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Use in Cagayan Valley**

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Dr. Gregory T. Papanikos  
President  
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## **Assessment of Organic Fertilizer Use in Cagayan Valley**

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### **Abstract**

The use of organic fertilizers is becoming popular in Cagayan Valley. The organic fertilizers known and used by farmers are organic compost, vermi-based, animal manure, bio-organic, plant-by products, and bat guano. The study aims to determine the size of farm and crops grown applied with organic fertilizers; level of awareness on the benefits of using organic fertilizers; extent of awareness and level of adoption of organic fertilizers and problems and constraints in the adoption of organic fertilizers. There were 720 respondents drawn from the three provinces of Cagayan Valley using purposive, quota and convenience sampling. Data gathered were analyzed using the Statistical Package for Social Sciences program.

Small size of Farms (1 hectare) in Cagayan Valley were planted with vegetables like eggplant, leafy vegetables, beans and squash are applied with organic fertilizers. Organic fertilizer is applied to rice and corn in wider farms. Farmers are better aware on the environmental and economic benefits of organic farming than its health and nutrition benefits. The leading benefits of using organic fertilizer are the ability to bring back soil fertility, production of chemical free agricultural products and lower farm inputs. Adoption of compost, bio-organic, animal manure and plant-by-product are higher than for bat-guano and vermin-based organic fertilizers due its scarcity. Slow effect of organic fertilizer is the pressing problem encountered while lack of skills and technical know-how in preparing organic fertilizers is the top constraint.

**Key words:** Organic Fertilizer, Adoption of Organic Farming, Environmental impact, health and nutrition benefits, economic benefits

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## I. INTRODUCTION

Organic agriculture is a holistic production management system which promotes and enhances agroecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasizes the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems (FAO/WHO, 1999). An organic production system is designed to a) enhance biological diversity within the whole system; b) increase soil biological activity; c) maintain long-term soil fertility; d) recycle wastes of plant and animal origin in order to return nutrients to the land, thus minimizing the use of nonrenewable resources; e) rely on renewable resources in locally organized agricultural systems; f) promote the healthy use of soil, water, and air, as well as minimize all forms of pollution thereto that may result from agricultural practices (El-Hage & Hattam, 2002). The holistic management was further confirmed in an article of Briones A. (2006) stating that Organic farming focuses on the process rather than product. Hence, an organic farm is an outcome of several years of operating a farm plan designed to pursue economic benefits while nurturing the farm's natural resources (soil, water, plants, animals, microorganisms).

The use of organic fertilizers leads to a sustainable development which caught the imagination and action of people all over the world for more than a decade. Sustainable agriculture is necessary to attain the goal of sustainable development. According to the Food and Agriculture Organization (FAO), sustainable agriculture "is the successful management of resources for agriculture to satisfy changing human needs while maintaining or enhancing the quality of environment and conserving natural resources".

Recent research suggests that organic agriculture results in less leaching of nutrients and higher carbon storage (Drinkwater et al. 1995), less erosion (Reaganold, Elliott & Unger 1987) and lower levels of pesticides in water system (Kreuger, Peterson & Lundgren 1999).

Heavy use of inorganic fertilizers, herbicides and pesticides makes the soil acidic. It also kills beneficial microorganisms present in the soil that aids in the decomposition of agricultural debris that serves as organic fertilizers. It destroys habitats of beneficial insects, birds and other living organisms. Health benefits could not be denied in this practice. Crops grown with synthetic fertilizers and pesticides contain residues which are detrimental to animal and human health.

A recent study carried out by FAO (1998) has shown that adequate management of organic farming generates a positive impact on the environment (e.g., reduction of water "contamination," increased soil fertility because of crop rotation). On the demand side, consumers have positive attitudes towards organic products, since they perceive them as healthier than conventional alternatives (Beharrel and MacFie, 1991).

Organic farming also has economic benefits. It lessens farm input thereby increases the net income of the farmers. Despite the numerous advantages of organic farming, the continuous increase in population pose a threat to this

practice if no intervention is made. Population is increasing very fast while agricultural land remains constant or even decreasing due to development and the conversion of agricultural land to residential and industrial sites. With this scenario, the pressures on the need to feed the growing population are at hand. To increase production to its maximum with the shortest possible duration seem an attractive solution to food shortage undermining the threats this approach could bring. With this threat, there is a need to intensify organic farming in order to bring back soil fertility to prepare the soil for the future when tripling production through artificial means is the only option left for survival.

