is July to November (*kesep*). The second period is a long period of waiting, thus, the people resort to eating camote, corn and millet, alternated with rice. The ricefields are prepared: plowed and harrowed for the planting of the seedlings. February to May is when the people need to water the plants (*asi chanum*) because it is dry season. The farmers usually spend the nights seeing to it that their ricefields are equally watered. This can also be done with owners of neighboring ricefields agreeing to water one field one night, then the



next field the next night, and so on. From May to June, the rice grains begin to develop and the people start putting up scarecrows (*asi faked*) and the children are sent to their rice fields to drive away the rice-eating birds (*enfelewcha*). *Asi ani* (harvest time) is usually in the months of June and July. In between harvest times, the women start sowing seeds for the second rice crop. After harvest in July is a thanksgiving ceremony may be performed. During the third period, the people have much to eat. It is also the onset of the rainy season and the second crop is planted. During this period, in the latter part of November, is the *asi tokhi* (digging of camote) and towards the end of November and the whole month of December, is the harvesting of second cropping (De Los Reyes, 1987).

Wet rice is planted on the rice terraces on the mountain slopes or on narrow flat areas along riverbanks where there is abundant water supply and where the people are able to grow crops of rice annually. Generally, the rice produce is not sufficient to support everyone all year round, hence, the need to supplement the produce from the swidden farms where crops are grown and sold to obtain money to buy additional rice if necessary (De Los Reyes, 1987).

Culhi et al. (1998-1999) found in their evaluation of the sustainability of the Ifugao terraces farming system, that the three traditional practices like *ahigabut* (genera/weeding), *ahihopnak* (seedbed preparation) and *ahikagoko* (weeding inside the rice paddies) significantly influenced the sustainability of the Ifugao rice terraces. Increased practice of these three traditional practices



contributed to the ecological sustainability of the terraces. The weeds removed and uprooted from the rice paddies are incorporated in the soil of rice paddies to be composted into an organic fertilizer.

Introduced/adopted agricultural practices. The Philippine economy remains to be predominantly agricultural. About 65 percent of Filipinos depend on agriculture for their livelihood. Logically, therefore, where agriculture goes, there goes the country (Valera et al., 1987).

However, traditional agricultural practices which are still widely practiced by the majority of the Filipino farmers should go up to the level of modern and science-based farming. Interventions, especially on the side of the government, are needed to fast track transformation and meet the demands of time and the increasing population. As reported in the 2006 Indicative Plans of the Department of Agriculture, improved agricultural practices in terms of seeding, transplanting and harvesting were the priority areas. Added to these are the improved technologies on plant varieties like the hybrid program on rice and vegetables.

Among the successful cultural technologies is the one introduced by AVRDC that improve production of pakchoi and has been proven to be profitable based on experimental and survey data from San Leonardo and CLSU (Marzan et al., 2001). The cost-and-return analysis of technology showed significant improvement in yield and net income when compared to traditional farmer's practice. For example, by sowing in rows on raised beds covered with screen



tunnels and by fertilizing with composted household waste, yield increased by 247 percent over the standard practice of broadcast seeding on flat beds with only inorganic fertilizer. The cost differential between improved and standard practices was 103 percent. The additional expense with the improved practice comes from the purchase of screen, and labor costs for bed preparation, seeding in rows, and harvesting/packaging more produce as a result of applying the improved practice. However, negative perceptions of the technology by farmers arise on the capital needed to buy screens and on labor needed to raise beds, to sow seeds in rows, and to erect screen tunnels. Farmers saw that by using the technologies, yield per unit was increased and pesticides cost was reduced, yet they were unwilling to invest the time and money required to use a new practice. Apparently farmers are most comfortable with their old practices, and they lack starting capital.

In the Cordillera, some of the successful agricultural practices adopted are the improved practices on pest and disease control.

Vegetable pests and disease control. Cabatu (1997), as cited by Wandalen (1996), stated that the ideal method of combating diseases is to grow resistant varieties. Since 1900, resistance breeding has assumed growing importance. The substantial increase in world food production has not only been possible because of improvement in the yield potential of the crop varieties but also because these varieties have genetic qualities to resist pathogen. The crop selection practices



adopted by many would play an important role in combating pathogens. With the variability among the hosts and also several efficient techniques for resistance breeding, there is a bright hope for continued success in this selection process.

The agricultural practice widely adopted by farmers in Benguet and Mountain Province are the use of sprinkler and drip irrigation. This is credited to the Highland Agricultural Development Project, which introduced such practice in 1987. After its implementation, the common method of irrigation practiced was sprinkler irrigation. Furrow irrigation and the use of watering cans have given way to the use of sprinkler or spray irrigation. Farmers have in fact invented their own version of sprinklers; they call it “rainbird.”

Aside from the adoption of this improved system of water application, controlled irrigation can also be used to control specific pests and diseases. Talekar et al. (1986) conducted a study on modified irrigation and appropriate intercropping on the control of DBM during the dry period where DBM is a serious pest. They applied water by 1.5 meter high sprinkler system over five minutes at dusk, then half days over the first three to four weeks, then every day thereafter. As reported, this method significantly reduced the DBM infestation and increased the yield at a level that is much better when compared with yield at a level that is on plots applied with drip irrigation (check plots), which received equal amount of water. The physical disruption of flying activity and *oviposition*, and to some extent, washing of larvae and adults, were presumably the major



causes of the observed effects. The researchers added that besides insect infestation, the irrigation system probably played a significant role in other ways in increasing the yield.

For bean rust, overhead irrigation is suitable to dispense the spores from the leaf surface. Right timing of planting and general sanitation are also important. On root rots, collection and destruction of infected plants are effective. Maintaining soil fertility through the application of organic matter inhibits the build-up of the disease. For downy mildew, this could be avoided by using resistant varieties, and observing general sanitation and proper irrigation (IIRR, 1986).

Phases of Agricultural Development

The farming areas in most of the provinces in the Cordillera are limited. Of the region's total land area of 1,829,400 hectares, only about 17 percent is classified as alienable and disposable and only about 10 percent is devoted to agriculture; approximately 40 percent is forest land, mostly pine forest; 15 percent is grassland; and 34 percent is with mixed crops.

Agriculture in the Cordillera, therefore, needs to be intensified to meet future demands for commodities and to avoid further expansion into marginal lands and encroachment on fragile ecosystems. In other words, there is a need to diversify the production systems to maximize benefits from local resources while minimizing environmental and economic risks (Colting, 2006).



Promoting Sustainable Agriculture

The objectives of promoting sustainable agriculture are: (a) to improve farm productivity in a sustainable manner, as well as to increase diversification, efficiency, food security and rural incomes, while ensuring minimized risks to the ecosystem; (b) to enhance the self-reliance of farmers in constructing and improving rural infrastructure; facilitate the transfer of environmentally sound technologies for integrated production systems, including indigenous technologies and the sustainable use of biological and ecological processes, agroforestry, sustainable wildlife management, aquaculture, inland fisheries and animal husbandry; and (c) to create farm and non-farm employment opportunities, particularly among the poor and those living in marginal areas, taking into account the alternative livelihood proposal inter alia in dry land areas (Agenda 21).

In the Cordillera, agricultural sustainability is at its weakest in the farming communities that engage in commercial vegetable production. The excessive use of pesticide has already altered the environment and worsened pest and disease problems in those communities. In rice production, however, some sustainable agricultural practices have been observed.

In their evaluation study, Culhi et al. (1998-1999) found that the sustainability of the Ifugao terraces farming system was at moderate level. With time, the Ifugao terraces farming system in its dynamic relationships with the



environment undertook ecological, social, cultural, and economic changes. This changes were due to the gradual loss of forests, abandonment of the rice terraces by some of the young farmers, gradual construction of houses along the rice terraces by some of the young farmers, non-existence of ordinances and sustainable agricultural programs, and the minimal application of *pingkol* (mounds) and *inado* (composts) by the farmers themselves.

Agricultural Problems Encountered by Farmers

Despite success of banner programs in agriculture as supported by major agricultural development projects such as HADP and CHARMP, several problems still remain in the Cordillera, both physical and non-physical. Physical problems include inadequate facilities and infrastructure. The insufficient and bad condition of many farm-to-market roads in the region has been stalling development in the countryside. The Philippines has the largest transport margin, which means that transporting products to the market takes 50 percent of the production cost. More expenses are incurred in delivering farm goods to the market (DA-CARFU, 1995).

Another area of concern is the inadequate irrigation facilities. Sufficient irrigation water is needed so that farmers can plant twice or more times a year.

For non-physical problems, economic factors, specifically farmers' access to credit and lack of control over rice trading, have remained the barriers in



improving the rice industry (DAR-FAPOs, 2002). Farmers continue to rely on informal money lenders who exact high interest despite the presence of sufficient credit facilities in the country due to the stringent criteria for the approval of the loan application.

Guiague (2002) found that the implementation of agricultural projects and programs is most extensively affected by unavailability of funds and inaccessibility of sites. These are coupled with lack of communication facilities. Some LGU officials cannot participate actively in the implementation of agricultural projects and programs due to problems on access and communication network. It was also found that cultural practices and beliefs of people and misunderstanding on land ownership are the most serious problems affecting the implementation of the agricultural programs and projects. Thus it was recommended that, to be effective in delivering support services such as funds and transportation facilities, strong coordination between LGU and the implementing body should be established which can be done by involving the latter in the project from planning to the implementation period.

Buen (2003) found that farmers/beneficiaries encountered serious problems such as difficulty to convince fellow farmers to change their old beliefs and practices in farming, illiteracy among most of the local leaders, lack of fellow farmer's capability to adopt technology due to lack of capital, complexity of technology, lack of material control among beneficiaries, persistence of the



“donor” syndrome and lack of interest in attending meetings/briefings. On the other hand, extension workers perceived that the problem on physical resources is serious and that the problem of road network highly affects the respondents.

These problems differ in different places in the Cordillera. The study of Vargas (1997) on the effect of devolution on selected agricultural development projects and extension services in Nueve Ecija, revealed that the problems stem from the following factors: extreme strictness of some local officials in the whereabouts of agricultural personnel; lack of financial support, trainings, and some seminars of AT's in technology; lack of monitoring and evaluation coming from national government; inadequate budget for supplies and materials; and non-implementation of yearly salary increase and hazard pay. It was inferred that there were changes on the adequacy of different items like budgetary appropriation, technical assistance provided to farmers, visit to target clientele, communication flow, organizational structure, monitoring and evaluation of the devolved function. Thus devolution affected the agricultural development programs and extension services in various degrees.

Conceptual Framework

Figure 1 shows the variables of the study. Farmers' socio-economic and community's agricultural profiles are interrelated. Agricultural development leads to improvement of farmers' socio-economic life.



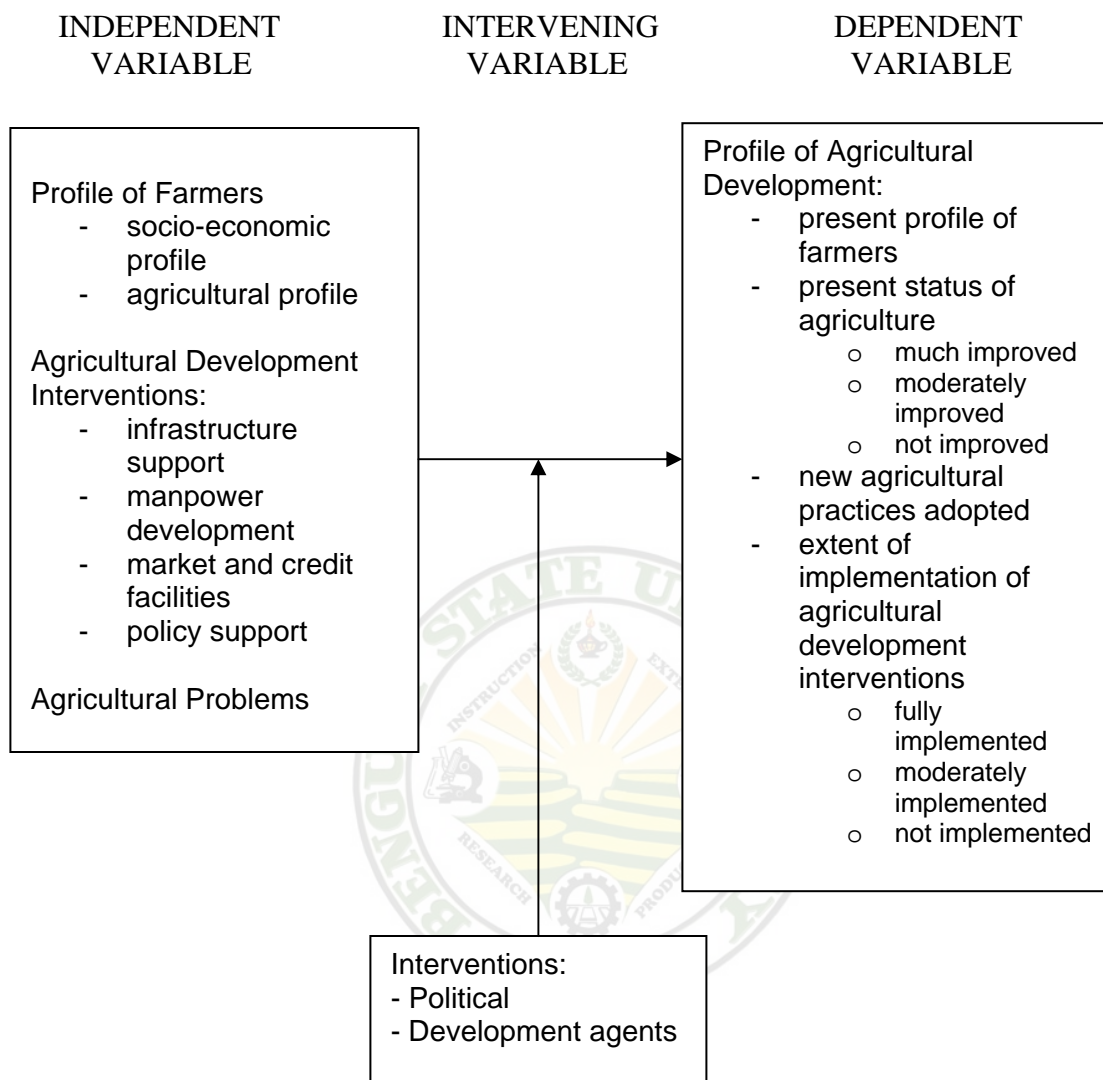


Fig. 1. Paradigm of the study showing the interrelationships of variables

Establishment and/or improvement of agricultural support facilities such as infrastructure, credit, market, and technical support facilities will increase production, income, and managerial capabilities of farmers. But this will only be possible depending on the nature of implementation employed by the change agents and the political machinery/system that supports it. Thus, the extent and



pace of agricultural development depends on the extent of implementation of agricultural development interventions. Strong political will augurs the full implementation of appropriate agricultural development interventions that will consequently hasten community development growth. This study looks into the extent of agricultural interventions and development in Bauko which is important in formulating and implementing further development plans.

Operational Definition of Terms

The following terms are defined according to how they are used in the study:

Agricultural development refers to the changes related to agricultural technologies, support facilities and practices that improve sustainability and productivity of farming systems.

Farming profile refers to the respondents' number of years in farming, species and type of crops planted, farm area, farming methods and farm income.

Farmers refer to the respondents involved in farming activities in rice and vegetable production.

Agricultural development interventions refer to the introduced technologies or practices and support services (such as infrastructure, credits, etc) that improve the socio-economic condition of the respondents or a certain community.



Agricultural practices refer to the traditional or modern activities in farming.

Agricultural facilities refer to the agricultural development interventions such as storage and greenhouses, packing and waiting sheds, nursery, training centers, dryers and irrigation system.

Agricultural technology refer to an innovation in the technique/method/ approach related to the farming systems of the communities.

Infrastructure refer to the agricultural support facilities such as community road network, farm-to-market road, pathways, bridges, buildings, irrigation system, and post-harvest facilities.

Manpower development refers to the capability building activities for the farmers such as seminars and workshops on new agricultural technologies.

Policy support refers to the ordinances formulated and passed by the local government units for agricultural development.

Degree of seriousness of problems refers to the extent of a problem encountered by the farmer-respondents in their farming activities, described as follows: extremely serious, very serious, moderately serious, slightly serious and not serious problem by the farmers.

Implementation refers to the degree by which an agricultural development intervention is operationalized or fulfilled by concerned agencies as perceived by the respondents, described as: fully implemented (100 percent completed) fairly



implemented (75 percent completed), moderately implemented (50 percent completed), and no implementation of the project/program.

Political intervention refers to the activities or outputs of the politicians or LGUs related to agricultural development projects or program.

Development agents refer to persons, agencies or organizations that initiate development programs or projects in the community.

