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Existing Upland Farming Technology in Ilocos Sur

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ABSTRACT

This study assessed the existing farming technology in 14 upland municipalities of Ilocos Sur. It aimed to identify the farmers' socio-economic characteristics, the farm technologies they used, the agencies involved in farm technology transfer, the kind of technology they promoted, the farm technologies adopted or rejected by the farmers, and the reasons for adoption/rejection of the technologies.

Majority of the farmer-respondents were male, married, belonged to the 50-69 age bracket, finished elementary, and had a monthly income of less than P5,000.00 derived mostly from their agricultural products.

Most of them prepared their seedbeds through the wet bed method and used the traditional plow and carabao to prepare the land for planting, although a considerable number used tractors and kuliglig. They tilled their land twice or thrice before planting, before and during the rainy season.

The total land area planted by majority of the farmer-respondents was one hectare and below. Their common crops were rice and vegetables, but some planted corn, tobacco, and root crops. They planted breeder and certified seeds using two or three of the methods of planting: direct seeding, local practice, random, and straight row planting. They used sidedressing, topdressing, and basal methods of fertilizer application following the amount recommended by the agricultural technologists or based on their own experience. Since their plants were rainfed, some used irrigation system and electric pump to supplement the water supplied by the rain. They also used insecticides, pesticides, and bio-pest control; some used fungicides and herbicides.

Harvesting of crops was manually done. Very few farmers used rice thresher and mechanical reaper for harvesting rice and the corn sheller for harvesting corn. All the rice and corn farmers sundried their products after harvesting them. The majority sold their products after drying. Those who did not sell all their

products stored them in granaries and warehouses. Only some treated their products with chemicals before storing them.

The farm technologies introduced mainly by the Department of Agriculture (DA) extension specialist were: use of chemicals, seed growing technology, integrated pest management, compost preparation, irrigation technology, use of farm machines, legume inoculation, and green manuring. Other sources of farm information were non-government organizations, institutions of higher learning, private organizations, and neighbors/friends.

All technologies introduced to the farmers were favorably accepted by the majority of the respondents due to the following reasons: it lessens expenses, increases production and income, improves the product quality, and is economical; integrated pest management prevents pollution; irrigation system provides enough water supply; machines are better farming facilities and make land preparation easier; and legume inoculation improves soil quality and produce healthier plants.

Those who did not accept the use of chemicals reasoned out that it was expensive and hazardous to health and soil nutrients were depleted. Some farmer-respondents did not accept legume inoculation because they had no adequate knowledge of the technology.

Introduction

Background of the Study

Rural development is the process of making the rural areas a better place to work and live in. Emphasis is directed to the peoples' well-being and economic growth. Rural development concerns an increase in real per capita income, alleviation of poverty, public services, and employment opportunities. **All** these are summed up in the term "quality of life."

The quality of life in rural communities is directly influenced by local agricultural producers, whose well-being is affected by the life status of their rural communities. Rural communities are the agricultural producers' service and shopping centers, where they buy their farm supplies, market their products, handle their finances, purchase their food and clothing, and receive education, welfare services, recreation, and entertainment. Most farm people feel that their quality of life should be comparable to that of other people in the other parts of the country. They are concerned about the quantity, quality, and cost of public and private goods they purchase.

The government's support for agricultural productivity in the rural areas in terms of infrastructure, irrigation, crop production, and postharvest technology is expected to have penetrated even the remotest barangay.

Research findings have noted that modem day technology is acceptable and prevalent in the lowland areas. However, the situation may not be the same in the upland municipalities. For this reason, the researchers wanted to identify and assess the existing farm technology in the upland municipalities which could serve as basis for conducting further studies that would address their problems and seek basis for recommendations, decisions, actions, and other support services for the upland farmers that would help them improve the quality of their products and ultimately, their quality of life.

Objectives of the Study

This study was conducted to assess the existing upland farming technology in Ilocos Sur.

Specifically, it aimed to:

1. Identify the socio-economic characteristics of farmer-respondents.
2. Identify the different farm technologies being used by fanner-respondents.
3. Identify the different agencies involved in farm technology transfer and the kind of technology promoted by the different groups.
4. Detennine the farm technologies accepted/adopted or rejected by the fanners.
5. Identify the reasons for adoption/rejection of the technologies.

Review of Related Literature

In the 70s, the Philippines was so productive that it became a rice exporter through the introduction of improved fanning technologies and strong institutional support system for farmers. However, this was not sustained for several reasons, namely: increasing population to feed, lack of funds for food agencies like the National Food Authority (NFA), poor policies, and lack of administrative capability or lack of effective government control coupled by natural and physical problems of the countryside and upland farmers. Fann technology has yet to be effectively transferred to the uplanders.