According to a publication of Greenpeace (2007) regarding the “state of water in the Philippines”, Cagayan Valley ranked 8<sup>th</sup> in terms of agricultural Biological Oxygen Demand (BOD) generation due to the continuous application of chemicals in the process of agricultural production. This implies the existence of a high degree of organic water pollution which is detrimental to aquatic resources. With this scenario, there is a need to decrease the use of chemical. The massive use of organic fertilizer is seen as an alternative solution to the problem. In order to come up with plans, strategies and policies in support for the information campaign for organic farming adoption, there is a need to assess the present status of organic farming in the region to give insights to people and agencies concerned on where and how to start and intensify organic farming, hence this project.

### *Objectives*

It is the goal of this research to shed light to the following objectives:

1. To determine the size of farm and crops grown applied with organic fertilizers
2. To determine the level of awareness on the benefits of using organic fertilizers
3. To determine the extent of awareness and level of adoption of organic fertilizers
4. To identify the problems and constraints in the adoption of organic fertilizers in Cagayan Valley.

## **II. METHODOLOGY**

### *Samples and Sampling Procedure*

The research samples were drawn from three provinces of Cagayan Valley particularly Isabela, Quirino, and Nueva Vizcaya.

A structured survey questionnaire was used to collect data that sheds light to the research objectives. Survey was conducted in March and April 2011 in the three Provinces of region 02. The instrument was pre-tested to farmers in other provinces not covered by the study. Respondents in the three provinces were identified using purposive, quota and convenience sampling techniques. Purposive sampling was used as basis in choosing respondents which are the

farmers using organic fertilizers or in combinations. In choosing the respondents, they were asked if they practice organic farming by using organic fertilizers and avoid the use of synthetic fertilizers, pesticides, and chemicals (Gil et al, 2000 & Esseks et al, 1990). If the answer of the farmer to the first question is yes, then they were accepted as respondents and proceeded with the interview. The quota sampling was used to set the number of respondents in each town. In this case, a total of 720 respondents were set and distributed as follows: 180 for Quirino province, 180 for Nueva Vizcaya and 360 for Isabela province. Distribution was based on a rough estimation of population, number of towns, and total land area per province. Convenience sampling was likewise used in choosing the number of provinces as source of respondents. This was done due to the very limited budget for this research.

In order to complement both quantitative and qualitative data, more information was collected from key informants. Interviews were conducted on farm-sites and in the homes of respondents.

#### *Data collection and analysis*

Data were collected from primary sources (respondents) through the triangulation approach (structured questionnaires, informal interviews and observation). The data collected were analyzed with the aid of the descriptive statistical tools.

All data were analyzed with the SPSS (Statistical Package for the Social Sciences) for Windows. Descriptive statistics was applied to analyze percentage and arithmetic mean.