Hypotheses of the Study

The following hypotheses were put forward for testing:

1. There is a significant difference in the socio-economic profiles of the respondents.
2. There is a significant difference in the respondents' perception of the extent of implementation of the agricultural development interventions in the community.
3. There are new agricultural practices and problems encountered in rice and vegetable production by farmers at present.
4. There is a significant difference on the degree of seriousness of the problems encountered by the respondents in the HADP and non-HADP areas.



METHODOLOGY

Locale and Time of the Study

The study was conducted in Bauko, one of the ten municipalities of Mountain Province (Fig. 2). The other municipalities of the province are Barlig, Bauko, Besao, Bontoc, Natonin, Paracelis, Sabangan, Sadanga, Sagada and Tadian.

Bauko is approximately 30 kilometers away from Bontoc, the capital town of Mountain Province, and 123 kilometers away from the City of Baguio. It takes about five to six hours ride to reach the place from Baguio. It consists of 22 barangays, namely, Sinto, Mt. Data, Monamon Sur, Monamon Norte, Sadsadan, Maba-ay, Leseb, Tapapan, Guinzadan Central, Guinzadan Sur, and Guinzadan Norte, Mayag, Abatan, Banao, Lagawa, Poblacion, Otucan Sur, Otucan Norte, Bila, Bagnen Oriente, Bagnen Proper and Balintaugan (Fig. 3).

The study was conducted from August to September 2006.

Respondents of the Study

The respondents of the study consisted of farmers, barangay captains, farmer leaders, municipal agriculture officers and municipal agricultural technicians.



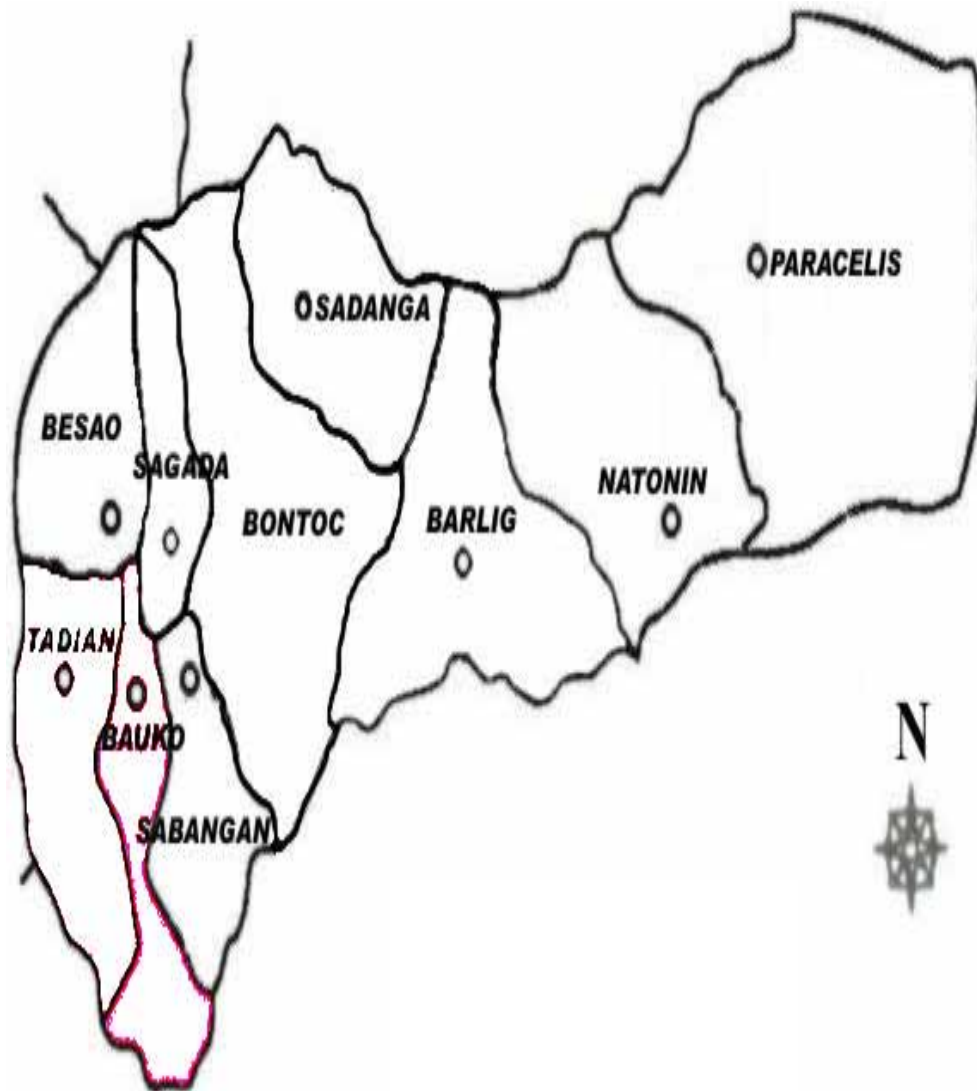


Figure 2. Map of Mountain Province showing Bauko and the other municipalities of the province



The respondents were selected from the 22 barangays of Bauko. The study area was categorized into non-HADP-covered barangays (Sinto, Mt. Data, Leseb, Guinzadan Central, Abatan and Poblacion) and HADP-covered barangays (Monamon Sur, Sadsadan, Mabaay, Tapapan, Banao, Otucan Sur and Bila). There were 70 respondents from each of the two groups of barangays, giving a total of 140 respondents.

Instrumentation and Data Gathering

In gathering the needed information, the instrument used depended on the problems and objectives of the study. For objective number 1, an interview schedule was used. For objective number 2, both interview and the annual accomplishment reports of the different barangays and the municipal LGU were used. For objectives 3, 4 and 5, interview schedule was also used. Ocular observations, photo-documentation, tape recording of respondents were also employed.

Data Interpretation and Analysis

The researcher consolidated and tabulated the gathered data in accordance with the objectives of the study. Frequency counts, percentages, weighted means and ranks were used to facilitate data interpretation.



The formula for weighted means is as follows:

$$\bar{\chi}_w = \frac{\sum f_i X_i}{\sum f_i}$$

Where: f_i = frequencies

X_i = weights

\sum = summation

$\bar{\chi}_w$ = weighted mean

T-ratio was also computed to determine the tabular value in testing the hypotheses of the study. The formula is:

$$\text{T-ratio} = \frac{\text{Average mean of X} - \text{average mean of Y}}{\text{Standard Error of Difference (SED)}}$$

The chi-square (χ^2) test was utilized to test differences between the respondents' profiles, perception on the extent of implementation of the agricultural interventions, farming practices, and perception of the degree of seriousness of their problems.

The formula of the chi-square is:

$$\chi^2_c = \sum \frac{(O_i - O_e)^2}{O_e}$$

Where:

χ^2_c = computed chi-square value

O_i = observed frequency

O_e = expected frequency

\sum = summation



RESULTS AND DISCUSSION

Respondents' Profile

The socio-economic and farming profiles of the respondents were determined. The socio-economic variables considered are age, sex, civil status, complimentary sources of income, number of children, educational attainment of respondents' children, house condition, water source, light source, toilet and appliances. Determined in farming profile are crops planted, types of crops planted, farm area, annual income, land tenure, farming method, farm inputs, cropping pattern and utilization of products.

Socio-Economic Profile

Table 1 shows the socio-economic profile of the respondents.

Age. The greatest number of the respondents from the barangays covered by the Highland Agricultural Development Program (HADP) range in age from 41 to 50 years, followed in descending order by those whose age range from 51 to 60 years, 61 to 65 years, 36 to 40 years, 31 to 35 years, and 25 to 30 years.

Similarly, the greatest number of the respondents from HADP areas are those who range in age from 41 to 50 years, followed by those who range in age from 51 to 60 years. Further followed in descending order by those aged 36 to 40 years, 31 to 35 years, and 25 to 30 years.



Table 1. Socio-economic profile of the respondents from non-HADP and HADP covered barangays of Bauko

PROFILE	NON-HADP AREA		HADP AREA	
	N	%	N	%
<u>Age (year)</u>				
25-30	3	4.29	3	4.29
31-35	3	4.29	3	4.29
36-40	9	12.86	12	17.14
41-50	23	32.86	32	45.71
51-60	20	28.58	15	21.43
61-65	12	17.14	6	8.57
Sub-total	70	100.00	70	100.00
	$X^2_c = 5.497^{ns}$		$X^2_{.05} = 11.07$	
<u>Sex</u>				
Male	53	75.71	29	41.43
Female	17	24.29	41	58.57
Sub-total	70	100.00	70	100.00
	$X^2_c = 16.98^*$		$X^2_{.05} = 3.84$	
<u>Civil Status</u>				
Single	8	11.43	5	7.14
Married	62	88.57	65	92.86
Sub-total	70	100.00	70	100.00
	$X^2_c = 0.762^{ns}$		$X^2_{.05} = 3.84$	
<u>Educational Attainment</u>				
No Schooling	6	8.57	6	8.57
Elementary level	9	12.86	9	12.86
Elementary graduate	9	12.86	9	12.86
High school level	3	4.29	-	-
High school graduate	26	37.14	26	37.14
College graduate	12	17.14	17	24.29
Vocational	5	7.14	3	4.29
Sub-total	70	100.00	70	100.00
	$X^2_c = 2.862^{ns}$		$X^2_{.05} = 14.07$	
<u>Number of Years in Farming</u>				
20 – 25	47	67.14	38	54.29
25 – 30	14	20.00	17	24.29
36 – 40	9	12.86	9	12.86
41 – 50	-	-	6	8.57
Sub-total	70	100.00	70	100.00
	$X^2_c = 3.942^{ns}$		$X^2_{.05} = 7.81$	



Table 1. Continued

PROFILE	NON-HADP AREA		HADP AREA	
	N	%	N	%
<u>Complimentary Sources of Income</u>				
None	32	45.71	20	28.57
Vending - transfer from one place to another (ambulant)	6	8.57	3	4.29
Storekeeping (stationary/semi-permanent store/stall/booth)	11	52.86	-	-
Wage earning	9	12.86	17	24.29
Animal husbandry	3	4.29	6	8.57
Wine making	-	-	3	4.29
Barangay official	9	12.86	15	21.42
Government employee	-	-	6	8.57
Sub-total	70	100.00	70	100.00
	$X^2_c = 16.19^*$		$X^2_{.05} = 14.07$	
<u>Number of Children</u>				
0 – 3	20	28.57	17	24.29
4 – 6	43	61.43	32	45.71
7 – 9	9	12.86	9	12.86
10 – 12	3	4.29	12	17.14
Sub-total	70	100.00	70	100.00
	$X^2_c = 7.24^{ns}$		$X^2_{.05} = 7.81$	
<u>Educational Attainment of Respondents' Children</u>				
Elementary level	15	21.42	56	80.00
Elementary graduate	54	77.14	36	51.42
High school level	24	34.29	27	38.57
High school graduate	59	84.29	54	77.14
College level	24	34.29	9	12.86
College graduate	68	97.14	65	92.86
	$X^2_c = 34.41^*$		$X^2_{.05} = 11.07$	
<u>House Condition</u>				
Concrete + Wood + G.I.	32	45.71	44	62.85
Wood + G.I.	37	52.86	26	37.14
Sub-total	70	100.00	70	100.00
	$X^2_c = 3.81^{ns}$		$X^2_{.05} = 5.99$	



Table 1. Continued ...

PROFILE	NON-HADP AREA		HADP AREA	
	N	%	N	%
<u>Light Source</u>				
Electric	70	100.00	67	95.71
Others (candle and/or kerosene lamp)	-	-	3	4.29
Sub-total	70	100.00	70	100.00
	$X^2_c = 1.56^{ns}$		$X^2_{.05} = 7.81$	
<u>Water Source (potable)</u>				
Undeveloped spring	-	-	8	11.43
Developed spring (tank + faucet)	65	92.86	59	84.28
Pumping	5	7.14	3	4.29
Sub-total	70	100.00	70	100.00
	$X^2_c = 4.75^{ns}$		$X^2_{.05} = 5.99$	
<u>Toilet Facilities</u>				
Open pit	6	8.57	3	4.29
Toilet with bowl (cemented)	44	62.86	41	58.57
Water sealed (automatic)	6	8.57	23	32.86
Water sealed (manual)	14	20.00	3	4.29
Sub-total	70	100.00	70	70
	$X^2_c = 18.17^*$		$X^2_{.05} = 7.81$	
<u>Appliances</u>				
Television	30	42.85	27	38.57
Radio	50	71.43	47	67.14
Refrigerator	18	25.71	24	34.27
Gas range	6	8.57	18	25.71
VHS/DVD	12	17.14	9	12.86
Gas stove	20	28.57	29	41.43
Others (Computer)	-	-	6	8.57
	$X^2_c = 10.77^{ns}$		$X^2_{.05} = 14.07$	

* - significant / ^{ns} - not significant

Sex. The great majority of the respondents from non-HADP-covered areas are males. Conversely, the majority of the respondents under the HADP-covered areas are females.



Civil status. In both groups of respondents, almost all are married; only a few are single.

Educational attainment. In both groups, the greatest number of respondents are high school graduates. Following in descending order of frequencies are college graduates, elementary graduates or those with elementary education, those without schooling, and vocational course graduates.

Number of years in farming. Leading in number in both groups of respondents are those who have been farming for 25 to 30 years, followed by those who have been farming for 36 to 40 years. No respondents under non-HADP areas have engaged in farming for 41 to 50 years while a few of those under HADP areas have engaged in farming for 41 to 50 years.

Complimentary source of income. The majority of the respondents from non-HADP areas derive additional income from storekeeping; less than half have no source of additional income; few derive additional income in the form of wage, they being employees of certain institution; and very few derive other income either from vending or from engaging in livestock raising.

In HADP areas, leading in number are respondents without other income sources, followed in descending order by those who derive other income from their employment in an institutions, from engaging in livestock raising, by working as government employees, and by engaging in wine making and vending (ambulant vendor's practice).



Number of children. The great majority of the respondents from non-HADP areas have four to six children; some have one to three children; few have seven to nine children; and very few have 10 to 12 children. In HADP areas, leading in number are also those with four to six children, followed also by those with one to three children; next are those with 10 to 12 children, and then those with seven to five children.

Educational attainment of respondents' children. The greatest number of respondents' children from non-HADP areas are college graduates, followed in descending order by high school graduates, elementary graduates, those who have reached high school or college level, and those who have attended elementary level. Similarly, most of the respondents' children of the HADP-covered areas are college graduates. Following in descending order are those who have attained elementary education, high school graduates, and those who have attended college or tertiary education.

House condition. The majority of respondents from non-HADP areas have houses made of wood and galvanized iron. Almost half of them have houses made of wood, concrete and galvanized iron. Conversely, the great majority of the respondents from HADP areas have houses made of concrete, wood and galvanized iron. Few of them have houses made of wood and galvanized iron.

Water source. Almost all the respondents from the non-HADP areas derive their potable water from developed spring with tank and faucet facilities.



The rest derive their potable water underground through pumping. None of them get their potable water from undeveloped spring. On the other hand, most of the respondents from HADP areas derive their potable water from developed spring, few of them derive their potable water from undeveloped spring, and very few derive their potable water from underground through pumping.

Light source. Both groups of respondents derive their lighting from electricity, except for three respondents from the non-HADP-covered areas who use candle and/or kerosene lamp for lighting.

Toilet. The great majority of respondents from non-HADP areas use a cemented bowl. Few of them use water-sealed bowls which are flushed manually. Similarly, the majority of the respondents from HADP-covered areas use cemented bowl; however, many of them use water-sealed bowls with flushers and very few have either manual-water sealed toilet or an open-pit toilet.

Appliances. In non-HADP areas, the leading household appliance the respondents have is radio, followed in descending order of frequencies by television, gas stove, refrigerator, and gas range. Similarly, in the HADP-covered areas, the leading appliance the respondents have is radio. Following in descending order of frequencies are gas stove, television, refrigerator, gas range, VHS/DVD player and computer.

Test of difference. Based on the results of the chi-square test, the hypothesis that there is a significant difference among respondents' socio-



economic profile is accepted only in terms of their sex, complimentary source of income, and educational attainment of respondents' children.

On the other hand, the age, civil status, educational attainment, number of years in farming, number of respondents' children, house condition, water and light sources, and appliances of the respondents do not significantly differ. This insignificant difference is shown by the computed chi-square value being lower than the tabular value at .05 level of significance.

Respondents' Farming Profile

Table 2 presents the farming profile of the respondents which includes crops planted, types of crops planted, farm area, annual income, land tenure, farming method, farm inputs, cropping pattern, and utilization of product.