The following information cites the effects of technologies in fanning and other means of production.

Agriculture has always been considered as the backbone of national economy and the major propeller of development, thus, agricultural productivity must be increased to achieve food self-sufficiency and improve levels of general welfare through employment in the countryside. Taking rice, the major agricultural crop and product, as an example, Gelia T. Castillo as cited by Philippine Rice Research Institute (1993) states:

> *"To the Filipino, rice is life, politics, and economics... rice is survival itself ... self-sufficiency in this prime commodity has been both o promise and an avowed goal of every government administration for as long as one can remember."*

Likewise, Rafael Salas also revealed:

> *"Rice shortages have been common phenomena* in *the Philippines since the turn of the century. Successive governments had made several attempts to increase domestic production, but almost without exemption, had to resort to rice importation. While this solution eased the immediate situation, it did not provide a base for long term self-sufficiency ... Our agricultural legacy from the past was not encouraging; erratic food production punctuated by periodic imports of rice; growing unemployment in the rural areas, causing immigration to the cities, spasmodic signs of unease in the provinces."* (Intercontinental Publications, Inc.)

Furthermore, Dr. Saturnina M. Ocampo, Jr., regional director of the Department of Science and Technology DOST), said:

> *"In Region I, despite the occurrence of natural calamities, projects were strengthened and successfully implemented. Linkages were forged with other agencies for working relationships in order to disseminate relevant technologies for better quality of life of the people. Programs and projects based on the demands and priorities of the region have been turned up to this cause."* (Department of Science and Technology, 1990).

The DOST Region I Annual Report (1990) also contains information on technology transfer and commercialization particularly on food processing, rapid composting, small farm reservoir project, technological sourcing and data banking, technology promotion, production and dissemination, and other topics relevant to agricultural technology.

The Department of Agriculture in Ilocos Sur, in conjunction with government and non-government organizations, has sponsored numerous projects and activities geared towards the attainment of a common provincial and regional goal of development, involving extensionists, farmer-leaders, and members of cooperatives.

Methodology

This study focused on the 14 upland municipalities in the province of Ilocos Sur, namely: Alilem, Banayoyo, Burgos, Cervantes, Del Pilar, Galimuyod, Lidlidda, Nagbukel, Quirino, Salcedo, San Emilio, Sigay, Sugpon, and Suyo. Five farmer respondents were taken from each barangay in the 14 municipalities for a total of 890 respondents. These respondents were selected at random. Due to unavoidable circumstances, however, only 830 farmers responded to this project.

In gathering the data, a questionnaire checklist supplemented with informal interview with the farmer-respondents was used. Frequencies and percentages were used in analyzing the data gathered.

Discussion of Results

Socio-Economic Characteristics

The socio-economic characteristics of the farmer-respondents are presented in Table 1.

A total of 657 (79.16%) were male respondents while 173 (20.84%) were female. Majority of them (76.02%) were married, 12.53% were widow/er, and 11.45% were single. According to age range, 49.04% belonged to the 50-69 age bracket; 30.84% were between 30-49 years old; 11.32% were 70 years old and above; and 8.80% were below 30 years old.

The farmer-respondents' educational background was considered to serve as basis on their know-how on farm technology. It was found out that a majority of them (51.69%) finished elementary; 33.73% finished high school; 11.08% finished an academic degree; 1.45% finished Agriculture; and 2.05% did not give any response.

The respondents' monthly income is also presented in Table, 1. More than half of them (56.14%) had an income below P5,000 per month; 23.85% had a monthly income of P5,000-6,999; 15.30% had P 7,000-8,999; 1.45% had P 9,000-10,999; 1.69% had Pl 1,000 and above; and 1.57% did not respond to the question.

Table 1. The socio-economic characteristics of farmer-respondents.

SOCIO-ECONOMIC CHARACTERISTIC	NO.	%
Sex		
Male	657	79.16
Female	173	20.84
Civil status		
Single	95	11.45
Married	631	76.02
Widow/er	104	12.53
Age (years)		
70&above	94	11.32
50–69	407	49.04
30 - 49	256	30.84
below 30	73	8.80
Educational background		
Finished elementary	429	519
Finished high school	280	33.73
Finished college		
Academic	92	11.08
Agriculture	12	1.45
No response	17	2.05
Monthly income		
Below P5000	466	56.14
P5O00 – 69 99	198	23.85
7000 – 8999	127	15.30
9000 – 10999	12	1.45
11000 & above	14	1.69
No response	13	1.57
Source of income		
Salary	138	16.63
Business	120	14.46
Agricultural products	502	60.48
Assistance from abroad	68	8.19
Pension	2	0.24

According to source of income, almost two-thirds of the respondents' (60.48%) got their income from agricultural products; 16.63% received salaries; 14.46% got their income from business; 8.19% received assistance from abroad; and only two respondents (0.24%) received pension as their source of income.