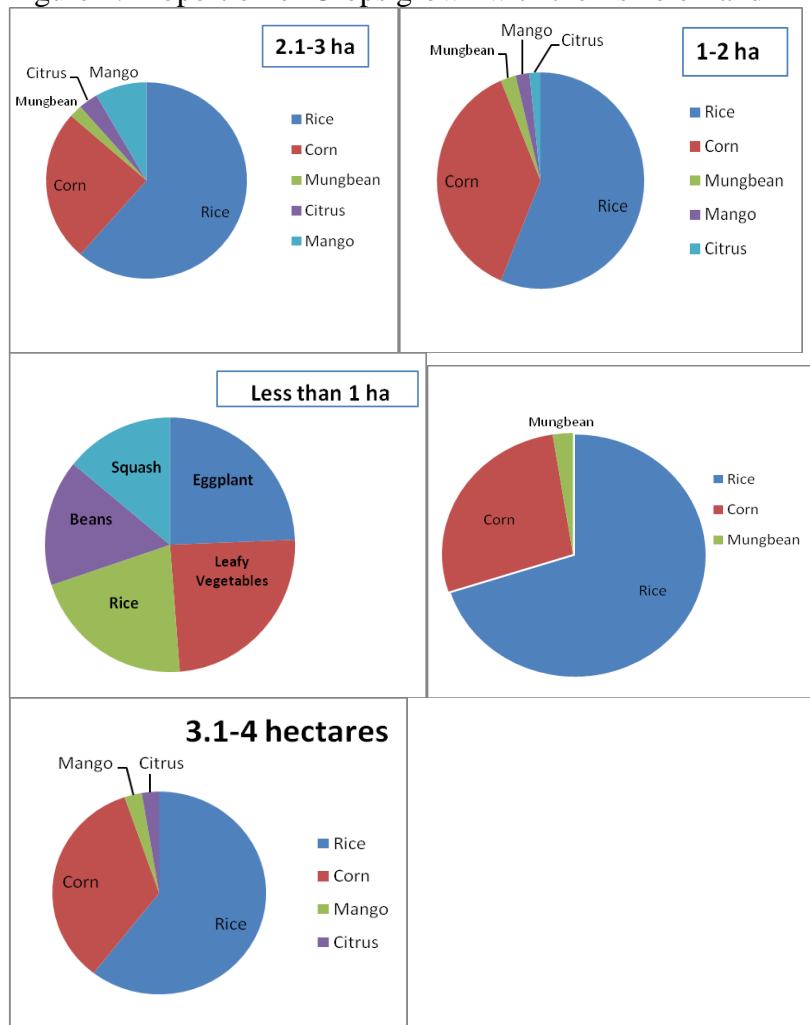
### **III. RESULTS AND DISCUSSION**

#### *A. Farm size and crops grown by organic farmers*

Size of farm is presented in five (5) categories as less than 1 ha, 1.1-2 ha, 2.1-3. ha, 3.1-4 and 4.1-5 ha. Figure 2 depicts the proportion of crops grown by farmers with the size of their farm. Among the crops grown are contained in the graph below. Farms with less than one hectare are planted with eggplant, leafy vegetables (pechay, kangkong, mustasa, jute, sweet potato, cabbage, and amplaya) beans and squash. As farm size increases (more than 1 ha) a change in crops grown shifts from vegetables to rice, corn, or fruit trees (Lee, 2006). There is a relatively higher share of organic farms for rice production particularly in larger size of farm.



Figure 1. Proportion of Crops grown with their size of land



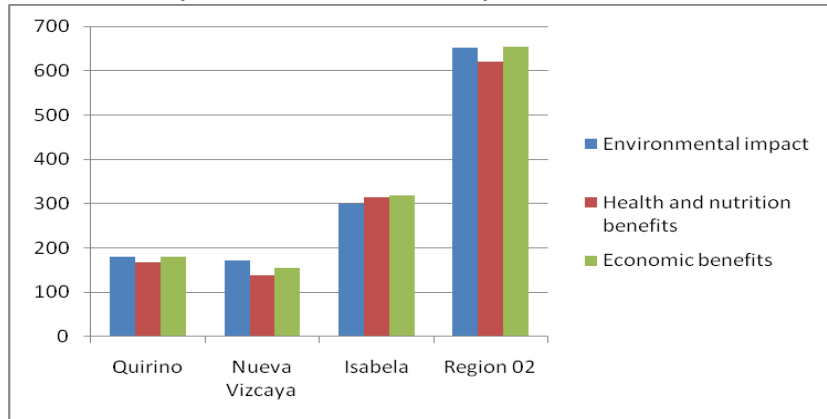
**B. Awareness of farmers on environmental impact, health & nutrition and economic benefits of organic farming in region 02**

*1. Level of awareness on environmental, health and nutrition and economic benefits*

The relatively high success of organic farming in some countries are due to the high awareness of the health problems caused by the consumption of contaminated food products, the ill effects of environment degradation, appropriate supports by the government and organizations (Narayanan, 2005). In this study all respondents from Quirino province are aware on the environmental impact while most of the respondents from Nueva Vizcaya and Isabela are also aware of its environmental impact. Similar result is observed on their awareness on health and nutrition benefits and economic benefits of organic farming where most of the farmers from Quirino Province have higher level of awareness on said benefits as compared to Nueva Vizcaya and Isabela.