Crops planted. In non-HADP areas, the leading crop planted by respondents is cabbage. Following in descending frequencies are carrots, gabi, Baguio beans and corn; wombok and rice; potatoes, peanuts, pepper and camote; sweetpeas, pechay and radish; and tomatoes. Conversely, the leading crop planted by respondents from HADP areas is rice, followed in descending order of frequencies by carrots, Baguio beans, peanut, cabbage, potatoes, corn, camote, wombok and pechay, gabi, pepper, and sweetpeas. None of them plant tomatoes and radish.



Table 2. Farming profile of the respondents

PROFILE	NON-HADP AREA		HADP AREA	
	N	%	N	%
<u>Crops Planted</u>				
a. Rice	24	34.29	50	71.43
b. Vegetables				
Tomatoes	3	4.29	-	-
Carrots	32	45.71	41	58.58
Cabbage	38	54.29	27	38.57
Wombok	24	34.29	15	21.43
Pechay	6	8.57	15	21.43
Radish	6	8.57	-	-
Pepper	12	17.14	6	8.57
Potatoes	21	30.00	21	30.00
c. Root Crops				
Camote	11	15.71	17	24.29
Gabi	29	41.43	8	11.43
d. Legumes				
Baguio beans	26	37.14	29	41.43
Sweetpeas	5	7.14	5	7.14
e. Others				
Peanut	17	24.29	29	41.43
Corn	23	32.86	20	28.57
	$X^2_c = 5.914^{ns}$		$X^2_{.05} = 9.49$	
<u>Type of Crops Planted</u>				
Hybrid	45	71.43	59	84.29
Local	33	50.00	29	41.43
Mixed	15	21.43	6	8.57
	$X^2_c = 6.026^*$		$X^2_{.05} = 5.99$	
<u>Farm Area (square meter)</u>				
0 – 500	3	4.29	17	24.29
501 – 1,000	35	50.00	29	41.43
1,001 – 2,000	8	11.43	6	8.57
2,001 – 3,000	-	-	3	4.29
3,0001 – 4,000	6	8.57	3	4.29
4, 001 – 5,000	6	8.57	3	4.29
5,001 – 6,000	12	17.14	9	12.86
Sub-total	70	100.00	70	100.00
Average Farm Area = 2,572	$X^2_c = 14.57^*$		$X^2_{.05} = 12.50$	



Table 2. Continued . . .

PROFILE	NON-HADP AREA		HADP AREA	
	N	%	N	%
<u>Annual Income</u>				
P1,000 – P5,000	3	4.29	23	32.86
P 6,000 – 10,000	6	8.57	11	15.71
P11,000 – 15,000	6	8.57	24	34.29
P16,000 – 20,000	29	41.43	3	4.29
P20, 000 – 25,000	14	20.00	6	8.57
P26,000 – P30,000	12	17.14	9	12.86
Sub-total	70	100.00	70	100.00
Average Income = P13,166	$X^2_c = 52.2^*$		$X^2_{.05} = 11.07$	
<u>Land Tenure</u>				
Tenant	17	24.29	9	12.86
Owned	47	67.14	50	71.43
Rented	6	8.57	11	15.71
Sub-total	70	100.00	70	100.00
	$X^2_c = 4.01^{ns}$		$X^2_{.05} = 5.99$	
<u>Farming Method</u>				
Manual (pure)	59	84.29	47	67.14
Manual with the help of animals	11	15.71	23	32.86
Sub-total	70	100.00	70	100.00
	$X^2_c = 5.56^{ns}$		$X^2_{.05} = 5.99$	
<u>Farm Inputs</u>				
Fertilizers - ammonia, triple 14, etc.	47	67.14	59	84.29
Pesticides/insecticides	70	100.00	50	71.43
Organic/chicken dung	15	21.43	3	4.29
Seeds/seedlings	15	21.43	20	28.54
Hired labor	15	21.43	38	54.29
	$X^2_c = 20.7^*$		$X^2_{.05} = 9.49$	
<u>Cropping Pattern</u>				
Mono cropping	9	12.86	15	21.43
Intercropping	29	41.43	42	62.86
Crop rotation	50	71.43	51	78.57
	$X^2_c = 1.827^{ns}$		$X^2_{.05} = 5.99$	
<u>Utilization of Product</u>				
For consumption	30	42.86	38	54.29
For market	50	71.43	18	25.71
Both consumption and for market	38	54.29	32	45.71
	$X^2_c = 12.37^*$		$X^2_{.05} = 5.99$	



Highland Agricultural Development Program (1994) reported that the principal crops in the program's coverage, which includes Bauko, were potatoes, cabbage, green pepper, pole beans, and garden peas; with smaller areas planted to lettuce, carrots, and other vegetables. This report is almost consistent with the findings of this study as to the crops planted by the respondents.

Type of crops planted. Of the crops planted by respondents from non-HADP areas, hybrid crops rank first in frequency, followed in descending order by local varieties and then by mixture of hybrid and local varieties. Hybrid crops also ranked first in barangays covered by HADP areas, followed by local variety and by mixture of hybrid and local variety.

Farm area. The average farm size of the respondents is 2,572 square meters. The farms of one half of respondents from non-HADP areas measure 501-1,000 square meters. Following in descending order are those with farms measuring more than 5,001 square meters; those with 1,001-2,000 square meters; those with 3,001-4,000 square meters and 4,001-5,000 square meters, and those with less than 500 square meters.

Similarly, the respondents from HADP areas having farms measuring 501-1,000 square meters have the greatest number (but less than are half), followed in descending order of frequencies by those with farms measuring 100-500 square meters.; those with more than 5,001 square meters; and those with 2,001-3,000 square meters, 3,001-4,000 square meters, and 4,001-5,000 square meters



Annual income. The average annual income of the respondents is P13,166. Almost half of the number of respondents from the non-HADP-covered areas earn annual incomes ranging from P16,000 to P20,000; some earn more than P26,000; few earn P11,000 to P15,000 and 6,000 to P10,000; and very few earn less than P5,000.

Many respondents from HADP areas earn annual incomes of P11,000 to P15,000 and less than P5,000; some earn P6,000 to P10,000 and more than P26,000; and few earn P16,000 to P20,000 or P20,000 to P25,000.

Land tenure. The majority of the respondents from non-HADP areas own the land that they till, some of them are tenants, and very few rent the land they cultivate. Similarly, the great majority of the respondents from HADP-covered areas own the land that they till; the rest are either tenant, or rent the land they cultivate. This finding that the great majority of the respondents own the land they cultivate is almost consistent with the CHARMP's report (2004) that most of their respondents are full owners of a particular parcel of land/farm.

Farming method. Almost all of the respondents from non-HADP areas and the great majority of the respondents from HADP areas employ purely manual method of farming. Only few of the respondents from non-HADP and some respondents from HADP areas employ manual method coupled with the use of domesticated animals. None of them employs mechanized farming.



Farm inputs. Leading in frequency as to farm inputs used by respondents from non-HADP areas is pesticides or insecticides, followed by commercial inorganic fertilizers, and then organic fertilizers (mainly chicken dung), seeds or seedlings and labor. On the other hand, the leading inputs of the respondents from HADP areas are commercial/inorganic fertilizers, followed in descending order by pesticides or insecticides, labor, seeds or seedlings and organic fertilizers.

The above information as to farm inputs partially jibes with HADPs (1994) report that the private sector supplies fertilizers and food crops; that fertilizers and pesticides usage on commercial vegetables is high; and that the vegetable seeds used are imported.

Cropping pattern. Leading in frequency among the cropping pattern practiced by respondents from non-HADP areas is crop rotation, followed by intercropping and monocropping. Similarly, among the cropping patterns practiced by respondents from HADP areas, crop rotation ranks first, followed by intercropping and monocropping.

Utilization of product. The great majority of the respondents from non-HADP areas raise the crops purposely to be sold in the market; more than half of them raise the crops mainly for both market and home consumption; and less than half raise crops purposely for home consumption only. Conversely in HADP areas, the majority of the respondents produce crops mainly for home



consumption; almost one half say they produce crops for both home consumption and market; and one fourth of them say they produce crops for market.

Test of difference. Based on the result of the chi-square test, the respondents' type of crops planted, farm area, annual income, farm inputs, and manner of product utilization significantly vary while the respondents' choice of crop species/varieties, land tenure, farming method, and cropping pattern do not significantly vary. Hence the hypothesis, that there is a significant difference in respondents' farming profile, is accepted only in terms of their types of crops planted, farm area, annual income, farm inputs and manner of crop utilization.

Agricultural Development Interventions

The agricultural development interventions are composed of infrastructure support facilities such as community roads, farm-to-market road, foot and road bridges, and pathways; agricultural facilities; manpower development; market and credit facilities; and policy support. Such interventions are part of the functions devolved to LGU as per RA 7160, otherwise known as the local Government Code of 1991. According to Dalog (2002), the LGUs of Bauko, Sabangan and Bontoc provide strong support for agricultural development in the form of loans; strong linkage with development agencies such as the CHARMP, DTI, TESDA and DA; and active staff/personnel. As per information gathered, Bauko has



achieved significant improvement in its agricultural industries through support that comes mainly from its LGU.

Infrastructure

Table 3 shows the infrastructure developed in Bauko, specifically farm-to-market roads, bridges, and pathways. Portions of them farm road networks are shown in Plates 1 and 2. These infrastructure support facilities are generally in good condition, although a significant number need improvement and/or repair.

Those that need urgent improvement or repair or completion are the following:

<u>Infrastructure</u>	<u>Improvement Needed</u>
<u>Roads:</u>	
Community road with a total length of:	
52.77 km	- Concreting or asphaltting
45 km	- Full concreting (only tire path concreted)
Farm to market road with a total length of:	
115.35 km	- Graveling or concreting
35.53 km	- Full concreting (tire path concreted)
<u>Bridges:</u>	
Road bridges with a total length of 96.5 m	- Repair
Foot bridges with a total span of 106 m	- Repair
Foot bridges with a span of 21.6 m in Banao and Sadsadan	- Completion
<u>Pathways:</u>	
Graveled pathway with a total span of 5 km	- Concreting
5.23 km foot path (on natural soil bed)	- Concreting



Table 3. Agricultural development interventions in terms of infrastructure support facilities

INFRASTRUCTURE	TOTAL NUMBER		DIMENSION		MATERIALS USED			CONDITION		
					KIND OF MATERIAL		% OF THE INFRA MADE OF THE MATERIAL		CRITERIA	% BY CATEGORY
	HADP AREA	NON HADP	HADP AREA	NON HADP			HADP AREA	NON HADP		
1. Community roads	16	9	4.5m* x 149.50k m	4.5m* x 135km	Concrete	68.75	44.44	In good condition	83.33	88.89
					Gravel	41.66	11.11	Needs repair		
					Asphalt	-	11.11	Not concreted	41.66	11.11
					Concrete (tire path)	-	33.33		8.33	-
2. Farm to market roads (FMR)	19	12	4m* x 62.27km	4m* x 22.1km	Gravel	10.53	33.34	In good condition	78.95	75.00
					Concrete (tire path)	10.53	25.00	Needs repair		
					Natural soil bed	73.68	41.67	Newly opened	10.53	8.33
					Concrete	5.28	25.00	Proposed	10.53	-
								-	16.67	
3. Road bridges	6	4	4.2m*x 160m	4.2* x 66m	Concrete	50.00	75.00	In good condition	50.00	75.00
					Solid steel (floor) + concrete (post)	16.67	25.00	Needs repair		
					Steel + wood + concrete	33.33	-		50.00	25.00
4. Foot bridges	22	12	0.9m*x 474m	0.9m* x 248m	Concrete	40.91	33.33	In good condition	81.82	83.33
					Steel matting + cable	40.91	58.33	Needs repair		
					wire	13.64	-	Under construction	13.64	16.66
					Concrete + wood	4.55	8.33		4.55	-
5. Pathways	35	19	1m* x 86km	1m* x 95km	Concrete	94.29	94.73	In good condition	94.29	94.73
					Gravel	5.71	-	Needs repair		
					Natural soil bed	-	5.26		5.71	5.26

$X^2_c = 0.19$

$X^2_{.05} = 9.49^{ns}$

ns – not significant

Legend:

* average standard width



Plate 1. Portion of the community and farm road networks; upper plate shows a gravelled road and the lower plate shows that only tire paths are cemented





Plate 2. Portions of farm-to-community road network paved with stones



One proposed farm to market road with a span of 3.68 km need to be allotted with funds.

Considered first class in terms of durability and quality by the respondents are those infrastructure made of concrete, followed by those made of steel and concrete combination. Considered last class are those made mainly of wood (for bridges) and roads on natural soil bed.

Based on HADP (1994) report, the roads of Bauko and other HADP projects in Mountain Province were extremely rugged prior to 1987. Data gathered in this data show significant improvement of the road network of Bauko.

Infrastructure funding agency. In terms of funding, the Barangay IRA, Municipal government and Provincial government are the regular sources (Table 4); each of these sources contributes about 1/4, or a total of 75 percent of the funding, for the infrastructure development in the municipality. The other sources altogether contribute about 25 percent of the funding, with the CDF contributing about 10 percent, about six percent from CHARMP/HADP, two percent from DPWH, and one percent from farmers association, community, and private sources. CHARMP (2004) reported that it delivered in Mountain Province a total of P240,689,505.46 worth of projects in rural infrastructure development, agricultural support services and community mobilization and resource management. Based on information gathered in this study, Bauko as CHARMP beneficiary has received an insignificant infrastructure support.



Table 4. Funding sources for the infrastructure support facilities of Bauko

INFRASTRUCTURE	SOURCE OF FUND		
	AGENCY	% CONTRIBUTION	
		HADP AREA	NON-HADP
1. Community roads	Community effort	-	11.11
	DPWH	-	22.22
	CHARMP	8.69	-
	Barangay IRA	17.39	22.22
	Municipal Gov't.	43.48	22.22
	Provincial Gov't.	30.43	22.22
2. Farm to market roads (FMR)	CDF	-	41.67
	Farmers association	-	8.33
	CHARM	21.05	-
	Community effort	5.26	-
	Private individuals	5.26	-
	Barangay IRA	21.15	16.67
	Municipal Gov't.	21.05	16.67
	Provincial Gov't.	26.32	16.67
3. Road bridges	CDF	-	50.00
	HADP	16.67	-
	Barangay IRA	-	50.00
	Municipal Gov't.	33.33	-
	Provincial Gov't.	50.00	-
4. Foot bridges	Community effort	4.55	8.33
	DA	4.55	-
	DPWH	9.09	-
	Barangay IRA	27.27	16.67
	Municipal Gov't.	40.91	58.33
	Provincial Gov't.	1364	16.67
5. Pathways	DPWH	14.28	-
	Barangay IRA	28.57	52.63
	Municipal Gov't.	21.43	41.67
	Provincial Gov't.	35.71	33.33

Legend: IRA - Internal Revenue Allotment
CDF - Congressional Development Fund



Agricultural Facility

Table 5 shows that the existing agricultural facilities in the municipality of Bauko include green-and storage houses, packing and waiting sheds, nurseries, dryers, and irrigation systems. Plate 3 shows representative waiting sheds; Plate 4, training centers of Sadsadan and Banao; and Plate 5, common drying facilities. These facilities are generally in good conditions although a significant number need improvement or repair.

The greenhouses, which are privately owned are all in good condition. They are temporary in nature, being made of plastics or nets with wooden skeletal frames.

The storage houses, which are either privately owned or for public use, are mainly for potato. Five of them, which are found in Sinto, Mt. Data and Sadsadan, need repair. Privately owned, packing sheds have semi-permanent structures, made of either concrete, or a combination of concrete, GI (roof) and wood (skeletal framework). One of the four packing sheds reported has no walls. There are six reported nurseries: one municipal nursery and five barangay nurseries. Only the nursery in Bila has a temporary shade made of wooden skeletal frames and grasses/brush as roof; the others are open (no temporary shed). Raised in those nurseries include, pine tree, germelina, and alnus seedlings.



Table 5. Agricultural facility

FACILITY	TOTAL NUMBER		DIMENSION	TOTAL AREA		MATERIALS USED			CONDITION		
						KIND OF MATERIAL	% OF THE FACILITY MADE OF MATERIAL		CRITERIA	% BY CATEGORY	
	HADP AREA	NON-HADP		HADP AREA	NON-HADP		HADP AREA	NON-HADP		HADP AREA	NON-HADP
1. Green house	-	3	10m x 15m*	-	600 sq.m	Plastic or net and wood	-	100	In good condition	-	100
2. Storage house: (mainly for potato)	9	4	20m x 24m*	1,341 sq.m.	1,300 sq.m	Concrete roof top & wall	88.89	50.00	In good condition	55.56	75.00
						Concrete floor + GI + wood	11.11	50.00	Needs repair	44.44	25.00
3. Packing sheds	-	4	10m x 18m*	-	800 sq.m.	Concrete	-	25.00	In good condition	-	75.00
						Concrete (floor) + GI (wall and roof)	-	75.00	Needs wall construction	-	25.00
4. Nursery	3	3	15m x 25m*	2,500 sq.m.	2,000 sq.m	(Open) Shade (grass w/ wood as structure frame)	66.67	100	In good condition	100	100
							33.33	-			
5. Training centers	5	3	27m x 24m*	1,700 sq.m.	1,500 sq.m	Concrete (floor) +GI roof + wood	40.00	16.67	In good condition	66.67	66.67
						Wood+ GI roof	60.00	33.33	Needs repair	33.33	33.33
6. Waiting sheds	29	23	4.56m x 5.22m*	456.50 sq.m.	320.5 sq.m	Concrete + (loading flat form on top)	37.93	8.70	In good condition	75.86	82.61
						Concrete + GI roof (no wall)	24.14	78.26	Needs wall construction	24.14	17.39
						Concrete (with wall)	37.93	13.05	In good condition	88.89	100

Table 5. Continued . . .