Farm Technology

The technologies used in land preparation, cultural management, harvesting, and postharvest are shown in Tables 2-5.

Land preparation. Table 2 presents the technologies followed by farmer-respondents in preparing the land for planting.

Table 2. Technologies used by farmer respondents in preparing the land for planting.

TECHNOLOGY USED IN LAND PREPARATION	FREQUENCY OF MENTION	%
Use of farm machines		
Tractors	242	29.16
Kuliglig	359	43.25
Use of plow/carabao	481	57.95
Manner of preparing the seedbed		
Dry bed	236	28.43
Wet bed	428	51.57
Dapog	129	15.30
Palatac	139	16.75
Tilling the land for farming		
During dry season	153	18.43
Before rainy season	439	52.89
During rainy season	372	44.82
Frequency of tilling the land before planting		
Once	173	20.72
Two times	303	36.51
Three times	235	28.31
More than three times	120	14.46

When asked about the use of farm machines in preparing the land for planting, 29.16% of the farmer-respondents revealed that they used tractors and 43.25% used kuliglig. More than one-half of them (57.95%), however, declared that they still used

the traditional plow and carabao. This shows that the majority of the farmers in the upland municipalities have not fully adopted the use of machines in fanning. When asked about their reason for non-adoption, many said that it was expensive and they could not afford them.

The manner of preparing the seedbed is also presented as a part of land preparation. Dry seedbed was prepared by 28.43% of the respondents while wet bed was prepared by 51.57%. The *dapog* was used by 15.30% and the *palatac* method was followed by 16.75% of the respondents. All the farmer-respondents had their own reason in using these kinds of seedbed preparation. They said that they followed what was best for them and that which they have been used to with some or little innovation. This means that they tried to follow gradually the introduced technology.

Also included in land preparation is the time of tilling the land for farming. It was found out that 18.43% of the respondents tilled their land during dry season; 52.89%, before rainy season; and 44.82%, during rainy season. During informal conversations with the respondents, they revealed that they tilled the land to prevent weeds from growing. Asked how many times they tilled the land before planting, 20.72% said they tilled the land just once, because there was no need to till the land many times. They have observed that the land was still rich in nitrogen and had few weeds, thus, tilling the land once was enough. More than one-third of the respondents (36.51%) tilled the land twice before planting because there was a need. More than one-fourth (28.31%) tilled the land thrice because the grass or weeds growing in their lands were difficult to exterminate. Fewer farmer-respondents (14.46%) tilled their lands more than thrice because they did not have much land to cultivate, thus, they had enough time to till their lands more than three times to ensure a better harvest or an increase in production.

Cultural management. The kind of crops planted by the farmer-respondents and the cultural management technologies they used in planting are presented in Table 3. According to the kind of crops they planted, the farmer-respondents are distributed as follows: 62.41% planted rice; 33.73% planted com; 57.11% planted vegetables; 33.61% planted tobacco; and 9.52% planted rootcrops. It was noted that some of the farmer-respondents planted two or more kinds of crops.

Table 3 also shows that the farmer-respondents were small farmers. Most of them (61.08%) were planting a land area of less than one hectare, 23.49% were planting one hectare, 8.80% had two hectares to plant; and 6.63% had more than two hectares to plant. Those who had less than one hectare to plant preferred to follow their own method of planting, which was tilling the land and watering their plants.

The kinds of seeds usually planted were the following: breeder seeds, planted by 30.14% of the farmer-respondents; foundation seeds, by 10.20%; registered seeds, by 15.06%; certified seeds, by 24.22%; and farmer's seeds, by 20.36%.

Table 3. The crops being planted and cultural management technologies followed.

KIND OF **PLANT/** TECHNOLOGY USED	**NO.**	%
Crop planted		
Rice	518	62.41
Com	280	33.73
Vegetable	474	57.11
Tobacco	279	33.61
Rootcrops	79	9.52
Area of land being planted (ha)		
Less than one	507	61.08
One	195	23.49
Two	73	8.80
More than two	55	6.63
Kind of seeds usually planted		
Breeder	251	30.14
Foundation	84	10.20
Registered	125	15.06
Certified	201	24.22
Farmer's seeds	169	20.36
Method used in planting		
Random planting	328	39.52
Direct seeding	391	47.11
Straight row planting	258	31.08
Local practice	353	42.53
Manner of fertilizing the plants		
Basal	358	43.13
Side	403	48.85
Top	233	28.07
Amount of fertilizer applied in the plant recommended by:		
Bureau of Soils	54	6.51
Agr'l technologists	403	48.55
Friends & neighbors	109	13.13
Own method & experience	264	31.81

Table 3. Continued.