This is due to the small area and population as compared to the two provinces. Quirino province have six (6) towns which could be easily reached by any form of communication, hence, the farmers have greater opportunity to be reached by print and broadcast means.

Figure 2. Level of awareness of farmers on environmental impact, health and nutrition benefits, and economic benefits



## 2. Sources of information

One can gain access to information about new technologies through various means, such as attending field days, visiting demonstration fields, participating in formal training, watching/listening to agricultural programs on television/radio, reading from print media, communicating in various ways with neighbours, relatives, and community leaders (Zegeye, 2001). Of all the sources of information presented in table 4, the main sources of information on the environmental and economic benefits are the DA (Department of Agriculture) technicians. This is an indication that the Department of agriculture are complying with RA No. 10068 which is an act that provides for the development and promotion of organic agriculture in the Philippines and for other purposes. Respondents obtained information on the environmental impact from fellow farmers and extension workers. Radio is another channel of organic farming information. This partly supports the findings of FAO (1989) which observed that radio was among the electronic media used successfully in rural areas. On the contrary, the findings of this study show that television/radio and reading materials are the least source of information regarding the environmental and economic impact of organic farming. The health workers/medical practitioners are the main sources of information on the health and nutrition benefits followed by television/radio and reading materials.

Table 3. Sources of Information on the environmental impact, health and nutrition benefits, and economic benefits of organic farming

<b>SOURCES OF INFORMATION</b>	<b>Quirino n=180</b>	<b>Nueva Vizcaya n=180</b>	<b>Isabela n=360</b>	<b>Total n=720</b>	<b>Rank</b>
<b><i>Environmental Impact</i></b>					
DA technician	121	127	206	<b>454</b>	<b>1</b>
Fellow farmers	64	99	149	<b>319</b>	<b>2</b>
Extension workers	102	76	97	<b>275</b>	<b>3</b>
Television and radio	7	86	116	<b>209</b>	<b>4</b>
Own reading from print media	32	18	89	<b>139</b>	<b>5</b>
<b><i>Health and Nutrition Benefits</i></b>					
Health workers	111	60	104	<b>275</b>	<b>1</b>
Television and radio	19	103	135	<b>257</b>	<b>2</b>
Own reading from print media	57	74	96	<b>227</b>	<b>3</b>
Medical practitioners	16	32	163	<b>211</b>	<b>4</b>
Children and other relatives	5	30	143	<b>178</b>	<b>5</b>
<b><i>Economic Benefits</i></b>					
DA technician	107	127	186	<b>420</b>	<b>1</b>
Own experience	117	119	127	<b>363</b>	<b>2</b>
Fellow farmers	62	116	156	<b>334</b>	<b>3</b>
Extension workers	84	87	105	<b>276</b>	<b>4</b>
Television and radio	12	85	129	<b>226</b>	<b>5</b>
Own reading from print media	30	62	91	<b>183</b>	<b>6</b>

### *3. Perceived benefits of Organic Farming*

The leading environmental benefit of organic farming as perceived by the farmers is the ability of organic fertilizers to bring back soil fertility. Another perceived benefit of organic farming is the reduction of farm input costs, ability to neutralize soil acidity, and production of chemical free agricultural fruits, vegetables, and cereals (McCann, 1997). However, there are many respondents who claimed that organic farming gives other benefits aside from the top four benefits listed in table 4.

The health benefits of organic farming are presented in the following order based on the farmers' responses: Chemical free agricultural products, prevention of the occurrence of diseases due to chemical intake from agricultural products; production of organically grown fruits and vegetables; better taste and high nutritional value of organically grown fruits and vegetables; and improvement of the immune system of the body.

The economic benefits on the use of organic fertilizer as perceived by farmer respondents lowers farm input costs leading to higher profit which is similar with the observation of Kawasaki et al., 2009.