FACILITY	TOTAL NUMBER		DIMEN- SION	TOTAL AREA		MATERIALS USED			CONDITION			
						KIND OF MATERIAL	% OF THE FACILITY MADE OF MATERIAL		CRITERIA	% BY CATEGORY		
	HADP AREA	NON- HADP		HADP AREA	NON- HADP		HADP AREA	NON- HADP				
7. Dryers (solar)												
- public dryers	9	6	7.29m x 61.11m*	1,183 sq.m.	1,300 sq.m	Concrete	100	100	Needs repair	11.11	-	
- private dryers	7	9	4.85m x 6.71m*	258 sq.m.	500sq.m	Concrete	100	100	In good condition	100	100	
8. Irrigation												
- conveyance	20	11	0.45m x 3.75km* (length)	39.9 km (length)	63km (length)	Concrete (Natural soil bed)	65.00 10.00	45.46 9.09	In good condition	80.00	72.73	
						Hose	20.00	45.46	Needs repair	10.00	18.18	
						Pipe	5.00	-	Unusable	5.00	9.09	
									Proposed	5.00	-	
- mini-dams	3	2	5m x 10m*	1,300 sq.m.	1,000 sq.m	Concrete	66.66	-	In good condition	66.67	100	
						Soil	33.33	100	Needs repair	33.33	-	

 $X^2_c = 2.9$ $X^2_{.05} = 14.07^{ns}$

ns – not significant



Plate 3. Waiting sheds; the lower plate shows a built-in loading platform on the second deck





Plate 4. Multi-purpose hall of Sadsadan (upper) and Banao (lower); the halls are usually used for trainings/seminars



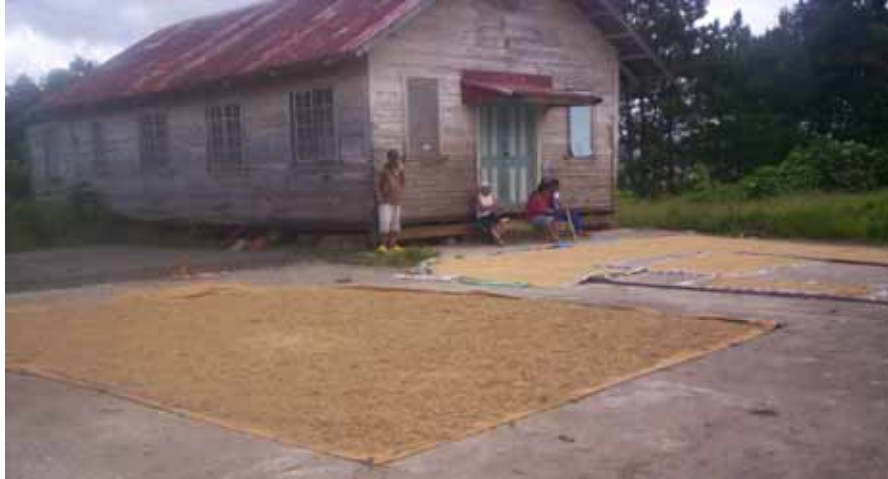


Plate 5. Seasoning agricultural products; lower photo shows corn being dried on a rooftop of the house; middle photos, drying of rice and grains in a stone-paved backyard wherein handwoven crafts, sacks, and other containers are used; upper photo, a concrete pavement where palay and other crops can be dried



Eight semi-permanent trainings centers are reported: one each in Bila, Otucan, Bagnen, Guinzadan, Banao, Sadsadan, Bauko Poblacion, and Mabaay; those found in Sadsadan, Otucan and Bagnen need repair.

Of the reported 52 public waiting sheds, all are semi-permanent but 11 need walls to safeguard people from getting wet during the rainy season or during a typhoon. The waiting sheds are usually used by people waiting for ride, resting when coming from farms with heavy load, and sometimes as packing shades for their products. Every barangay has one to three waiting sheds. HADP has contributed in the construction of potato storages, nursery, and waiting sheds with loading platform at the upper deck as part of its marketing assistance program (HADP, 1994).

The irrigation systems consist of 31 irrigation canals and five mini-water impounding dams. The mini-dams, found in Otucan and Bauko, are concrete; the other two, which are found in Bila and Bagnen, are made of soil materials and need repair.

Agricultural facility funding source. As shown in Table 6, there are 12 sources of funds. Barangay IRA is the top source, followed in descending order by private (facility owners), the municipal and provincial governments, NIA, HADP/CHARMP, DA, DENR, CDF, SK fund, community contribution and OCW's own effort. The data show that green- and storage houses, packing sheds, dryers are mostly privately-owned.



Table 6. Funding source for agricultural facilities

FACILITY	SOURCE OF FUND		
	AGENCY	% CONTRIBUTION OF AGENCY	
		HADP AREA	NON-HADP
1. Green house	Private	-	100
2. Storage house: (mainly for potato)	HADP	100	75.00
	Private	-	25.00
3. Packing sheds	Barangay IRA	-	-
	Private	-	100
4. Nursery	DA	33.33	-
	DENR	33.33	-
	Municipal gov't	33.33	66.67
	Provincial gov't	-	33.33
5. Training centers	Barangay IRA	100	-
	Municipal gov't	-	66.67
	Provincial gov't	-	33.33
6. Waiting sheds	OCWs Fund	3.45	-
	SK Fund	6.90	-
	HADP	10.34	-
	Barangay IRA	27.59	8.70
	Municipal gov't	27.59	69.57
	Provincial gov't	24.14	4.35
	CDF	-	13.04
	Community e	-	4.35
7. Dryers (solar) - public dryers	SK Fund	11.11	-
	Barangay IRA	22.22	100
	Municipal gov't	33.33	-
	Private	100	100
- private dryers	Private	100	100
8. Irrigation - conveyance	NIA	35.00	54.55
	DA	10.00	-
	Barangay IRA	-	18.19
	Municipal gov't	20.00	18.19
	HADP	5.00	-
	CDF	30.00	-
	Provincial	-	18.19
	- mini-dams	HADP	33.33
	NIA	33.33	-
	Barangay IRA	33.33	-



The number of facilities under HADP areas, as shown in the table, is slightly higher than that in non-HADP areas, impliedly due to HADP projects. HADP is ranked sixth among the funding sources.

Manpower Development

Various seminar-workshops related to farm management including farmers field school trainings and food processing have been conducted, mainly by DA-LGU (Table 7). The table shows that the seminars on the safety use of pesticides are conducted by private companies. Soil testing and Farmers Field School (FFS) trainings are conducted by the DA, and the rest jointly by DA-LGU.

The Farmers Field School, as envisioned and implemented by DA, is a strategy in promoting Integrated Pest Management (IPM). It was launched by then Pres. Fidel V. Ramos in 1993 through Memorandum Order 126, series of 1993. This strategy consists of a series of activities: planning, establishing rapport, setting criteria of prospective participants, conducting benchmark surveys, validating participants' needs, and curriculum designing. Its implementation entails giving orientation and overview, leveling of expectations, team farming, team building, pre-testing and using ballot box test, soil sampling and demonstrating the use of soil test kit, demonstrating effects of pesticides on human, discussing growth stages of crops, conducting participatory action research and analyzing of the agro-ecosystem, and assessing the FFS which include post-testing, field day, integrating learning, evaluation, and graduation.



Table 7. Manpower development

MANPOWER DEVELOPMENT	NO. OF BARANGAYS BENEFITED		FRE-QUENCY	PARTICIPANTS	FUNDING AGENCY	REMARKS
	HADP AREA	NON-HADP				
1. Seminars/ workshops						
- Safety use of pesticides	5	4	3x/year	Farmers Barangay officials	SYNGENTA, BAYER, ALDIS, FACONDA	- Continuous education - More free samples
- Farm management	4	4	1x/year	Farmers Barangay Officials	DA-LGU	- Farmers applied their experiences in farming
- Organic farming	7	7	1x/year	Farmers Barangay officials	DA-LGU	- Not applied
- Soil testing	5	3	1x/year	Selected farmers Barangay officials	DA	- Only 1 soil test kit - Applied as need arises
- Integrated pest management (IPM)	4	5	2x/year	Selected farmer	DA-LGU	- Some IPM component applied like natural cultural and biological control
2. FFS (Farmers Field School)	4	2	1x/year	Selected farmers	DA	- No follow-up
3. Food processing trainings						
- soya-milk, taho and tokwa making	4	3	1x/year	Women	DA-LGU	- Not practical
- banana and potato chips making	6	4	1x/year	Farmers	DA-LGU	- Lack of facility
- banana vinegar making	3	2	1x/year	Farmers	DA-LGU	- For food consumption
- fruit jelly	3	2	2x/year	Farmers	DA-LGU	- For commercial
- squash <i>ukoy</i> and <i>maja</i> making	2	4	1x/year	Farmers	DA-LGU	- Seasonal product
- baking (squash/carrots/banana cakes)	4	-	1x/year	Farmers	TESDA	- Additional income
- carrot juice making	7	7	1x/year	Farmers	DA-LGU	- For food consumption
- Meat (<i>longanisa</i> and <i>tocino</i> making)	2	4	2x/year	Farmers	DA-LGU	- Not affordable - No grinder
4. Wine making	4	4	4x/year	Farmers	DA-LGU	- Additional income - Improved packaging - Improved taste

 $X^2_c = 5$ $X^2_{.05} = 22^{ns}$

ns – not significant

Farmers Field School is a “school without walls,” where 25 or more farmer-members gather in a schedule agreed by them to meet and share learning experiences in farming, to come up with solutions to specific problems and conduct researches and do analysis. The farm becomes the school because 90 percent of the activities are done in the field. Technicians are present to facilitate discussions.

As gathered from the respondents, applying chemicals is the dominant practice in farming. According to them, organic farming is too laborious and thus, the Farmer Field School, which is supposed to promote environment-friendly farming system, is not sustained. Hence, organic farming remains a dream. At least some environment-friendly, cultural-and-biological-pest-and-disease management practices are still employed by some farmers. These practices include manual weeding, crop rotation, rat trapping, *bewew* and incorporation of sunflower leaves into the soil as fertilizer and pest repellent.

The new development is the conduct of soil testing to determine soil condition as guide in fertilization and in selecting appropriate crops to plant. However, the respondents commented that only one soil testing kit is available in their barangay and not all barangays are provided.

Food processing. Trainings on fruit, root crop, vegetable and meat processing, and wine making are popular among the barangays (Table 7). The people in each barangays are taught to make potato and banana chips, banana



vinegar, carrot juices, and fruit jelly such as that of guava and cherries; taught to bake cakes out of banana, carrots, squash, etc; and also taught to make *maja* and *ukoy* from squash, *longanisa* and *tocino* from meat, soya milk, *taho*, and *tokwa* from soybeans and wines from fruits like guava, cherry, pineapple, *bugnay* and citrus (lemon and pomelo), and out of *pongpong* leaves.

Some respondents said that those trainings have helped them in their home needs like vinegar, *longanisa*, *tocino* and cakes for their snacks; hence their market dependence for such items is lessened. Others say that they are able to realize some income by selling their processed products, especially fruit wines and jellies.

The respondents recommend the provision of facilities especially for banana and potato chips processing so as to make the venture more profitable. They added that the trainings or workshops should be continuous so that new technologies are shared to them.

Test of difference. The computed chi-square value, being lower than the tabular value at .05 level of significance, leads to the rejection of the hypothesis, that there is a significant difference on the agricultural interventions as to infrastructure support facilities, agricultural facilities and manpower development. The result implies that in terms of the agricultural development interventions in Bauko, HADP has contributed particularly in its service-covered barangays; however, its contribution has not significantly spread across the non-HADP areas.



It may also imply that, although the non-HADP areas may have been supported by agencies other than HADP, it has achieved development at par with that of the HADP-covered barangays.

Credit Facilities

Two banks, five cooperatives, three microfinance providers, one government program, and a community association which are all engaged in providing loans presently operate in the municipality (Table 8). These credit facilities offer low interests, 1-2 percent per month, except for the Episcopal Church Lending Office which collects 10 percent interest per month. The government loaning program, Geb-an Self Employment Assistance Kaunlaran (SEAK-DSWD), and the farmer's *paluwagan* entail no interest. The loanable amount from these various providers range from as low as P300 to P1,500 to as high as P50,000 to P500,000.

The Rural Bank of Buguias, which has a branch in Abatan, Bauko, provides more services than the other providers. Corporate in structure, this bank is under the supervision of the Bangko Sentral ng Pilipinas. Loans offered in this bank entails collaterals. The average interests charged by rural banks is 20-30 percent per annum. The bank offers many types of loans like productive, agricultural, and providential; it also accepts saving and time deposits.



St. Paul's Credit Cooperative, which is located in Otucan Norte, is the biggest credit cooperative in Bauko. It provides services such as loans, savings and time deposits to members only. A member is required a capital share aside from approved application. Loanable amount is 2x to 3x of the member's share capital. Interests rates range from 12 percent – 24 percent per annum. Borrowers in this cooperative are required to have collaterals like pledging share capital, savings and/or time deposits, real estate and chattel mortgage, and to have co-makers. Patronage and dividends from the cooperative's earnings are distributed to members annually.

The microfinance lending schemes that reach the municipality of Bauko are those of the Christian Children's Fund (CCF) and Simpangabong microfinance. The same follows the so-called GRAMEEN Bank model, which was reportedly developed in Bangladesh by professor Mohamad Yunus. In this model, small amounts of loans are extended to the poorest borrowers. Loan amounts range from P2,000 to P150,000. Repayments are short-term (one year), but the amortization is either daily, weekly or monthly. Interest rates are higher as compared to those given by other lending institutions. This range rates from 3 percent – 6 percent per month. No hard collateral is required because most of the clients are poor. Collateral substitutes are utilized such as peer pressure, wherein the borrowers are grouped into five and each member acts as guarantor to their co-maker. Another scheme resorted to is 2-2-1. This scheme involves three



people, two of which are borrowers and one is a guarantor. The guarantor may borrow only when the first two have fully paid their loans. The borrower's performance is rated and the rating will be the basis of whether to increase or not the succeeding loans. A regular saving deposit, which is collected daily or weekly, is required also from borrowers.

At present, microfinance is being adopted by banks, cooperatives and NGOs and government agencies such as Self Employment Assistance Kaunlaran of Department of Social Welfare and Development. The microfinance scheme is introduced in almost all barangays of Bauko.

Agricultural loan is the dominant among the types of loan being availed of by the farmers. As claimed by the farmers, the credit facilities help them much in their farm improvement, farm inputs and even the needs of their families. Highland Agricultural Development Program (1994) reported that in its service communities, financing vegetable production is usually provided by informal money lenders who charge a high interest in a credit-marketing tie-up, and formal credit was made available only by Land Bank in 1990. The scenario now in Bauko is different as there are several credit facilities, both formal and informal.

Marketing of Products

In marketing of products, the different barangays in Bauko sell during trade fairs, local feasts/fiestas, and market days in satellite or nearby markets, and through buyers (Table 9).



Table 9. Marketing of products by the respondents

MARKETING	NUMBER OF BARANGAYS PRACTICING	PLACE OF MARKETING PRODUCTS
Through trade fairs	10	Municipal (Town fiesta) Bontoc (<i>Lang-ay</i>) Benguet (<i>Adivay</i>)
Direct selling	14	Bontoc Isabela La Trinidad (Tading post) Baguio City
Through middlemen (<i>ahente</i>)	8	Within the barangay Outside buyers
Market satellite	14	Abatan, Bauko Guinzadan Sadsadan Abatan 90, Buguias

Considered as interventions in the marketing of products are the construction of satellite markets and conduct of trade fairs where products of farmers are promoted.