KIND OF PLANT/ **TECHNOLOGY** USED	**NO.**	%
Manner of watering the plants		
Rainfed	686	82.65
Irrigated	365	43.98
Water Pump	145	17.47
Spring	45	5.42
Use of insecticide		
Yes	493	59.40
Sometimes	206	24.82
No	131	15.78
Use of fungicide		
Yes	273	32.89
Sometimes	289	34.82
No	268	32.29
Use of herbicide		
Yes	164	19.76
Sometimes	237	28.55
No	198	35.90
No response	131	15.78
Use of Pesticide		
Yes	415	50.00
Sometimes	263	31.69
No	110	13.25
No response	42	5.06
Use of other bio-pest control		
Yes	316	38.07
Sometimes	196	23.61
No	264	31.81
No response	54	6.51

The researchers also inquired on the method used by the respondents in planting. Random planting was used by 39.52%; direct seeding was followed by 47.11%, 31.08% followed the straight row planting; and 42.53% followed the local practice. Some of the farmers claimed also that sometimes they used three methods depending on the location of their land, availability of seedlings, manpower, funds, and materials. According to them, they could not follow solely the new technology because of lack of hired laborers especially when the farmers in the barangay work all together in the field. Sometimes they lacked money to hire additional manpower, thus, they resorted to the local practice.

On fertilizer application, 43.13% followed the basal method; 48.85% used sidedressing; and 28.07% used topdressing. Some of the farmers followed two or three methods of fertilizing their plants.

When asked about the basis of the amount of fertilizer applied in the plant, a majority of the farmers 48.55% revealed that this was recommended by the agricultural technologists assigned in their respective areas; 13.13% said this was recommended by their friends and neighbors, while 6.51% said this was based on the recommendations of the Bureau of Soils. This shows that these fanners are positive-thinkers and are ready to innovate because they believe on the technologies recommended by the experts in agriculture and modern technologies. On the other hand, it was noted that 31.81% followed their own method based on their experience. This shows that they have negative attitudes and they still adhere to their traditional methods of farming.

Watering the plants is a part of cultural management. The farmers' manner of watering their plants was as follows: 82.65% depended on the rain for watering the plants; 43.98% used irrigation; 17.47% used deep well run by electric water pump; and 5.42% drew water from the spring. Farmers whose plants were watered by irrigation, electric water pump, and spring also resorted to rainfall during the rainy season.

When asked if they used insecticides to control harmful insects, 59.40% said "yes"; 24.82% said "sometimes"; and 15.78% said "no". On the use of fungicides, 32.89% said "yes"; 34.82% said "sometimes"; and 32.29% said "no". On the use of herbicides, "yes" was declared by 19.76%; "sometimes", by 28.55%; "no", by 35.90%; and 15.78% did not respond. On the use of pesticide, it was "yes" by 50%; "sometimes", by 31.69%; "no", by 13.25%; and 5.06% did not respond. On the use of biopest control, it was "yes" by 38.07%; "sometimes", by 23.61%; "no", by 31.81%; and 6.51% did not answer. When asked during informal interviews why they did not use any pest/insect control/ prevention technique, the farmers who said "no" replied that these were expensive. Some said these are hazardous to their health, while others claimed that they did not know how to apply them. For those who did not respond, it was implied that they were quite lazy to give their responses or they simply ignored some of the questions.

Harvesting. Table 4 presents the technologies used in harvesting.

Out of 518 farmers who planted rice, 9.65% used the reaper in harvesting and 22.78% used the rice thresher. More than two-thirds 67.57% still used the manual method of harvesting.

Among the 280 farmers who planted corn, 17.5% used the corn sheller while 82.5% used the traditional manual way of harvesting com.

All other crops were harvested by means of the manual method.

Table 4. Technologies used in harvesting.

HARVESTING TECHNOLOGY USED	NO.	%
Rice		
Mechanical (Reaper)	50	9.65
Manual	350	67.57
Rice 'Thresher	118	22.78
Corn		
Mechanical (Com Sheller)	49	17.50
Manual	231	82.50

Postharvest. This study also aimed to know the technologies used in postharvest. These are shown in Table 5.