Table 4. Benefits of Organic Farming as perceived by the farmers

<b>Environmental benefits</b>	<b>Quirino</b>	<b>Nueva Vizcaya</b>	<b>Isabela</b>	<b>Total</b>	<b>Rank</b>
Brings back soil fertility	172	66	267	<b>505</b>	<b>1</b>
Reduce farm input costs	147	138	149	<b>434</b>	<b>2</b>
Neutralizes soil acidity	109	118	126	<b>353</b>	<b>3</b>
Produce chemical free agricultural fruits, vegetables, cereals, etc.	77	73	173	<b>323</b>	<b>4</b>
Safe for beneficial insects and other organisms	75	108	129	<b>312</b>	<b>5</b>
Improve water holding capacity	60	123	90	<b>273</b>	<b>6</b>
Promotes clean and safe air	50	79	133	<b>262</b>	<b>7</b>
Promotes the growth of beneficial microbes	21	72	98	<b>191</b>	<b>8</b>
Makes the plants stronger and becomes resistant to pest, diseases	13	62	96	<b>171</b>	<b>9</b>
Organically grown fruits, vegetables and cereals commands higher price	9	31	87	<b>127</b>	<b>10</b>
<b>Health and Nutrition Benefits</b>					
Chemical free agricultural products	159	159	230	<b>548</b>	<b>1</b>
Prevent the occurrence of diseases due to chemical intake from agricultural products	85	72	207	<b>364</b>	<b>2</b>
Organically grown fruits and vegetables tastes better and with high nutritional value	61	66	33	<b>160</b>	<b>3</b>
Improves immune system of the body	51	100	0	<b>151</b>	<b>4</b>
<b>Economic Benefits</b>					
Lower farm input costs	179	160	247	<b>586</b>	<b>1</b>
Higher profit	127	151	216	<b>494</b>	<b>2</b>

### *C. Extent of awareness and adoption of organic fertilizer*

#### *1. Adoption and awareness of different organic fertilizers*

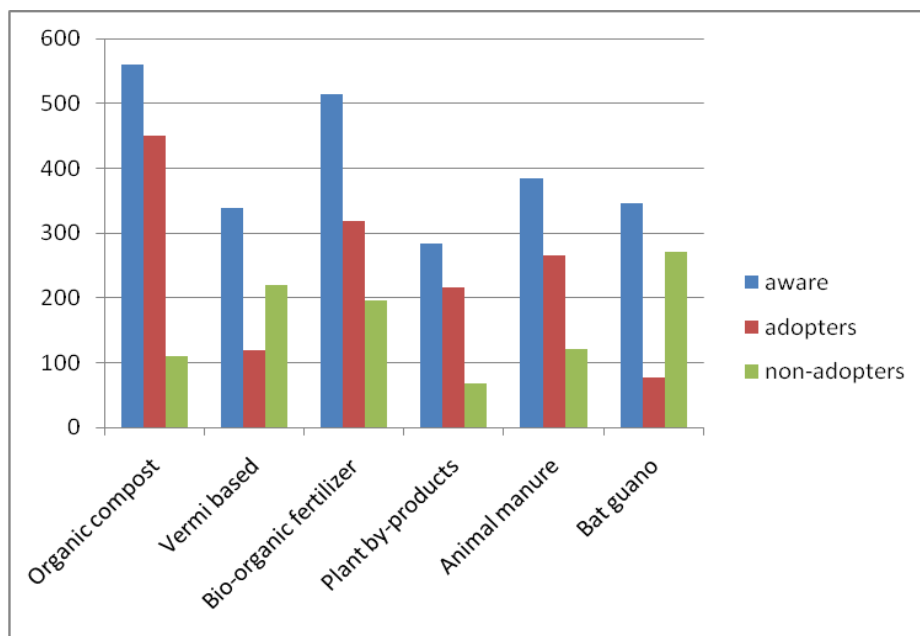
Organic compost is used by farmers as organic fertilizer. This organic fertilizer is usually homemade and readily available for home gardens. Dried leaves, kitchen left over and grass clippings can be piled to decompose and used as side dressing in the garden or farm. Among the organic fertilizers considered in this study, organic compost is the top organic fertilizer that the farmers are aware of and at the same time adopt or use. Bio-organic plant supplement made from fruit extracts and beneficial microorganisms increase crop yields by as much as 30 percent while reducing the use of chemical fertilizer by 50 percent in the initial cropping (Abello, 2009). Thus, this fertilizer subsequently gained awareness to the farmers followed by vermi based fertilizers which gained popularity primarily here at region 02.