Almost all of respondents practiced direct selling. They bring their products in bulk to the different market places in Bontoc, Isabela, La Trinidad (trading post) and Baguio City. The respondents also bring their products in satellite market in the barangays such as Abatan, Guinzadan and Sadsadan in Mountain Province and nearby municipalities as Abatan 90, Buguias in Benguet. They also participate in trade fairs held during town fiesta, provincial fiesta like the *Lang-ay* of Bontoc and *Adivay* of Benguet. These feasts are seasonal, but the respondents take note of the dates. There are less but significant number of respondents who sell their harvests or products through *ahente* (middlemen) in



their community or Baguio and Manila. Some respondents report that most middlemen are *barat* (cheapskate).

Highland Agricultural Development Program (1994) reported that vegetables usually pass from four to seven channels before they reach the consumers; and agricultural produce is sold wholesale in La Trinidad and Baguio City. According to the report, vegetables sold wholesale in La Trinidad and Baguio City are usually bulked for shipment to Manila.

Barangay Ordinances

The implemented barangay ordinances in Bauko municipality are shown in Table 10. No stealing of crops is implemented in all the barangays covered by the study; scheduling of connection of hose at the mini-irrigation system/water source is implemented in almost all the barangays, no stealing of hose and no using of sprinkler or rainbird during summer are implemented in 10 barangays; and liquor ban for peace and order in the community is enforced in eight barangays.

The Barangays nearest to the business sites do not implement liquor ban because respondents claim that serving liquor is their major business. Backyard gardening in Sadsadan barangay to support the clean-and-green program of the municipality is proposed. In this proposed ordinance, each household must plant any vegetable or flower in its backyard for beautification and for having a source of income or product for household use.



Table 10. Barangay ordinance implemented

ORDINANCE	NUMBER OF BARANGAYS IMPLEMENTING	REMARKS
1. No stealing of hose	10	Implemented
2. Scheduling of connection of hose at the mini-irrigation system/water source	13	Implemented
3. No stealing of crops	14	Implemented
4. No using of sprinkler or rainbird during summer	10	Implemented
5. Enforcing backyard gardening (clean and green program)	1	Proposed
6. Others (banning liquor to maintain peace and order)	8	Implemented

Livelihood Support Projects

Table 11 presents the other livelihood projects in Bauko municipality. Ten farmers have benefited from seedlings dispersal; 15 farmers, from fruit trees; and 22 households; from tilapia fingerling dispersal. Those benefited are required by the DA-LGU to establish demo-farms to serve as showcases for other farmers. The respondents claim that almost all the projects are successful.

Table 11. Livelihood support projects

PROJECT	NUMBER BENEFITED	REQUIREMENT	AGENCY	REMARKS
Seedlings dispersal	10 farmers	Farmers with demo- farms	DA-LGU	successful
Fruit tree production	15 farmers	Farmers with demo- farms	DA-LGU	successful
Fingerlings dispersal (tilapia)	22 household	Farmers with demo-farms	DA-LGU	successful



Extent of Implementation of Agricultural Development
Intervention as Perceived by the Respondents

Presented in Table 12 are the agricultural development interventions and their extent of implementation as perceived by the respondents. Included in the table are the weighted means of the respondents' perception with its respective descriptive equivalent and rank. The respondents' perceptions in HADP area are compared with those in the non-HADP area. The computed t-ratio and the tabular value at .05 level of probability or significance for each agricultural intervention is also provided in the table.

Infrastructure Service

First in rank among the infrastructure services is the community road network. This support service is perceived by the respondents from HADP-covered barangays as fully implemented. Second in rank are farm-to-market road, pathways, and foot bridges, all of which are perceived as fairly implemented. Last in rank is road bridges which are perceived also as fairly implemented .

Dryer

Ranked first among the dryers in HADP areas is the public solar dryer, which is perceived by the respondents as fairly implemented; and ranked second is private dryers, perceived as slightly implemented. No mechanical dryer is reported by the respondents.



Table 12. Respondents' perception of the extent of implementation of agricultural development interventions in Bauko

INTERVENTION	EXTENT OF IMPLEMENTATION					
	HADP AREA			NON-HADP AREA		
	WM	Desc.	Rank	WM	Desc.	Rank
A. Infrastructure Service						
1. Community road network	3.6	FI	1	3.54	FaI	1
2. Farm-to-market road	3.3	FaI	3.5	3	FaI	3.3
3. Pathways	3.3	FaI	3.5	3	FaI	3.3
4. Foot bridges	3.5	FaI	2	3	FaI	3.3
5. Road bridges	2.8	FaI	5	2.8	FaI	6
	tc = 7.07*		t. ₀₅ = 2.77			
B. Dryers						
1. Public solar dryer	3.27	FaI	1	3.54	FaI	1
2. Private solar dryer	1.51	SI	2	3.41	FaI	2
	tc = - 0.85 ^{ns}		t. ₀₅ = 12.7			
C. Buildings						
1. Waiting shed	3.32	FaI	4	3.67	FaI	1
2. Packing shed	3.61	FI	1	3.46	FaI	3
3. Green house	3.46	FaI	3	3.54	FaI	2
4. Training center	3.6	FI	2	3.37	FaI	4
	tc = - .016 ^{ns}		t. ₀₅ = 3.18			
D. Irrigation System						
1. Conveyance	3.45	FaI	1	3.5	FaI	1.5
2. Mini-dams	3.33	FaI	2	3.4	FaI	1.5
	tc = - .703 ^{ns}		t. ₀₅ = 12.7			
E. Manpower Development						
1. Trainings, seminars and workshops attended	3.21	FaI	1.5	3.5	FaI	1
2. Livelihood projects	3.2	FaI	1.5	3.24	FaI	2
	tc = - .94 ^{ns}		t. ₀₅ = 12.7			
F. Credit Facilities						
1. Banks	3.41	FaI	5	3.28	FaI	5
2. Coop	3.6	FI	3.5	3.32	FaI	4
3. Government loan	3.6	FI	3.5	2.46	FaI	1
4. <i>Paluwagan</i> system	3.67	FI	1.5	3.41	FI	2.5
5. Micro-finance	3.67	FI	1.5	3.41	FI	2.5
	tc = 1.99 ^{ns}		t. ₀₅ = 3.18			



Table 12. Continued . . .

INTERVENTION	EXTENT OF IMPELEMENTATION					
	HADP AREA			NON-HADP AREA		
	WM	Desc.	Rank	WM	Desc.	Rank
G. Marketing of Products						
1. Trade fair	3.58	FaI	4	3.37	FaI	2.5
2. Satellite market	3.67	FI	1.5	3.71	FaI	1
	tc = 1.875 ^{ns}		t. ₀₅ = 3.18			
H. Policy Support						
1. No stealing of neighbor's produce	3.45	FaI	2	3.2	FaI	2
2. No use of sprinkler during summer	3.5	FaI	1	3.42	FaI	1
3. Penalizing those who intentionally damage of hose of others	3.04	FaI	4.5	3.02	FaI	4.
4. Scheduling of connection of hose at the mini-irrigation system/water source	3.04	FaI	4.5	3.02	FaI	4.5
	tc = 1.954 ^{ns}		t. ₀₅ = 4.3			

Legend:

<u>Numerical Value</u>	<u>Weighted Mean</u>	<u>Description</u>
5	4.6 – 5.0	Fully Implemented (FI)
4	3.6 – 4.5	Fairly Implemented (FaI)
3	2.6 – 3.5	Moderately Implemented (MI)
2	1.6 – 2.5	Slightly Implemented (SI)
1	0 – 1.5	Not Implemented (NI)

Similarly, in HADP areas, public solar dryers are ranked first and are perceived by the respondents as fairly implemented. Private solar dryers, ranked second, are perceived as fairly implemented. There is no reported mechanical dryers.



Building

First in rank among the building structures in HADP-covered barangays is packing shed, which is perceived by the respondents to be fully implemented; followed by training center, which is perceived to be fully implemented; and greenhouse, which is perceived to be fairly implemented.

In the non-HADP area, first in rank is waiting shed, followed by greenhouse, packing shed and training center. Waiting shed is perceived to be fully implemented and the rest are perceived to be fairly implemented.

Irrigation System

Both groups of respondents perceived that are conveyance system and mini-dams as fairly implemented.

Manpower Development

Both groups of respondents perceive as fairly implemented the trainings and workshops and livelihood projects. Based on the weighted mean, trainings and workshops rank first, followed by livelihood projects.

Credit Facilities

Perceived by respondents in HADP-covered barangays as fully implemented, arranged in descending order of ranks, are *paluwagan* system and microfinance, and cooperatives and government loan; last in rank is bank services which is perceived as fairly implemented. The respondents in barangays not



covered by HADP perceive that all the facilities are fairly implemented and rank them in descending order as follows: government loan, *paluwagan* system and microfinance; and cooperatives and banks.

Marketing of Products

Perceived by both groups of respondents as fully implemented is the construction of satellite market. They perceive as fairly implemented is the conduct of trade fair.

Policy Support

Both groups of respondents received as fairly implemented all the policies and rank them in the following descending order: no use of sprinkler during summer, by no stealing of neighbors produce, penalizing those who intentionally damage hose of others, and scheduling of connection of hose at the mini-irrigation facility.

Test of Differences

The t-test results shows that the respondents perceptions of the extent of implementation of the agricultural development interventions in Bauko do not significantly vary except on infrastructure services. Their identified perceptions imply that HADP is not a major factor in the implementation of agricultural intervention in Bauko, except in that of infrastructure development. As reported by HADP (1994), the implementation leads to the construction of 126.79



kilometers barangays roads, 402.07 meters of road bridges, and 361 meters foot bridges in Mountain Province. This report justifies the result of the t-test in this study showing which indicates that infrastructure development in HADP areas are better than that in the non-HADP-covered areas.

Respondents' Agricultural Practices

Practices in Rice Production

Table 13 shows the rice production practices of the respondents. The practices relate to land preparation, seed selection, sowing or planting, soil fertility and water management, variety selection, pest and disease management, cropping season, and crop integration, harvesting and post-harvest practices.

Land preparation. The respondents employ land preparation practices either manually or with the aid of draft animals. Those with large farm areas usually have draft animals (Plate 6) for farming, and those with small farms generally prepare their land solely by manual labor. Weeds and/or crop residues on continuously irrigated ricefields are either manually pulled-out or hoed, then trampled by the feet and/or pressed by the hands into the soil or directly incorporated into the soil by *daynek* – the use of an animal, or a group of draft animals guided to move around over an area of the ricefield until weeds and crops residues are incorporated into the soil. *Daynek* is also applied on hoed or plowed rainfed ricefield to pulverize soil and incorporate into the soil vegetable materials.



Table 13. Rice production practices of the respondents

PRACTICE	HADP AREA				NON-HADP AREA			
	Practicing		Not Practicing		Practicing		Not Practicing	
	N	%	N	%	N	%	N	%
1. Land Preparation								
- manual (hoeing and/or pulling by the hand stubbles and weeds and trampling and or pressing by hand into the soil)	58	82.86	12	17.14	53	75.71	17	27.29
- hoeing soil and pulverizing it by harrowing and/or by trampling	48	68.54	22	31.43	43	61.43	27	38.57
- use of wooden plow and harrow pulled by carabao	53	75.71	17	24.29	53	75.71	17	27.29
- <i>daynek</i> (pulverizing plowed/hoed soil or incorporating into the soil stubbles and weeds through guided movement of draft animal)	58	82.86	12	17.14	53	75.71	17	27.29
- use of banana stem, wood or bamboo pole pulled by carabao or pushed manually to level soil on an irrigated field prior to planting	53	75.71	17	24.29	43	61.43	27	38.57
	$X^2_c = 0.917$		$X^2_{.05}=3.84$		ns - not significant			
2. Sowing								
- soaking seeds overnight up to 3 days prior to sowing	58	82.86	12	17.14	43	61.43	27	38.57
- broadcasting seed on submerged seed bed	63	90.00	7	10.00	53	75.71	17	27.29
- broadcasting seed and covering with thin layer of pulverized soil (unirrigated/rainfed seed bed)	12	17.14	58	82.86	17	24.29	53	75.71
	$X^2_c = 1.32$		$X^2_{.05}=3.84$		ns - not significant			
3. Planting								
- transplanting 1- 1 ½ months old seedlings	53	75.71	17	24.29	70	100	0	0
- approximately 4-6 inches spacing	53	75.71	17	24.29	43	61.43	27	38.57
- single seedling per planting space/hole	38	54.29	32	45.71	32	45.71	38	54.29
- planting during <i>besca</i> (full moon)	27	38.57	43	61.43	12	17.14	58	82.86
	$X^2_c = 0.36$		$X^2_{.05}=3.84$		ns - not significant			



Table 13. Continued . . .

PRACTICE	HADP AREA				NON-HADP AREA			
	Practicing		Not Practicing		Practicing		Not Practicing	
	N	%	N	%	N	%	N	%
4. Soil Fertility Management								
- fallowing (resting field after each cropping)	43	61.43	27	38.57	53	75.71	17	24.29
- rice stubbles and weeds are incorporated or left to decomposed the field	32	45.71	38	54.29	38	54.71	32	45.71
- <i>umang</i> and <i>taep</i> (rice hulls and rice stalks) are returned to rice fields	22	31.43	48	68.57	38	54.71	32	45.71
- <i>kamas</i> incorporating organic matter into the soil trough <i>daynek</i> or manually during the onset fallow period	22	31.43	48	68.57	43	61.43	27	38.57
	$X^2_c = 3.10$		$X^2_{.05}=3.18$		ns - not significant			
5. Water Management								
- continuously irrigated, water level is maintained by fixing the level of outlet	17	24.29	53	75.51	17	24.29	53	75.71
- tapping unused water from river/stream or outflows from other rice fields with use of indigenous conveyance system (ordinary canal and/or bamboo poles)	63	90.00	7	10.00	70	100	0	0
- use of hose for irrigation	63	90.00	7	10.00	70	100	0	0
	$X^2_c = 0.77$		$X^2_{.05}=3.18$		ns - not significant			
6. Rice Variety								
- <i>magumbal/dalacan</i> (red rice)	7	10.00	63	90	0	0	0	0
- intan	53	75.71	17	24.29	43	61.43	27	38.57
- intan bradon	22	31.43	48	68.57	22	31.43	48	68.57
- California/Taiwan	70	100	0	0	53	75.71	17	24.29
- <i>diket</i> (white), <i>balatinao</i> (red)-glutinous rice	48	68.57	22	31.43	22	31.43	48	68.57
	$X^2_c = 0.52$		$X^2_{.05}=3.18$		ns - not significant			



Table 13. Continued . . .

PRACTICE	HADP AREA				NON-HADP AREA			
	Practiced		Not Practiced		Practiced		Not Practiced	
	N	%	N	%	N	%	N	%
7. Pest and Disease Management								
- use of scarecrows to drive away mayas (rice birds)	63	90.00	7	10.00	70	100	0	0
- use of <i>piket</i> (sticky sap from trees) to trap mayas	7	10.00	63	90.00	0	0	0	0
- <i>bewew</i> (a farmer or any member of the family keep watch of their rice field to drive mayas until harvest time)	70	100	0	0	53	75.71	17	24.29
- use of hand-made rat traps	70	100	0	0	43	61.43	27	38.57
- use of <i>silo</i> (straw trap) for other pests like <i>bayawak</i> , <i>danggo</i> , etc	38	54.29	32	45.71	22	31.43	48	68.57
- maintaining pets like <i>anop</i> (dog that search and kill rats, <i>bayawak</i> etc.)	32	45.71	38	54.29	38	54.29	32	45.71
- cultural rituals/ceremonies (entails butchering of chicken/pig and prayer of elders or <i>manbunong</i>)	17	24.29	53	75.71	38	54.29	32	45.71
	$X^2_c = 0.7$		$X^2_{.05} = 3.18$		ns - not significant			
8. Cropping Season								
- once a year	53	75.71	17	24.29	53	75.71	17	24.29
- <i>tupeng</i> (twice a year)	38	54.71	32	45.71	70	100	0	0
	$X^2_c = 10.4$		$X^2_{.05} = 3.18$		* - significant			
9. Crop Integration								
- root crops + rice	17	24.29	53	75.71	70	100	0	0
- rice only	70	100	0	0	70	100	0	0
	$X^2_c = 12.6$		$X^2_{.05} = 3.18$		* - significant			
10. Harvesting								
- use of <i>rakem</i> (special knife to cut panicle) and <i>daneq</i> (thin strips of bamboo or rattan) to bundle palay	58	82.86	12	17.14	48	68.57	22	31.43
- <i>gapas</i> with <i>basbas</i> or <i>hampas</i> system to separate grains from panicle (<i>iric</i>)	70	100	0	0	70	100	0	0
- <i>kutong</i> (use of finger to glean the palay)	12	17.14	58	82.86	48	68.54	22	31.43
	$X^2_c = 2.3$		$X^2_{.05} = 3.18$		ns - not significant			



Table 13. Continued . . .