Only the farmers who planted rice (518) and com (28) dried their products after harvesting. Those who planted vegetables, tobacco, and rootcrops did not dry their products. All the rice farmers (62.41% of the respondents) and the com farmers (33.73% of the respondents) used sun-drying. By this method, according to the farmers, there is 100% quality drying, but they usually did this two or three times depending on the weather. However, they encountered problems during the rainy season or typhoons because their products could not be dried immediately. Thus, they signified a need to use a mechanical dryer but they could not use one because it was expensive and the farmers could not afford to have one.

After drying their products, 21.69% of the respondents sold them immediately. These were the farmers who had more than enough for their family consumption or those who had a second cropping. The majority of the respondents (57.47%) sometimes sold some of their products after drying so that they would have money to spend but they usually kept the rest for future consumption. Only 20.84% definitely did not sell their products after drying. They just kept them for family consumption.

Those who did not sell their products after drying stored them in the following manner: 33.61%, in warehouses and 43.37%, in granaries; 23.01% did not respond. When asked if they treated their products before storing them, the following responses were gathered: yes for 22.77%; sometimes, for 25.42% and no, 51.81%. When asked why they did not treat their products before storage, they said that their products would not be stored for so long, thus there was no need to treat them.

Table 5. Technologies used in postharvest.

TECHNOLOGY USED	NO.	%
Manner of drying products		
Mechanical dryer	0	**0.00**
Sun drying		
Rice	**518**	62.41
Corn	**280**	33.73
Products sold after drying		
Yes	180	21.69
Sometimes	477	57.47
No	173	**20.84**
Manner of storing products		
Warehouse	279	33.61
Granary	360	43.37
No response	191	23.01
Treatment of products before storage		
Yes	189	22.77
Sometimes	211	**25.42**
No	430	**51.81**
Manner of treating products before storage		
Spraying Chemicals	304	76.00
No response	96	24.00

Out of the 400 respondents who treated or sometimes treated their products before storing, 76% sprayed chemicals in treating their products while 24% did not give any response.

Farm Technology Transfer

The different farm technologies introduced to the farmer-respondents (Table 6), the sources of information on these farm technologies (Table 7) and the farmer-respondents' adoption of the technologies (Table 8) are hereby presented.

Farm technologies introduced. Eight farm technologies introduced to the farmers are shown in Table 6.

Table 6. Technologies introduced to the farmer respondents.

TECHNOLOGY INTRODUCED	NO.	%
Use of Chemicals		
Yes	550	66.26
No	204	24.58
No Response	76	9.16
Seed Grower		
Yes	531	63.98
No	161	19.40
No response	138	16.62
Integrated Pest Management		
Yes	407	49.04
No	252	30.36
No response	171	20.60
Compost Preparation		
Yes	414	49.88
No	370	44.58
No response	46	5.54
Irrigation System		
Yes	497	59.88
No	228	27.47
No response	105	12.65
Use of Machineries in Farming		
Yes	495	59.64
No	245	29.52
No response	90	10.84
Legume Inoculation		
Yes	148	17.83
No	402	48.43
No response	280	33.74
Green Manuring		
Yes	451	54.34
No	267	32.17
No response	112	13.49

The use of chemicals was introduced to 66.26% of the respondents; it was not known by 24.58% and 9.16% did not respond.

Seed growing technology was introduced to 63.98% of the respondents; 19.4% claimed it was not introduced to them and 16.62% did not respond.

Integrated pest management was introduced to 49.04% of the respondents; 30.36% did not know about it; and 20.60% did not give any response.

Almost half of the respondents 49.88% had knowledge on compost preparation; 44.58% did not have knowledge on it; while 5.54% did not respond.

Irrigation system was introduced to 59.88% of the farmer-respondents; it was not introduced to 27.47%; and 12.65% did not respond.

The use of machines in farming was introduced to 59.64%; it was not introduced 29.52%; and 10.84% refrained from responding.

On legume inoculation, 17.83% had knowledge on the technology; 48.43% did not have any knowledge on it; and 33.74% did not respond.

Green manuring technology was introduced to 54.34%; 32.17% claimed that they were not infonned; and 13.49% did not respond.

It is implied that except legume inoculation, these farm technologies **were** introduced to majority of the farmer-respondents.

Sources of information. Table 7 presents different sources of information on the farm technologies introduced for the farmers. The respondents of this part of the research were those who declared that the technologies were introduced to them. Thus, the number of respondents vary per technology.

Information on the use of chemicals was disseminated to 550 farmer-respondents, a majority of whom 64.18% declared that this information came from the Department of Agriculture (DA) through the agricultural extension technologist. Others were informed by the NGO's (15.64%), private organizations (14.91%), and an institution of higher learning (5.27%).