The use of organic compost in farming is now gaining popularity among farmers in region 02. There are many forms of organic compost available in the market but vermi compost is now gaining popularity. Vermi-based fertilizers are first class compost product. Some farmers manufacture their own vermicast compost fertilizer in their backyard due to the distribution of vermiworms by the Department of Agriculture and other NGO's in Region 02. The Bureau of Soil and Water Management (BSWM) distributed earthworms and aerator in Region 02 for the production and processing of vermitea. With this assistance, many farmers especially in Quirino and Nueva Vizcaya established their own vermicast production.

The figure shows a high adoption of organic compost, bio-organic, animal manure and plant by-product. On the contrary, there are more non-adopters than adopters for bat-guano and vermin-based. This is maybe due to the limited sources of bat-guano and vermin-based.

Organic agriculture is defined by its input supply and the agricultural practices used. It involves the use of natural, non-chemical materials that can be collected on farms and/or in households. In organic agriculture, efforts are made to avoid the use of chemical inputs. The advantages of organic agriculture include increased productivity and enhanced biodiversity of the farmlands and surrounding areas. It increases the quality of the water, is safer for animals, and is beneficial to plants and, of course, organic agriculture is generally more advantageous for the well-being of farmers and consumers than conventional agriculture (Sununtapongsak 2006). Thus, organic agriculture is economically viable, environmentally sound and socially acceptable (Dabbert, 2003; Liebhardt, 2003; Wood and others 2005).

**Figure 3. Awareness and adoption of organic fertilizers**



#### ***D. Problems and constraints in the adoption of organic farming***

When the farmers were asked to rank the various problems they encountered on the use of organic fertilizers, they came up with the following lists presented in a descending order: slow effect of organic fertilizer; labor-intensive; source of manure Cost of organic fertilizer; storage of manure; emergence of weeds; and unfavorable smell of most organic fertilizers (Cáceres, 2001, Wynen, 2003, Sittiwong and Varinrak, 2004, Singpornpong, 2005, Pornpratansombat, 2006, Svotwa, 2007, Hanson, 2004, Parra Lopez C., 2005, Wheeler 2008, & Kerselaers et al. 2007).

Lack of skills and technical knowhow are the most pressing constraints on the use of organic fertilizers (Pornpratansombat, 2010 & Walter S. et al, 2002) followed by technological challenge and policies for quality control of organic products. Other important constraints identified are sources of raw materials; absence of nutrient analysis on homemade organic fertilizers; and difficulty to attain higher CN ratio. The most important constraints felt in the progress of organic farming) are the lack of skills, acceptability of farmers, and lack of policies for quality control of organic-based food products. These are similar to the observations of Nagaranan (2005).

Table 5. Problems and constraints encountered by Farmers in Organic Farming

<b>Problems</b>	<b>Quirino n=180</b>	<b>Nueva Vizcaya n=180</b>	<b>Isabela n=360</b>	<b>Total n=720</b>	<b>Rank</b>
Slow effect of organic fertilizer	127	55	149	<b>331</b>	<b>1</b>
Labor-intensive	83	99	144	<b>326</b>	<b>2</b>
Source of manure	65	65	143	<b>273</b>	<b>3</b>
Cost of organic fertilizer	27	32	146	<b>205</b>	<b>4</b>
Storage of manure	29	20	71	<b>120</b>	<b>5</b>
Emergence of weeds	5	0	20	<b>25</b>	<b>6</b>
Organic fertilizers are odorous	13	10	0	<b>23</b>	<b>7</b>
<b>Constraints</b>					
Lack of skills and technical know-how	68	126	203	<b>397</b>	<b>1</b>
Acceptability of the technology by the farmers	87	111	173	<b>371</b>	<b>2</b>
Lack of policies for quality control of organic based food products	24	130	174	<b>328</b>	<b>3</b>
Source of raw materials in organic farming	63	79	162	<b>304</b>	<b>4</b>
Poor sustainability of organic farming	17	50	156	<b>223</b>	<b>5</b>
Most homemade organic fertilizer did not undergo nutrient analysis	81	32	82	<b>195</b>	<b>6</b>
Lack of supply of organically-grown agricultural products	24	48	108	<b>180</b>	<b>7</b>
Lack of knowledge on the health advantages of chemical free food	15	41	104	<b>160</b>	<b>8</b>
Difficult to attain CN ratio	74	3	55	<b>132</b>	<b>9</b>
Laziness on the part of the farmers	6	0	3	<b>9</b>	<b>10</b>