PRACTICE	HADP AREA				NON-HADP AREA			
	Practicing		Not Practicing		Practicing		Not Practicing	
	N	%	N	%	N	%	N	%
11. Post Harvest Practices								
a. Packaging								
- use of sacks	70	100	0	0	70	100	0	0
- use of ropes/bamboo/rattan to bundle palay	38	54.29	32	45.71	32	45.71	38	54.29
- use of woven baskets, such as <i>luwa</i> or <i>labba</i> to pack harvested palay	12	17.14	58	82.86	17	24.29	53	75.71
b. Drying								
- use of solar dryer	53	75.71	17	24.29	32	45.71	38	54.29
- use of multi-purpose drying pavement	70	100	0	0	70	100	0	0
- use of private dryers (frontage, or roof)	70	100	0	0	70	100	0	0
c. Storing								
- store in <i>agamang</i> (rice granary)	70	100	0	0	70	100	0	0
- use of <i>bobeda</i> (attic) of the house to store palay	38	54.29	32	45.71	32	45.71	38	54.29
d. Cleaning/Threshing								
- use of pedal-powered thresher	70	100	0	0	70	100	0	0
- use of manual method (treading by feet to separate grains from panicle)	38	54.29	32	45.71	38	54.29	32	45.71
- use of <i>basbas</i> or <i>hampas</i> method (use of solid object to beat the panicle or striking bundled rice to hard objects)	48	68.57	22	31.43	38	54.29	32	45.71
e. Milling								
- manual pounding and winnowing	32	45.71	38	54.29	32	45.71	38	54.29
- rice mill	70	100	0	0	70	100	0	0
		$X^2_c = 0.25$		$X^2_{.05} = 3.18$		ns - not significant		





Plate 6. Carabao used in farming; farmers may either place their carabaos under shade at high noon or leave them to wallow on muddy areas



To level the soil in order to make the water level uniform over the rice field, the farmers utilize a whole banana stalk, or a wooden or bamboo pole; the banana stalk or wooden pole is either pulled or pushed manually or pulled by a guided draft animal.

Sowing. The respondents reported three common sowing practices, namely, soaking seeds overnight up to three days, broadcasting seed on submerged seed bed, and broadcasting seed on rainfed beds and covering them with thin layer of pulverized soil.

Planting. The respondents transplant about 1½-months-old seedlings at 4-inches or 6-inches spacing. A single seedling is planted per planting space/hole. Few plant during *besca* (full moon), although not a few respondents believe that planting at this time can ensure better palay growth and yield. However, those who do not believe that effect say that at this time, destructive insects and other pests become very active in destroying or damaging the plants.

Soil fertility management. The common practices of the respondents to maintain soil fertility are fallowing after each cropping, letting stubbles and weeds decomposed on the fields, and returning rice hulls and stalks in ricefields. Plate 7 shows representative ricefields under fallow. Usually in fallowing irrigated fields, the crop residues (such as stubbles), weeds, and other organic matter are incorporated into the soil, either manually or through *daynek*.





Plate 7. Photos of continuously irrigated rice fields under fallow (rested)



Water management. The common practice of the respondents to maintain irrigation or sufficient water in their ricefields is tapping water from river/stream/spring, usually using hose to convey water. According to some respondents, many ricefields in Bauko are irrigated by on-site springs, which they believe are maintained by forests on upper slope. With the belief, some protect existing trees from being burnt or indiscriminately cut and plant trees around or near water sources.

Rice variety. The respondents have identified the common rice varieties they plant, namely, *dalacan/magumbal*, *intan*, *intan-bradon*, California/Taiwan, and glutinous rice (white and violet-red varieties). A significant percentage of the respondents prefer *intan*, California/Taiwan, and *diket*. All of the respondents from HADP areas plant the California or Taiwan variety. Some respondents choose *intan* because it is more resistant to drought. They further report that their main bases in selecting varieties are productiveness and resistance to drought and pests/diseases; secondarily, they also base their selection on the recommendations of DA personnel and other knowledgeable people.

The *diket*, according to the respondents, is a special kind of rice meant for special occasions only, not for everyday consumption as is the case for ordinary varieties; hence, not all plant *diket*. According to them, *diket* is mainly used in making rice wine for special occasions and for making delicacies such as *suman*



to be eaten during occasions such as anniversaries or commemorative activities for the dead, and during barangay fiestas, Holy Week and Christmas season.

Pest disease management. All the respondents in barangays covered by HADP have adopted the practice of attending to their ricefields every day to drive away mayas or ricebirds. Almost all of them have adopted the practice of using scarecrows. A majority of them use *silo* (straw trap), and almost half of them maintain pets such as dogs and cats to prey on pests.

Most of the barangays not covered by HADP attend to their farm every day to drive away mayas and use hand-made rat traps. The majority maintain pets and observe cultural rituals. Few of them use *silo* (straw trap).

Cropping season. The respondents practice one or two croppings per year, depending on the availability of water and labor. Cropping twice a year is locally termed *tupeng* (Plate 8). Most areas with sufficient water the whole year round are, as some respondents report, cultivated twice a year.



Plate 8. Ricefield planted for second cropping (*tupeng*)



Crop integration. As gleaned, the respondents either integrate other crops with rice or not. In most continuously irrigated areas, rice is the only crop while in rainfed areas, usually root crops are integrated rotationally with rice.

Harvesting. The respondents practice either *gapas* or the use of *rakem* (small knife). In the *gapas* system, the harvested rice is threshed by striking the bundled rice against an improvised object. This is known in the locality as *gapas* and *basbas* system. Usually the tall rice varieties, specially the *diket*, are harvested by using the *rakem*, and if the crops have very poor yield or have only some portions producing good grains. *Kutong* (use of finger to collect the panicle) is applied in gleaning from harvested ricefields.

Post-harvest practices. The respondents use sacks as containers of palay harvested through the *gapas* system, and thin strips of bamboo to bundle panicles on their stalks; use multi-purpose drying pavement or their own solar dryer in seasoning palay; use rice granaries or attic of the house for storage; use of pedal-powered thresher, treading by foot, and *hampas/basbas* method of threshing; and use of rice mill or manual pounding and winnowing in dehulling.

Test of significance. Based on the chi-square test, the two groups of respondents do not significantly vary in their rice production practices. The result of the test implies that HADP does not have a significant impact on the respondents' rice production practices. The respondents only significantly vary in their cropping season and crop integration practices. All the respondents in the



non-HADP practice two croppings a year while the majority of the respondents in HADP areas practice the same. As gathered from farmer respondents, the two croppings per year, which is practiced in continuously irrigated areas, entails availability of labor, and depends on owners' sufficiency of rice supply. On this premise, it may be inferred that most ricefields in non-HADP areas are continuously irrigated.

In crop integration all respondents in HADP area practice both monoculture rice production and integration of root crops and rice. In non-HADP areas, all the respondents said they practice pure rice production, and some integrate root-crops with rice. As reported by some respondents, root-crop and rice integration is more commonly applied in rainfed areas than in continuously irrigated farms.

It can be then inferred that the respondents on non-HADP areas, who generally have both continuously irrigated and rainfed rice fields, are maximizing the use of their land. With the increase of population, it is expected that there will be less available land per capita. Hence, there is a need to maximize the use of every parcel of land.

Respondents' Vegetable Production Practices

The respondents practices in vegetable production are shown in Table 14. The information gathered pertain to land preparation, seed planting/bed



preparation, sowing, planting soil management, irrigation, thinning, fertilization hilling-up and pest-and-disease management.

Table 14. Respondents' vegetable production practices

PRACTICE	HADP AREA				NON-HADP AREA			
	Practicing		Not Practicing		Practicing		Not Practicing	
	N	%	N	%	N	%	N	%
1. Land Preparation								
- Cleaning with the use of sickle, bolo, or grub hoe)	53	75.71	17	24.29	63	90.00	7	10.00
- Plowing and harrowing, 2 or 3 times, to minimize weeds.	48	68.57	22	31.43	48	68.57	22	31.43
- Broadcasting of lime if the soil pH is below 6.0	43	61.43	27	38.57	15	21.43	53	75.71
- Digging at least 30 cm deep to ease root penetration and aeration.	38	54.29	32	45.71	48	68.57	22	31.43
- Constructing/fixing drainage/canals	48	68.57	22	31.43	58	82.86	12	17.14
- Manual plot or elevated bed preparation manually	48	68.57	22	31.43	48	68.57	22	31.43
	$X^2_c = 0.56$		$X^2_{.05}=3.18$		ns - not significant			
2. Seed/Planting Bed Preparation								
- Uniform pulverization of soil	27	38.57	43	61.43	48	68.57	22	31.43
- Mixing organic fertilizers and ash with the soil before planting	22	31.43	48	68.57	43	61.43	27	38.57
- Sterilization of seed beds by burning combustible materials (e.g. sticks, dried grasses, dried leaves) on top of the seed beds	27	38.57	43	61.43	22	31.43	48	68.57
- Single row seedbed	70	100	0	0	17	24.29	53	75.71
- Double row seedbed	38	54.29	32	45.71	27	38.57	43	61.43
	$X^2_c = 0.73$		$X^2_{.05}=3.18$		ns - not significant			
3. Sowing								
- Broadcasting seeds	22	34.43	48	68.57	7	10.00	63	90.00
- Sowing seeds along parallel lines	0	0	0	0	7	10.00	63	90.00
- Covering seeds sown with ash or fine soil	32	45.71	38	54.29	58	82.86	12	17.14
- Mulching (covering sown beds with finely chopped dry grasses to cushion it from the impact of watering or rainfall)	22	31.43	48	68.57	7	10.00	63	90.00
	$X^2_c = 0.464$		$X^2_{.05}=3.18$		ns - not significant			



Table 14. Continued . . .

PRACTICE	HADP AREA				NON-HADP AREA			
	Practicing		Not Practicing		Practicing		Not Practicing	
	N	%	N	%	N	%	N	%
4. Planting								
- One or two seed per hole	43	61.43	27	38.57	70	100	0	0
- One seedling per hole	0	0	0	0	58	82.86	12	17.14
- Determining spacing by estimation (4-9 inches) depending on size of grown plant	48	68.57	22	31.43	70	100	0	0
	$X^2_c = 10$		$X^2_{.05}=3.18$		* - significant			
5. Soil Management								
- Fallowing	0	0	0	0	32	45.71	38	54.29
- Intercropping	48	68.57	22	31.43	70	100	0	0
- Crop rotation	43	61.43	27	38.57	70	100	0	0
- Mix cropping	38	54.29	32	45.71	43	61.43	27	38.57
- Maintaining plants on the sides of farm to prevent erosion	48	68.57	22	31.43	7	10.00	63	90.00
- Allowing vegetable materials to decompose on the farm	48	68.57	22	31.43	7	10.00	63	90.00
	$X^2_c = 0.56$		$X^2_{.05}=3.18$		ns - not significant			
6. Irrigation								
- Fetching water for watering crops	0	0	0	0	7	10	63	90.00
- Watering crops thru the use of watering cans	38	54.29	32	45.71	17	24.29	53	75.71
- Using hose/pipeline to bring water to the farm (thru gravitation)	27	38.57	43	61.43	22	31.43	48	68.57
- Using rainbird/rainburst method/sprinkler.	70	100	0	0	27	38.57	43	61.43
- Flooding (conveying amount of water enough to submerge planted beds or plots)	43	61.43	27	38.57	70	100	0	0
	$X^2_c = 6.4$		$X^2_{.05}=3.18$		* - significant			
7. Thinning								
- Two or three seeds are planted per hole but only one plant will be left to grow	38	54.29	32	45.71	7	10.00	63	90.00
- Thinned at 2-3 weeks after seed germination	27	38.57	43	61.43	7	10.00	63	90.00
	$X^2_c = 22.9$		$X^2_{.05}=3.18$		* - significant			



Table 14. Continued . . .

PRACTICE	HADP AREA				NON-HADP AREA			
	Practiced		Not Practiced		Practiced		Not Practiced	
	N	%	N	%	N	%	N	%
8. Fertilization								
- Application of chicken dung	53	75.71	17	24.29	58	82.86	12	17.14
- Application of compost	0	0	0	0	53	75.71	17	24.29
- Application of commercial fertilizer	70	100	0	0	38	54.29	32	45.71
- Application of ash	53	75.71	17	24.29	27	38.55	43	61.63
- Application of liquid fertilizers	27	38.57	43	61.43	70	100	0	0
	$X^2_c = 0.54$		$X^2_{.05}=3.18$		ns - not significant			
9. Hilling-Up								
- Placing soil at the bases of plants to cover roots and keep the plants firm	48	68.57	22	31.43	17	24.29	53	75.71
- Hilling immediately after applying fertilizer	43	61.43	27	38.57	53	75.71	17	24.29
	$X^2_c = 3.21$		$X^2_{.05}=3.18$		* - significant			
10. Pest and Disease Management								
- Maintaining strong smelling plants around the farm to drive away insects	22	31.43	48	68.57	43	61.43	27	38.57
- Inter planting strong-smelling plants (e.g. tomatoes, mint, onion) in between crops to drive away insects	22	31.43	48	68.57	0	0	0	0
- Spraying pesticides and insecticides	53	75.71	17	24.29	70	100	0	0
- Trapping insects with stickers	22	31.43	48	68.57	0	0	0	0
- Catching insects thru the use of mosquito net	0	0	0	0	7	10.00	63	90.00
- Hand picking and quashing of pests (e.g. worms)	27	38.57	43	61.43	70	100	0	0
- Use of rainbird irrigation	22	31.43	48	68.57	70	100	0	0
- Maintaining good drainage in the area	17	24.29	53	75.71	27	38.57	43	61.43
	$X^2_c = 7.05$		$X^2_{.05}=3.18$		*- significant			

Land preparation. The respondents employ either manual cleaning, plowing and harrowing, or digging (commonly by hoeing) as the primary land



preparation activity. Constructing or fixing canals follows. Application of lime is usually done to lower soil acidity.

Seed planting/bed preparation. The respondents prepare a single-row bed or double-row beds. Soil is pulverized uniformly. Weeds are usually burnt on the beds to eliminate pathogens and weeds, and at the same time to incorporate ash to the soil. The farmers commonly mix organic fertilizers in the planting beds.

Seed sowing and planting. For seedling production, both broadcasting and sowing on narrow parallel furrows are applied. The furrows may be made by the use of stick or a Japanese hoe to have a uniformly-spaced planting furrows. Direct field sowing is also reportedly applied wherein one to three seeds, sometimes more, are sown per planting hill or hole. Usually, the holes, each about a centimeter deep for fine seeds, are made by pressing a pencil-sized stick of the planting hill or hole. Sometimes an improvised planting hole drill or maker is made. The implement is just pressed on the planting beds to drill several uniformly-spaced holes at a time. Some crops are sown in furrows. The furrows are made through a stick or a Japanese hoe. After sowing, the seeds are covered with a thin layer of fine soil or sometimes with ash. The farmers usually cover sown beds with chopped dry grasses to cushion them from the impact of raindrops and wind.

A seedling is planted per planting hill or hole at a spacing of 4- 9 inches, depending on the size of grown plants. Spacing is usually estimated by the



planter. Sometimes, furrows are made instead of planting hills or holes, as guide in planting. The furrows can be made by the hand, or the use of hoe or other improvised implement.

Soil management. The respondents practice intercropping, crop rotation, mix cropping, fallowing and maintenance of hedgerows on the side of farms to prevent erosion. They also collect and pile plant materials for composting. In some instances, they burn them to produce ash as fertilizers.

Irrigation. The respondents commonly use rainbird method or sprinkler, flooding, or watering cans to water their crops. The use of hose for water conveyance is commonly observed among the farmers.

Thinning. The farmers leave only one plant to grow per planting hole/hill. Thinning is done two to three weeks after the emergence of seeds. The farmers commonly remove the less robust plants and leave the healthy germinants or the best ones.

Fertilizer application. The respondents apply both commercial and organic fertilizers. Chicken dung is the most common organic fertilizers, followed by ashes and compost from plant residues. Some apply liquid fertilizers.

Hilling-up. The base of plants is covered by soil that is usually taken from the canals of planting plots/beds. This common practice is done immediately after solid fertilizer has been applied.



Pest and disease management. The adopted practices of respondents in barangays covered by HADP, arranged in descending order of frequencies, are spraying commercial pesticides, quashing pest manually, using of rainbird irrigation, trapping insects, and interplanting strong-smelling plants.

The practices of the respondents in non-HADP covered barangays are spraying commercial pesticides, quashing of pests, using rainbird irrigation, using strong-smelling plants left at the sides of each plot, maintaining good drainage in the area, and catching insects through the use of mosquito net.