Similarly, out of 531 farmer-respondents to whom the technology on seed growing was introduced, 64.03 averred that information on the technology was disseminatcu by the DA extension workers, followed by the neighbors/friends (17.89%), institution of higher learning (6.59%), NGO's (6.21%), and private organizations (5.27%).

Integrated pest management was introduced by DA extension workers (85.99%); NGO's (5.41%); private organizations (4.91%); and an institution of higher teaming (3.69%).

Table 7. Sources of information on farm technology.

SOURCE OF INFORMATION	NO.	%
Use of Chemicals	N=550	
Private organizations	82	14.91
NGO's	86	15.64
Dept. of Agriculture	353	64.18
Institution of Higher Learning	29	5.27
Seed Growing		
Private organizations	28	5.27
NGO's	33	6.21
Dept. of Agriculture	340	64.03
Institution of Higher Learning	35	6.59
Neighbors/friends	95	17.89
Integrated Pest Management	N=407	
Private organizations	20	4.91
NGO's	22	5.41
Dept. of Agricuture	350	85.99
Institution of Higher Learning	15	3.69
Compost Preparation	N=414	
Private organizations	18	4.35
NGO's	32	7.73
Dept. of Agriculture	343	82.85
Institution of Higher Learning	21	5.07
Irrigation System	N=497	
Private organizations	58	11.67
NGO's	41	8.25
Dept. of Agriculture	378	76.06
Institution of Higher Learning	20	4.02
Use of Machineries in Farming	N=495	
Private organizations	176	35.56
NGO's	81	16.36
Dept. of Agriculture	224	45.25
Institution of Higher Learning	14	2.83
Legume Inoculation	N=148	
Private organizations	5	3.38
NGO's	9	6.08
Dept. of Agriculture	121	81.76
Institution of Higher Learning	13	8.78
Green Manuring		
Private organizations	17	3.77
NGO's	23	5.10
Dept. of Agriculture	354	78.49
Institution of Higher Learning	57	12.64

Compost preparation technology was introduced to 4.35% of the respondents by private organizations; to 7.73% by NGO's; to 82.85% by the Department of Agriculture; and 5.07% by an institution of higher learning.

Only 11.67% said that the technology on irrigation system was introduced by private organizations; 8.25% by non-government organizations, 76.06% by the DA extensionists; and 4.02%, by an institution of higher learning.

The use of machines in farming was introduced by private organizations to 35.56% of the respondents; by non-government organizations to 16.36%; by DA extension technologists to 45.25%; and by an institution of higher learning to 2.83% of the respondents.

Legume inoculation technology was disseminated by the **DA** extensionists to 81.76% of the respondents; by an institution of higher learning to (8.78%); by private organizations to 3.38%; and by non-government organizations to 6.08%.

The technology on green manuring was disseminated by **DA** extensionists to 78.49% of the respondents; by an institution of higher learning to 12.64%; by non-government organizations to 5.10%; and by private organizations to 3.77%.

It was noted that the majority of the farmer-respondents cited the Department of Agriculture as their major source of information on all these technologies.

Adoption offann technology. Adoption refers to whether or not the farmers accepted the technologies introduced by the different sources of information. Table 8 shows the farmers' responses on this aspect.

Out of *550* respondents to whom the use of chemicals was introduced, 71.82% accepted it and 28.18% did not accept it. The seed growing technology was accepted by 81.17% of the respondents but was not accepted by 18.83%.

Majority (96.81%) accepted the integrated pest management technology while 3.19% did not accept it. Similarly, 93.96% accepted the compost preparation technology while 6.04% did not accept it.

Irrigation technology was accepted by 88.33% of the respondents while 11.67% did not accept the technology. Likewise, 85.66% accepted the technology on the use of machines in farming while 14.34% did not accept the technology.

Legume inoculation technology was accepted by 79.33% of the respondents while 20.27% did not accept it. Green manuring technology was accepted by 87.36% while 12.64% did not accept it.

Table 8. Adoption of farm technologies by the farmer-respondents.

STATUS OF TECHNOLOGY ADOPTION	NO.	%
Use of Chemicals	N=550	
Accepted	395	71.82
Not Accepted	155	28.18
Seed Growing	N=531	
Accepted	431	81.17
Not Accepted	100	18.83
Integrated Pest Management	N=407	
Accepted	394	96.81
Not Accepted	13	3.19
Compost Preparation	N=414	
Accepted	389	93.96
Not Accepted	25	6.04
Irrigation System	N=497	
Accepted	439	88.33
Not Accepted	58	11.67
Use of Machineries in Farming	N=495	
Accepted	424	85.66
Not Accepted	71	14.34
Legume Inoculation	N=148	
Accepted	118	79.73
Not Accepted	30	20.27
Green Manuring	N=451	
Accepted	394	87.36
Not Accepted	57	12.64

The farmer-respondents' reasons for acceptance or non-acceptance of the technology are found in Table 9.