#### IV. SUMMARY AND RECOMMENDATIONS

##### *A. Summary*

Agriculture is the main source of livelihood in Cagayan Valley as shown in the wide vast of land devoted to agriculture. Isabela is dominantly plain; hence the main crops in the province are rice and corn. Nueva Vizcaya and Quirino are dominantly flat to hilly conducive for growing rice, corn, fruit trees and vegetables. With this scenario, the researchers were motivated to come up with this type of research in order to assess the extent of organic fertilizer use focusing on the level of awareness and adoption as well as problems and constraints encountered by farmers in using organic fertilizer. The result of this research is envisioned to add knowledge in the field of organic farming. It serves as baseline data for policy formulation by government to promote the massive use of organic fertilizers.

Data were gathered in the three provinces of Cagayan Valley from January to March 2010. Among the highlights of the study are as follows:

Organic vegetables are usually grown in small scale purposely for home consumption.

The level of awareness on the environmental impact on the use of organic fertilizer slightly differs with their awareness on the economic benefit. However, awareness on the health benefits registered the lowest due to minimal exposure or limited access to information. The department of agriculture is the predominant source of information on the environment and economic impact of organic farming while health workers, television and radio are the main source of information for the health and nutrition benefits. Among the perceived environmental benefits of organic farming as rated by the farmers are presented in the following order: bring back the soil fertility, reduced the costs of farm input, ability to neutralize soil acidity; the production of chemical fruits, vegetables and cereals; and the provision of an conducive environment for the growth of beneficial insects and microorganisms. The most ranking health and nutrition benefits are the production and promotion of chemical free agricultural products. The use of organic fertilizer lowers the cost of farm inputs, thereby attaining a higher profit.

Organic compost registered the highest level of awareness and adoption. This is due to the availability of raw materials especially plant residues and animal manure. Organic compost is easy to produce with less cost as compared to the rest of organic fertilizers. Bio-organic fertilizer which is a commercially available organic fertilizer ranked second in terms of awareness and adoption by farmers. Animal manure which is readily available ranked third in terms of awareness and adoption by farmers. Vermi-based organic fertilizer (vermicast, vermiwash, and vermitea) is gaining popularity within the region but the awareness and adoption of farmers differs slightly with animal manure. Guano is a well known organic fertilizer but farmers have low levels of adoption due to the difficulty of sourcing and transporting the materials.

In Cagayan Valley, the pressing problems identified by farmers are slow effects of fertilizer, labor intensive, source of manure, cost of organic fertilizer

and storage of manure. The problems identified are aggravated by the lack of skills and technical know-how by farmers in preparing and handling organic fertilizers, the lack of policies that promotes quality control of organic fertilizer and the scarcity of raw materials.

## **B. Recommendation**

1. The respondents registered the lowest level of awareness on health and nutrition due to lack of IEC and advocacy by the agencies concerned. In this regard, it is recommended that extension workers from the Department of Agriculture and from SUC's and health workers to prepare appropriate IEC materials and conduct massive information drive through broadcast means in order for the information to penetrate the far flung areas.
2. Awareness level is very much higher as compared to the level of adoption. With this findings, it is recommended that agencies concerned should conduct more training to farmers especially housewives to further enhance their skills in the actual production and application of organic fertilizers.
3. For the LGU's to establish a centralized production and distribution center for organic fertilizer at a subsidized price. This is to solve the problems on labor intensive, source of manure and cost of fertilizer. On the other hand, farmers should be taught to accept the reality on the slow effect of organic fertilizer in lieu of the many advantageous effects on the use of organic fertilizer.

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