Test of difference. The result of the chi-square test reveals that the vegetable production practices of the two groups of respondents generally do not significantly vary. This result may imply that HADP has no significant impact the vegetable production practices in the area. However, significant difference between the two groups of respondents exists in their irrigation, thinning, and pest and-disease management. All respondents in the HADP area utilize rainbird system; only a minority use the system in the non-HADP areas. On the other hand, all the respondents in the non-HADP area apply flooding while only near half of HADP area respondents use flooding. This finding implies that water in the non-HADP area is more abundant as flooding entails so much water. Information about in the rice production practices among the respondents also point out that most ricefields in the non-HADP area are irrigated since the respondents practice two croppings of rice a year.



Thinning is practiced by a very significantly higher number of respondents in the HADP area as compared to those in the non-HADP area. It may be inferred that the vegetable farmers of non-HADP areas generally practice seedling production and transplanting, practices that do not require thinning in vegetable production.

In pest-and-disease management, there is significantly fewer respondents applying pesticides, hand-picking, and using rainbird to manage pests in the HADP area. On the other hand, none from non-HADP area applies the use of sticker traps and intercropping strong-smelling plants, which are applied by nearby half of those in the HADP area. This finding implies significant differences on the education and experiences of the respondents as to pest-and-disease management.

New Agricultural Technologies Adopted

The new technologies adopted in rice farming are the (1) use of new varieties of rice like Taiwan and California, which the respondents claim to have long panicles that are easy to be threshed and milled, and have strongly desired aroma, flavor and texture; (2) use of *gapas* system and of pedal-powered thresher; and (3) the use of sacks for container of threshed palay from the farm. Some respondents say that with such technologies, they find the work easier and less labor on their part.



In vegetable production, the following are the reported new technologies: (1) use of rainbird and hose for irrigation, (2) establishment of potato seed storage to prolong and improve shelf-life of the crop, (3) use of hybrid varieties of seeds, and (4) use of improved chemical fertilizers, pesticides and insecticides.

Another new technology is the establishment of nurseries ins some barangays of Bauko which are used for agroforestry seedling production.

Agricultural Problems

Presented in Table 15 are the respondents' problems in farming and their perceived degree of seriousness. Included in the table are the respective ranks of the problems based on the computed weighted mean, computed chi-square value, and the tabular value at .05 level of significance.

All the problems on infrastructure support facilities are perceived by the respondents in HADP-covered barangays as moderately serious. The problems, arranged in descending order of ranks, are lack/insufficient storage or packing facilities, lack of credit facilities, insufficient farm to market road, and lack/insufficient irrigation system.

The other problems perceived by the same group of respondents as very serious, arranged in descending order of ranks, are low and highly fluctuating prices, vegetable importation, high costs of inputs, lack of trainings/workshops on



Table 15. Seriousness of the problems encountered by the respondents

PROBLEM	DEGREE OF SERIOUSNESS					
	HADP AREAS			NON-HADP AREAS		
	WM	Desc	Rank	WM	Desc	Rank
1. Lack/insufficient infrastructure support facilities	3.37	MS	8	2.9	MS	10
a. Farm-to market road	3.23	MS		3.68	VS	
b. Irrigation system	3.12	MS		2.48	SS	
c. Dryers	3.14	MS		2.05	SS	
d. Storage/packing facilities	3.44	MS		2.71	MS	
e. Credit facilities	3.05	MS		2.0	SS	
2. Lack of support from LGUs (animal or seedling dispersal)	3.5	MS	7	3.21	MS	8
3. Lack of trainings/workshops and seminars related to farm/agriculture	3.52	MS	6	3.0	MS	9
4. No market of products	3.91	VS	5	3.71	VS	4
5. Low and highly fluctuating prices	4.21	VS	1	3.68	VS	5
6. Problem on vegetable importation	4.17	VS	2	3.91	VS	2
7. High costs of inputs (labor, fertilizers, pesticides, seeds etc.)	4.08	VS	3	3.94	VS	1
8. Lack of technical know how in farm management	4.08	VS	3	3.0	MS	8



Table 15. Continued . . .

PROBLEM	DEGREE OF SERIOUSNESS					
	HADP AREAS			NON-HADP AREAS		
	WM	Desc	Rank	WM	Desc	Rank
9. Soil infertility caused by over use of chemicals	4.08	VS	3	3.82	VS	3
10. Calamity (typhoons)	3.37	MS	8	3.62	VS	7
11. Pest and diseases	3.24	MS	9	2.96	SS	6
a. Rice						
Pests (rats, mayas, bayawak, golden <i>kohol</i> , azolla, weeds)	4.1	VS		1.9	SS	
Diseases (<i>bungaw</i>)	2.44	SS		2.87	MS	
b. Vegetables						
Pests (snails, slugs, aphids, beetle, white flies, cutworm, thrips)	2.25	SS		3.8	VS	
Diseases (clubroot, powdery mildew, bacterial wilt, root nematodes)	4.18	VS		3.28	VS	
T _c = 1.63 T _{0.05} = 2.22						

Legend:

<u>Scale</u>	<u>Weighted Mean (WM)</u>	<u>Description (Desc)</u>
5	4.6 – 5.0	Extremely Serious (ES)
4	3.6 – 4.5	Very Serious (VS)
3	2.6 – 3.5	Moderately Serious (MS)
2	1.6 – 2.5	Slightly Serious (SS)
1	0 – 1.5	Not Serious (NS)



agriculture, lack of support from LGU on animal and seedling dispersal, and pests-and-diseases outbreaks. Perceived as very serious is the infestation of crops by rats, mayas, bayawak, *bungaw*, snails, slugs, aphids, beetle, white flies, cutworms and thrips.

The respondents in non-HADP-covered barangays perceive the problems in almost the same way as those in HADP areas. Perceived as very serious problems, arranged in descending order of ranks, are high costs of inputs, problems on vegetable importation, soil infertility caused by overused of chemicals, no market of products, low and highly fluctuating prices and natural calamity. Perceived as moderately serious are lack of support from LGUs, lack of trainings and workshops, insufficient/lack of infrastructure support facilities and pests-and-diseases outbreaks. Among the problems on infrastructure facilities, perceived as very serious, relate to farm-to-market road and credit facilities. Perceived as moderately serious is lack of or insufficient storage facilities and as slightly serious is lack of irrigation system and dryers. Among the problems on pests and diseases, perceived as very serious are the infestation of crops by snails, slugs, aphids, beetle, white flies, cutworms and thrips, and the infestation of crops by clubroot, powdery mildew, bacterial wilt, and nematodes. Perceived as moderately serious is crop infestation by *bungaw*; and as slightly serious are crop infestation by rats, mayas, bayawak, golden *kohol*, azolla and weeds.



The computed t-ratio is lower than the tabular value at .05 level of significance. Hence the hypothesis, that there is significant difference between respondents' perception on the degree of seriousness of problems in farming, is rejected. Based on the result of the t-test, it may be inferred that the respondents are affected by the problems in the same way, and that HADP has not significantly reduced pest-and-disease problems in the area.

According to Vargas (1997), the problems on agriculture emanate from the strictness of local officials, lack of monitoring and evaluation from the national government, inadequate budget of supplies and materials and non-implementation of yearly salary increase and hazard pay among project implementors and personnel. The situation in Bauko is different; the information gathered from the respondents do not directly relate to what Vargas reported.



SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The study sought to determine the agricultural development interventions in Bauko, Mountain province. Specifically, it determined the socio-economic and farming profiles of the respondents; the agricultural development interventions in terms of infrastructure, agricultural facilities, manpower development, credit facilities, marketing facilities, barangay ordinances, and livelihood projects; the respondents' perception of the extent of implementation of the agricultural development interventions; the respondents' agricultural practices; and the degree of seriousness of the problems of the farmers.

Interview schedule and secondary data were used to gather the needed data. Gathered data were tabulated and analyzed using descriptive statistics. The hypotheses were tested using either the t-test or the chi-square test.

The salient findings of the study are the following:

1. The respondents range in age from 25 to 50 years, are mostly females, and married; and are high school graduates. They have been farming for less than 25 to 50 years; have complimentary sources of income; have one to twelve children with educational attainment ranging from elementary grade to college graduates; have houses made of either wood and galvanized iron or wood-concrete and GI materials; have water sources mainly from developed springs (tank and pipe); have electrical source of light, and use toilet with concrete bowl;



and own various electrical and electronics appliances. The respondents plant mainly rice and/or vegetables; have farm areas ranging from less than 500 to more than 5,000 square meters, either own or rent the land they till; employ purely manual method in farming with only some using draft animals combined with manual method; and use mainly fertilizers and pesticides as their major farm inputs. Generally, the respondents do not significantly differ in their socio-economic and farming profiles

2. The agricultural facilities in the municipality are storage houses, packing and waiting sheds, nurseries, dryers and irrigation system. Internal Revenue Allotment is the regular source of fund in the establishment of these facilities. For manpower development, farmers field school (FFS) trainings and food processing are undertaken mainly by DA-LGU. On food processing, the respondents are taught to make potato and banana chips, banana vinegar, carrot juices, and fruit jellies. The credit facilities available to the respondents are two banks, five cooperatives, three micro-financing schemes, one government loan program and a community lending association.

3. The leading infrastructure project perceived by the respondents as fully implemented is community road network. Perceived as fully implemented under HADP are packing shed, micro finance, cooperatives and government loan. Perceived as fully implemented in non-HADP area is the establishment of waiting shed.



4. The leading practices of respondents under HADP area are engaging in manual land preparation, soaking seeds overnight, and transplanting 1½ months old seedlings. The leading practices of respondents under in non-HADP are fallowing, tapping water from river/stream for irrigation and tending farm daily. Generally, the respondents do not significantly differ in their farming practices.

5. The leading problems perceived as very serious by both groups of respondents are low, and highly fluctuating, prices; vegetable importation; and high costs of inputs.

Conclusions

Based on the findings, the following conclusions are drawn:

1. There is a significant difference in the respondents' profile in terms of the age, sex, complimentary source of income, educational attainment of the respondents' children, farm area, annual income, farm inputs, type of crops planted and utilization of products. It may be generalized, therefore, that the socio-economic profile of the respondents is not a total factor to be considered in the agricultural development interventions in Bauko.

2. There is a significant difference between respondents' perception of the implementation of infrastructure services but not in their perception on the implementation of agricultural interventions such as on the construction of irrigation systems, manpower development, provision of credit facilities and provision of policy support. Therefore, some barangays under the non-HADP and



HADP-covered areas have different perceptions on the extent of implementation in the infrastructure and some agricultural support facility interventions, and similar in their perceptions on the construction of irrigation system, manpower development, credit and policy support.

3. There is a significant difference between respondents' planting practice but not in land preparation, sowing, water management and pest/disease management practices. The respondents have more or less similar farming practices on rice and vegetable farming.

4. There is no significant difference between farmers' perception of the degree of seriousness of the problems they encounter in farming. In other words, all respondents deal with the same problems.

Recommendations

Based on the findings and conclusions, the following are recommended:

1. Since there is significant difference between respondents in terms of their perceptions on the implementation of infrastructure services, implying that there are more infrastructure services in HADP covered barangays, the local government and other partner agencies should give more consideration to the other barangays not covered by HADP in terms of services to create a balance in development.

2. As suggested by respondents, agricultural trainings, especially on environment-friendly and sustainable technologies appropriate to the area such as



organic farming, and integrated pest management should be intensified. Water and soil fertility management and quality planting stock production by the farmers themselves should be also emphasized or included in trainings to be provided.

3. To address the problems encountered by the respondents such as low, and high fluctuating, prices and high cost of inputs, efforts should be made on the following:

a. Establishing data base that will guide farmers on what crop to plant to fill up a demand by feeding information as to the amount/volume of each crop species is already planted every cropping season and their corresponding volume of demand;

b. Training farmers on crop processing to achieve value added and ensure long-shelf life of products;

c. Organizing farmers into cooperatives to manage their product marketing so as to eliminate unfair prices and be able to compete with other marketing business.



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GLOSSARY OF TERMS

agamang – rice granary

anop – hunt; a dog used in hunting wildlife

besca – new moon

bewew – driving off rice birds by an individual

daynek – pulverizing harrowed/hoed soil or incorporating into the soil stubbles and weeds through the trampling by guided movement of carabaos in land preparation for rice production.

gapas – harvesting rice by cutting at about half of the stalks using sickle/scythe.

kutong – collecting rice panicles by cutting them off from the stalk by the pinch of the hand; usually done when only few panicles bear good fruits, or when gleaning from harvested fields.

labba – multi-purpose hand woven container made of thin strips of bamboo or rattan, much taller than *luwa*.

rakem – tool for harvesting rice, made of about a centimeter-diameter and 4” long wooden handle whose mid-length is attached a thin, arching, sharp-edge metal or knife.

luwa – shallow hand woven container made of thin strips of bamboo or rattan and used by women in carrying palay, usually from farm to the home.

piket – adhesive, usually sap made of collected from trees like jack fruit, *Ficus sp.* (ex. balete) and cooked to a consistency which produce high binding strength.

silo – trap/snare for wildlife (birds, wild cat, etc.)





Plate 9. The researcher interviewing respondents during the data gathering phase



BIOGRAPHICAL SKETCH

MS. ANALYN BALAAN-GARCILIAN has been employed as an administrative staff member of the Benguet State University, Open University, La Trinidad, Benguet since 1997.

She was born on August 18, 1976 at Bila, Bauko, Mountain Province. She is the second of the five children of Mr. Estefanio Balaan and Dominga Payapey Balaan. She is the only one married among their children, which include Dina, Stephen, Dexter and Vanes.

She married RICHARD C. GARCILIAN of Benguet and Ilocos. They are blessed with one girl, STEFIE FRANZ B. GARCILIAN. The family happily resides at DA-014 Tomay, La Trinidad, Benguet.

As to her academic background she finished her elementary education at Bila Elementary School, secondary education at Otucan-Bila National High School, tertiary level at Benguet State University being a grantee under the Special Selected Ethnic Groups Educational Assistance Program of the Presidential Management Staff enabled her to obtain the degree Bachelor of Science in Agriculture major in Extension Education. While working she pursued her master's degree in Rural Development with a minor in Public Administration at the Graduate School, Benguet State University she hopes to graduate this October 2006.



INTERVIEW SCHEDULE

I. A. Socio-economic profile of the respondents

Age: <input type="checkbox"/> 25 – 30 <input type="checkbox"/> 31 – 35 <input type="checkbox"/> 36 – 40 <input type="checkbox"/> 41 – 50 <input type="checkbox"/> 51 – 60 <input type="checkbox"/> above 60	Other Source of Income: <input type="checkbox"/> vending <input type="checkbox"/> store keeping <input type="checkbox"/> wage earning <input type="checkbox"/> animal husbandry <input type="checkbox"/> wine making/pottery/weaving <input type="checkbox"/> others _____	Light Source: <input type="checkbox"/> electric <input type="checkbox"/> others <input type="checkbox"/> kerosene _____ <input type="checkbox"/> gasul with lamp _____ Toilet Facilities: <input type="checkbox"/> open pit <input type="checkbox"/> toilet bowl (DOH) <input type="checkbox"/> water sealed <input type="checkbox"/> water sealed (manual) <input type="checkbox"/> others _____
Sex: <input type="checkbox"/> male <input type="checkbox"/> female	Number of Children: <input type="checkbox"/> 0 – 3 <input type="checkbox"/> 7 – 9 <input type="checkbox"/> 4 – 6 <input type="checkbox"/> 9 – 12	Furniture and Appliances: <input type="checkbox"/> TV <input type="checkbox"/> computer <input type="checkbox"/> radio <input type="checkbox"/> VHS/DVD <input type="checkbox"/> refrigerator <input type="checkbox"/> gas stove <input type="checkbox"/> gas range <input type="checkbox"/> electric
Civil Status: <input type="checkbox"/> single <input type="checkbox"/> married <input type="checkbox"/> separated <input type="checkbox"/> widower/er	Educational Attainment of Children: <input type="checkbox"/> elementary graduate <input type="checkbox"/> high school graduate <input type="checkbox"/> college graduate <input type="checkbox"/> vocational graduate	Remarks: _____ _____ _____
Educational Attainment: <input type="checkbox"/> elementary <input type="checkbox"/> high school <input type="checkbox"/> vocational <input type="checkbox"/> college	House Condition: <input type="checkbox"/> concrete <input type="checkbox"/> wooden <input type="checkbox"/> nipa hut <input type="checkbox"/> others _____	_____ _____ _____ _____ _____
Number of Year in Farming: <input type="checkbox"/> below 25 <input type="checkbox"/> 25 – 30 <input type="checkbox"/> 31 – 35 <input type="checkbox"/> 36 – 40 <input type="checkbox"/> 41 – 50 <input type="checkbox"/> 51 and above	Water Source: <input type="checkbox"/> undeveloped spring <input type="checkbox"/> developed spring <input type="checkbox"/> creek <input type="checkbox"/> river <input type="checkbox"/> others _____	_____ _____ _____ _____ _____

I. B. Farming profile of the respondents

CROPS	FARM AREA/ Square Meter	LAND TENURE (tenant, owned, rented)	FARMING METHOD (manual, with animals, mechanical)	FARM INPUTS (fertilizers, pesticides, organic)	KIND OF CROP PLANTED (hybrid/local)	INCOME (market/ consumption)	CROPPING PATTERN/ MIX CROPPING What?	FARMING NEEDS TO BE ADDRESSED	REMARKS
Rice									
Vegetables									
a. Carrots									
b. Celery									
c. Cabbage									
d. Wombok									
e. Pechay									
Others									
Root Crops									
a. Camote									
b. Potato									
c. Gabi									
Others									
Legumes									
a. Beans									
b. Peanut									
c. Corn									
Others									

II. Agricultural Development Interventions

Give assessment of the status or conditions of the following agricultural development interventions in terms of the following areas?