The following reasons were cited by 395 respondents who accepted the technology on the use of chemicals: it is economical (63.29%); increase in production (55.44%) effective control or prevention of insect pests/diseases (50.13%); and increase in income

Table 9. Farmer-respondents' reasons for their acceptance or non-acceptance of the different technologies.

REASON	NO.	%
Use of Chemicals		
Acceptance	N=395	
Economical	250	63.29
Increase in production	219	55.44
Effective control or prevention of insects pest/diseases	198	50.13
Increase of income	128	32.40
Non-Acceptance	**N=155**	
Expensive	140	90.32
Hazardous to health	133	85.81
Soil nutrients are depleted	82	52.90
Seed Growing		
Acceptance	N=431	
More seed breeder	350	81.21
Resistant to pest & diseases	264	61.25
Economical	249	57.77
More income	185	42.92
Quality seeds	183	42.46
Integrated Pest Management		
Acceptance	N=394	
Prevents pollution	289	73.35
More income	200	50.76
Increase in production	190	48.22
Lessens expense	132	33.50
Compost Preparation		
Acceptance	N= 389	
Gets rid of commercial fertilizers	295	75.84
Enriches soil fertility	256	65.81
Additional income	246	63.24
Improves quality of soil	240	61.70
Alternate to commercial fertilizers	224	57.58
Better harvest	180	46.27
Lesser expense	111	28.53
Irrigation System		
Acceptance	N=439	
More income	355	89.98
Provides enough supply of water	384	87.47
Increase in production	284	64.69
Less expense	176	40.09

Table 9. Continued.

REASON	NO.	%
Use of Machineries in Farming		
Acceptance	N=424	
Easier land preparation	234	55.19
Better farming facilities	232	54.72
More systematic way of farming	185	43.63
Less expense	80	18.87
Non-Acceptance	N=71	
Too expensive	71	100.0O
Legume Inoculation		
Acceptance	N=118	
Improvement of soil quality	90	76.27
Healthier plants	80	67.80
Protection from pests	75	63.56
Increase of production	66	55.93
Better quality of products	55	46.61
Non-Acceptance	N=30	
Lack of knowledge on the technology	30	100.00
Green Manuring		
Acceptance	N = 394	
Prevents pollution	253	64.21
Enriches soil fertility	200	50.76
Natural fertilizer	160	40.61
More production	135	34.26
More income	100	25.38
Lessens expenses	98	24.87

(32.40%). The respondents who did not accept this technology gave the following reasons: chemicals are expensive (90.32%); it is hazardous to health (85.81%); and soil nutrients are depleted (52.90%).

Those who accepted seed growing technology gave the following reasons: more hybrid seeds are produced (81.21%); it is resistant to pest and diseases (61.25%); it is economical (57.77%); it generates more income (42.92%); and it produces quality breeder seed (42.46%).

The 394 farmer-respondents who accepted the integrated pest management technology also gave the following reasons: it prevents pollution (73.35%); it generates more income (50.76%); it increases production (48.22%); and it lessens expenses (33.50%).

The 389 farmer-respondents who accepted compost preparation technology gave the following reasons: it gets rid of commercial fertilizers (75.84%); it enriches soil fertility (65.81%); it gives additional income (63.24%); it improves the quality of soil (61.70%); it is an alternate to commercial fertilizer (57.58%); it generates better harvest (46.27%); and it lessens expenses (28.53%).

The reasons of 439 farmer-respondents for accepting irrigation system technology were the following: it generates more income (89.98%); it provides enough water supply (87.47%); it increases production (64.69%); and it is less expensive (40.09%).

The reasons of 424 farmer respondents for accepting the technology on the use of machines in farming were as follows: land preparation is easier (55.19%); machines are better farming facilities (54.72%); it is more systematic way of farming than the plow and cow (43.63%); and it is less expensive (18.87%). That machines are too expensive is the unanimous reason of 71 farmer-respondents who did not accept the use of machines in farming.

Legume inoculation technology was also accepted by 118 farmer-respondents, who gave the following reasons: it improves soil quality (76.27%); healthier plants are produced (67.80%); it provides protection from pests (63.56%); it increases production (55.93%); and it produces better quality products (46.61%). All the 30 farmer-respondents who did not accept this technology reasoned out that they did not have enough knowledge on the technology.