INFRASTRUCTURE SUPPORT FACILITIES

A. ACCESS

1. ROAD (Community Road Network)

1.1. Identify and fill up the following data under community road network.

PARTICULAR		DATA	REMARKS
a.	Length Concreted:		
b.	Length not concreted:		
c.	Length under construction:		
d.	Length under repair:		
e.	Length damaged/unpassable:		
f.	Length of road planned to be opened:		
g.	Average width of community road:		
h.	Length of community network		
i.	Others:		

1.2 Are there roads constructed and/or maintained through community initiative? ____ yes ____ no

If yes, please provide data on the following:

Location (place)	Width (m)	Height (m)	Nature of Community Initiative (ex. concreting widening, gravelling, riprapping, aspalting, etc.)	Year implemented	Actual or estimated cost	Source of Fund/ Agency	Lead person/s and position's	Remarks/ Other relevant information
1.								
2.								
3.								
4.								
5.								

1.3 Please give information on government initiatives (within last 10 years) on road construction/maintenance in Bauko.

Location (place)	Width (cm)	Height (m)	Nature of Community Initiative (ex. concreting widening, gravelling, riprapping, aspalting, etc.)	Year implemented	Actual or estimated cost	Source of Fund/ Agency	Lead person/s and position's	Remarks/ Other relevant information
1.								
2.								
3.								
4.								
5.								

1. 4 If there are foreign funded projects on the road access please identify.

Location (place)	Width (cm)	Height (m)	Nature of Community Initiative (ex. concreting widening, gravelling, riprapping, aspalting, etc.)	Year implemented	Actual or estimated cost	Source of Fund/ Agency	Lead person/s and position's	Remarks/ Other relevant information
1.								
2.								
3.								
4.								
5.								

2. Farm to market road (please fill the table below with appropriate data on farm to market road for Bauko.

Location (place)	Width (m)	Height (m)	Nature of Community Initiative (ex. concreting widening, gravelling, riprapping, aspalting, etc.)	Year implemented	Actual or estimated cost	Source of Fund/ Agency	Lead person/s and position's	Remarks/ Other relevant information
1.								
2.								
3.								
4.								
5.								

3. Bridges

3.1 Foot bridges. Please fill the table that follows with appropriate data on foot bridges developed in Bauko.

Location (place)	Length (m)	Width (m)	Type of Material Used (cable, steel matting for hanging type, wooden bridge, concrete)	Condition (excellent, good, needs repair, damaged, under repair and upassable.	Year Constructed	Cost	Implementing Agency	Remarks
1.								
2.								
3.								
4.								
5.								

3.2 Road bridges

Location (place)	Length (m)	Width (m)	Type of Material Used (cable, steel matting for hanging type, wooden bridge, concrete)	Condition (excellent, good, needs repair, damaged, under repair and upassable.	Year Constructed	Cost	Implementing Agency	Remarks
1.								
2.								
3.								
4.								
5.								

B. Dryers

1. Solar dryers (pavement which can be used for drying and other purposes such as playing court)

Location (place)	Length (m)	Width (m)	Concrete or Not Concrete	Condition	Year Constructed	Cost	Implementing Agency	Remarks
1.								
2.								
3.								
4.								
5.								

2. Private dryers. Please identify household who have their own dryers and provide relevant information by filling the table below.

Household	Length (m)	Width (m)	Type of Solar Dryer (concrete roof top/ concrete pavement)	Condition	Description	Cost	Remarks
1.							
2.							
3.							
4.							
5.							

3. Mechanical dryers. Are there mechanical dryers installed in your community? _____ yes _____ no. If yes please fill up the table below.

Location	Brief Description	Cost	Source of fund	Implementing agency	Year implemented Description	Remarks
1.						
2.						
3.						
4.						
5.						

C. Buildings

1. Waiting shed

Location	Size and or Floor Area	Materials Used (e.g. concrete wall and floor, G.I. sheets roof and wall, etc.)	Condition (excellent, good, under repair, dilapidated usable)	Cost # Fund Source	Implementing Agency/	Remarks
1.						
2.						
3.						
4.						
5.						

2. Packing shed

Location	Size and or Floor Area	Materials Used (e.g. concrete wall and floor, G.I. sheets roof and wall, etc.)	Condition (excellent, good, under repair, dilapidated usable)	Cost # Fund Source	Implementing Agency/	Remarks
1.						
2.						
3.						
4.						
5.						

3. Green house

Location	Size and or Floor Area	Materials Used (e.g. concrete wall and floor, G.I. sheets roof and wall, etc.)	Condition (excellent, good, under repair, dilapidated usable)	Cost # Fund Source	Implementing Agency/	Remarks
1.						
2.						
3.						
4.						
5.						

4. Training center

Location	Size and or Floor Area	Materials Used (e.g. concrete wall and floor, G.I. sheets roof and wall, etc.)	Condition (excellent, good, under repair, dilapidated usable)	Cost # Fund Source	Implementing Agency/	Remarks
1.						
2.						
3.						
4.						
5.						

5. Others

Location	Size and or Floor Area	Materials Used (e.g. concrete wall and floor, G.I. sheets roof and wall, etc.)	Condition (excellent, good, under repair, dilapidated usable)	Cost # Fund Source	Implementing Agency/	Remarks
1.						
2.						
3.						
4.						
5.						

D. Irrigation System

1. Conveyance

Location	Length (m)	Depth/diameter	Type (concrete, canal, pipe, hose, etc.)	Condition	Cost	Implementing Agency	Remarks
1.							
2.							
3.							
4.							
5.							

2. Dams

Location	Length (m)	Depth/ Diameter	Type (concrete, canal, pipe, hose, etc.)	Wt./ Vol./ Capacity	Cost	Implementing Agency	Remarks
1.							
2.							
3.							
4.							
5.							

MANPOWER DEVELOPMENT

Please provide relevant information on the table below.

PARTICULAR	Year conducted	Partici- pants	Duration	Agency Involved	Place/ Venue	Comments/ Suggestions	Remarks
A. Kinds of trainings attended (identify)							
1. FFS (farmers field school)							
2. Safety use of pesticides							
3. Farm management							
4. Organic farming							
5. Others _____							
B. Livelihood Projects							
1. Homemaking (wine making)							
2. Crafts							
3. Food processing							
4. Tailoring							
5. Others _____							

Note: To validate choose among participants to be interviewed.

POLICY SUPPORT

ORDINANCES	Year Proposed	Year Approved	Committee	Agency Involved	Place/Venue	Comments/Suggestions	Remarks

CREDIT FACILITIES

Please identify and provide relevant information on the available market/credit facilities for farming in Bauko by filling the table below.

CREDIT PROVIDER	LOAN SERVICES PROVIDED						
	Amount of Loan		Rate (%)	Mode of Payment	Requirement (collaterals, guarantor, etc.)	Type of Loan	Other information
	Min.	Max.					
A. Banks (identify)							
B. Coop (identify)							
C. Paluwagan System (identify)							
C. Government Loan Assistance (identify)							
D. Others (specify)							

MARKETING

A. Trade fair							
D. Market satellite							
E. Others (specify)							

III. Extent of awareness and implementation of the agricultural development interventions

Please check on the table provided using the following scale inside the table.

AGRICULTURAL DEVELOPMENT INTERVENTION	AWARENESS		IMPLEMENTATION				
			Fully Implemented (100%)	Fairly implemented (75%)	Moderately implemented (50%)	Slightly implemented (25%)	Not implemented (0)
A. Access (Infrastructure service)	Aware	Not Aware					
1. Road (Community Road Network)							
2. Farm-to-market road							
3. Bridges							
B. Dryers							
1. Solar							
2. Mechanical							
C. Buildings							
1. Waiting shed							
2. Packing shed							
3. Green house							
4. Training center							
D. Irrigation System							
1. Conveyance							
2. Dams							
E. Manpower Development							
1. Trainings attended by the farmers							
2. Livelihood projects							
F. Credit Facilities							
1. Banks							
2. Coop							
3. Government loan							
4. <i>Paluwagan</i> system							
G. Market Provider							
1. Trade fair							
4. Market satellite							
H. Policy Support							

IV. AGRICULTURAL PRACTICES

a. Rice (please check in the column what you are practicing and not practicing in your ricefields)

PRACTICE	PRACTICING	NOT PRACTICING
1. Land Preparation		
- manual (hoeing and/or pulling by the hand stubbles and weeds and trampling and or pressing by hand into the soil)		
- hoeing soil and pulverizing it by harrowing and/or by trampling		
- use of wooden plow and harrow pulled by carabao		
- <i>daynek</i> (pulverizing plowed/hoed soil or incorporating into the soil stubbles and weeds through guided movement of draft animal)		
- use of banana stem, wood or bamboo pole pulled by carabao or pushed manually to level soil on an irrigated field prior to planting		
2. Sowing		
- soaking seeds overnight up to 3 days prior to sowing		
- broadcasting seed on submerged seed bed		
- broadcasting seed and covering with thin layer of pulverized soil (unirrigated/rainfed seed bed)		
3. Planting		
- transplanting 1- 1 ½ months old seedlings		
- approximately 4-6 inches spacing		
- single seedling per planting space/hole		
- planting during <i>bescra</i> (full moon)		
4. Soil Fertility Management		
- fallowing (resting field after each cropping)		
- rice stubbles and weeds are incorporated or left to decomposed the field		
- <i>umang</i> and <i>taep</i> (rice hulls and rice stalks) are returned to rice fields		
- <i>kamas</i> incorporating organic matter into the soil trough <i>daynek</i> or manually during the onset fallow period		

5. Water Management	PRACTICING	NOT PRACTICING
- continuously irrigated, water level is maintained by fixing the level of outlet		
- tapping unused water from river/stream or outflows from other rice fields with use of indigenous conveyance system (ordinary canal and/or bamboo poles)		
- use of hose for irrigation		
6. Rice Variety		
- magumbal/dalacan (red rice)		
- kintoman		
- intan		
- intan bradon		
- California/Taiwan		
- diket (white), balatino (red)-glutinous rice		
7. Pest and Disease Management		
- use of scarecrows to drive away mayas (rice birds)		
- use of <i>piket</i> to trap mayas		
- <i>bewew</i> (a farmer or any member of the family keep watch of their rice field to drive mayas everyday until the rice is harvested)		
- use of hand-made rat traps		
- use of <i>silo</i> (snare/trap) for other pests like <i>bayawak</i> , <i>danggo</i> , fowl etc.		
- maintaining pets like <i>anop</i> (dog that search and kill rats, bayawak etc.)		
- cultural rituals/ceremonies (entails butchering of chicken/pig and prayer of elders or <i>manbunong</i>)		
8. Cropping Season		
- once a year		
- <i>tupeng</i> (twice a year)		
9. Crop Integration		
- root crops + rice		
- rice + vegetables		
- rice only		

	PRACTICING	NOT PRACTICING
10. Harvesting		
- use of <i>rakem</i> (special knife to cut panicle) and <i>daneg</i> (thin strips of bamboo or rattan) to bundle palay		
- <i>gapas</i> with <i>basbas</i> or <i>hampas</i> system to separate grains from panicle (<i>iric</i>)		
- <i>kutong</i> (use of finger to glean the palay)		
11. Post Harvest Practices		
a. Packaging		
- use of sacks		
- use of ropes/bamboo/rattan to bundle palay		
- use of woven baskets, such as <i>luwa</i> or <i>labba</i> to pack harvested palay		
b. Drying		
- use of solar dryer		
- use of multi-purpose drying pavement		
- use of private dryers (frontage, or roof)		
c. Storing		
- store in <i>agamang</i> (rice granary)		
- use of <i>bobeda</i> (attic) of the house to store palay		
d. Cleaning/Threshing		
- use of pedal-powered thresher		
- use of manual method (treading by feet to separate grains from panicle)		
- use of <i>basbas</i> or <i>hampas</i> method (use of solid object to beat the panicle or striking bundled rice to hard objects)		
e. Milling		
- manual pounding and winnowing		
- rice mill		

b. Vegetable practices (please check in the column what you are practicing and not practicing in your garden)

PRACTICES	PRACTICING	NOT PRACTICING
1. Land Preparation		
- Manual (cleaning with the use of sickle, bolo, or grub hoe)		
- Plowing and harrowing, 2 or 3 times, to minimize weeds.		
- Broadcasting of lime if the soil pH is below 6.0		
- Digging at least 30 cm deep to ease root penetration and aeration.		
- Constructing/fixing drainage/canals		
- Manual plot or elevated bed preparation manually		
2. Seed/Planting Bed Preparation		
- Uniform pulverization of soil		
- Mixing organic fertilizers and ash with the soil before planting		
- Sterilization of seed beds by burning combustible materials (e.g. sticks, dried grasses, dried leaves) on top of the seed beds		
- Single row seedbed		
- Double row seedbed		
3. Sowing		
- Broadcasting seeds		
- Sowing seeds along parallel lines		
- Covering seeds sown with ash or fine soil		
- Mulching (covering sown beds with finely chopped dry grasses to cushion it from the impact of watering or rainfall)		
4. Planting		
- One or two seed per hole		
- One seedling per hole		
- Determining spacing by estimation (4-9 inches) depending on size of grown plant		
5. Soil Management		
- Fallowing		
- Intercropping		
- Crop rotation		
- Mix cropping		
- Maintaining plants on the sides of farm to prevent erosion		
- Allowing vegetable materials to decompose on the farm		

6. Irrigation	PRACTICING	NOT PRACTICING
- Fetching water for watering crops		
- Watering crops thru the use watering cans		
- Using hose/pipeline to bring water to the farm (thru gravitation)		
- Using rainbird/rainburst method/ sprinkler.		
- Flooding (conveying amount of water enough to submerge planted beds or plots)		
7. Thinning		
- Two or three seeds are planted per hole but only one plant will be left to grow		
- Thinned at 2-3 weeks after seed germination		
X2c = 22.9		
8. Fertilization		
- Application of chicken dung		
- Application of compost		
- Application of commercial fertilizer		
- Application of ash		
- Application of liquid fertilizers		
9. Hilling-Up		
- Placing soil at the bases of plants to cover roots and keep the plants firm		
- Hilling immediately after applying fertilizer		
10. Pest and Disease Management		
- Maintaining strong smelling plants around the farm to drive away insects		
- Inter planting strong-smelling plants (e.g. tomatoes, mint, onion) in between crops to drive away insects		
- Spraying pesticides and insecticides		
- Trapping insects with stickers		
- Catching insects thru the use of mosquito net		
- Hand picking and quashing of pests (e.g. worms)		
- Use of rainbird irrigation		
- Maintaining good drainage in the area		

V. What are the problems you encountered in your community kindly check the degree of seriousness by checking under the corresponding numbers using the scale inside the table.

Problem	Extremely Serious	Very Serious	Moderately Serious	Slightly Serious	Not Serious	Remarks
	(5)	(4)	(3)	(2)	(1)	
1. Lack/insufficient infrastructure support facilities						
a. Farm-to market road						
b. Irrigation system						
c. Dryers						
d. Storage/packing facilities						
e. Credit facilities						
3. Lack of support from LGUs (animal or seedling dispersal)						
4. Lack of trainings/workshops and seminars related to farm/agriculture						
5. No market of products						
4. Low and highly fluctuating prices						
6. Problem on vegetable importation						
7. High costs of inputs (labor, fertilizers, pesticides, seeds etc.)						
8. Lack of technical know how in farm management						
9. Soil infertility caused by over use of chemicals						

Problem	Extremely Serious	Very Serious	Moderately Serious	Slightly Serious	Not Serious	Remarks
	(5)	(4)	(3)	(2)	(1)	
10. Calamity (typhoons)						
11. Pest and diseases						
a. Rice						
Pests (rats, mayas, bayawak, golden <i>kohol</i> , azolla, weeds)						
Diseases (<i>bungaw</i>)						
b. Vegetables						
Pests (snails, slugs, aphids, beetle, white flies, cutworm, thrips)						
Diseases (clubroot, powdery mildew, bacterial wilt, root nematodes)						