Acceptance of green manuring technology by 394 farmer-respondents was due to the following reasons: it prevents pollution (64.21%); it enriches soil fertility (50.76%); it provides natural fertilizer (40.61%); production is increased (34.26%); it generates more income (25.38%); and it lessens expenses (24.87%).

Conclusions

Socio-Economic Characteristics of Farmer-Respondents

Majority of the farmer-respondents were male and married. They belonged to the 50-69 age bracket and finished elementary. Their monthly income was less than P5,000.00, which was derived mostly from their agricultural products.

Farm Technology

Land preparation. Most of the fanner-respondents still used the traditional plow/ carabao in preparing the land for planting but a good number already used tractors and kuliglig. The majority prepared their seedbeds using the wet bed method, although

one-fourth of them used the dry bed method. Majority of them tilled the land for farming before and during rainy season. Most of them tilled the land twice or thrice before planting.

Cultural management. Most of the farmer-respondents planted rice and vegetables, some planted com and tobacco, while a few planted root crops. The total land area being planted by majority of the farmer-respondents was one hectare and below. Most of the farmers planted breeder and certified seeds.

The farmers used two or three of the following methods in planting: direct seeding, local practice, random planting, and straight row planting.

Majority of them applied fertilizers using sidedressing and basal methods, but a good number also topdressed their plants. Most of them followed the agricultural technologists' recommendation on the amount of fertilizer to be applied to their plants while a considerable number of farmer-respondents based it on their own experience. Most of them claimed that their plants were rainfed, but some also used irrigation system and electric water pump to supplement the water supplied by the **rain.**

Harvesting, Most of the farmer-respondents harvested rice, com, and other crops manually. Very few used rice thresher and mechanical reaper for harvesting rice and the com sheller for harvesting com.

Postharvest. All the farmer-respondents who were planting rice and corn sun-dried their products after harvesting them. Majority of them sold their products after drying. Those who did not sell all their products stored them in granaries and warehouses. Most of them did not treat their stored products with chemicals. However, a considerable number of respondents sometimes treated their products with chemicals before storing them.

Fann Technology Transfer

Farm technologies introduced. The technologies introduced to majority of the farmer-respondents were: use of chemicals, seed growing technology, integrated pest management, compost preparation technology, irrigation technology, use of machines in fanning, legume inoculation, and green manuring.

Source of information. Majority of the farmer-respondents claimed that these technologies were introduced by the agricultural extension technologist of the Department of Agriculture. Only a few mentioned non-government organizations, institutions of higher learning, private organizations, and neighbors/friends as sources of information.

Adoption of farm technologies. All technologies introduced to the farmer-respondents were favorably accepted by the majority of the respondents.

The frequently mentioned reasons for accepting these technologies were the following: it lessens expenses, it increases production and income, it is economical; it improves the quality of products; integrated pest management prevents pollution; irrigation system provides enough water supply; legume inoculation improves soil quality and produces healthier plants; and machines are better farming facilities and make land preparation easier.

Those who did not accept the use of chemicals reasoned out that it was expensive and hazardous to health and soil nutrients were depleted. Some farmer-respondents did not accept legume inoculation because they did not have enough knowledge of the technology.

Recommendations

For the improvement of farming practices in the upland municipalities in Ilocos Sur, the following are hereby recommended:

1. Municipal and barangay officials should be united and work closely in coordination with the Department of Agriculture (DA) so that farmer-representatives of each municipality could jointly petition the national authorities to procure farm machines for hire at minimal fees to enable the low- and middle-income farmers to avail of these machines.

2. Agricultural technologists should continue giving assistance to the farmers and monitor them in their respective areas particularly in following the recommended technologies. They should not stay only in their offices and wait for farmers to consult them, but should go to the farmers and give them better service.

3. Non-innovative farmers should be persuaded to follow the farm management techniques recommended by authorities, especially from the DA.

4. Although the different farm technologies were accepted by most of the farmer-respondents, regular demonstrations and seminars for farmers should be conducted so that there will be constant sharing of ideas/opinions relative to farming and the farmers will be updated on improved farming technology.

5. Farmers should from time to time attend seminars relative to farming and follow what they learn from these seminars to improve their farming techniques and, ultimately, improve and increase their production and income.

6. Farmers should consult the farm technicians especially on the use of insecticides, pesticides, fungicides, herbicides, and other biopest control to ensure correct and effective use of these chemicals.

7. Farmers should be persuaded to treat their products before storage especially **if** intended for future use.

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