

**CULTURAL MANAGEMENT PRACTICES AND CONSERVATION STRATEGIES ON UPLAND RICE PRODUCTION.**

Maybelyn L. Pedroso<sup>1</sup>  
Onofre S. Corpuz<sup>2</sup>

<sup>1</sup>Asst. Professor, Cotabato Foundation College of Science and Technology, Doroluman Arakan Cotabato

<sup>2</sup>College Professor, CFCST Graduate School Doroluman Arakan Cotabato

**Abstract**

This study aimed to explore the farmers’ cultural management practices and conservation strategies on upland rice production in the four (4) municipalities of Arakan Valley Complex, North Cotabato. Based on the data, farmers’ cultural management practices like seed variety selection, land preparation, care and maintenance, pest management, harvesting, threshing, drying, marketing practices, farm nutrient management, and post-harvest management were observed in the area. However, some practices were rarely observed especially using of mechanical machines or highly technical farm equipment from planting to marketing. Analysis on two-tailed Pearson Correlation revealed that farm nutrient management (-0.230\*) had a significant relation to yield and income but of negative correlation. Moreover, soil analysis (-2.37\*) as the predictor of cultural management practices significantly influenced yield but was not practiced by the farmers. resulted to wrong application of fertilizer, therefore obtained lower yield and income. Marketing practices (3.19\*\*) like storing of rice waiting for the market price to increase found to significantly influenced farmers’ rice production on yield due to selling rice at higher price. Furthermore, conservation strategies like green manuring were rarely practiced by the farmers significantly influenced upland rice production in terms of yield. Upland rice farming rice when properly planned and managed cannot only gave farmers high profit but also help country’s increase food security.

**Keywords:** Upland rice, cultural management, Conservation strategies, Production

**I INTRODUCTION**

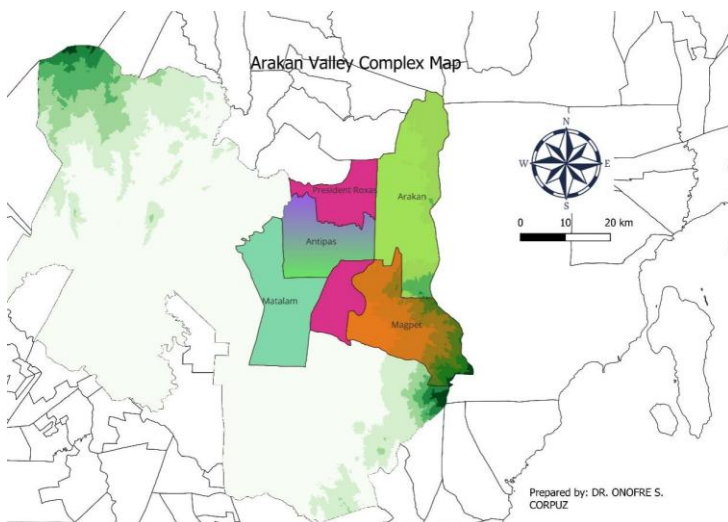
Agriculture in the Philippines is rapidly changing. New farming techniques and varieties come into use are widely introduced by the Local Government Units (LGUs) through the Department of Agriculture Programs. The deterioration of the environment and natural resources such as the deforestation, land degradation, misuse of pesticides and chemicals, and the loss of genetic resources coupled with the fast-growing population in the country gave the DAs’ challenge in refocusing strategies in ensuring food security and availability (DA-Cagayan de Oro).

Rice (*Oryza sativa L.*), as the world’s primary staple food crop for almost of the world’s population (DA-URDP, 2011), has become a problem in the aspect of production where farmers cannot cope up to produce the supply needed for rice, in the market, and product development (Bordey, 2015). The key to sustainable rice cultivation is for every farmer is to select and harvest enough rice grains as seeds for the next cropping (Ila’va, 2015).

With the belief that the development of the communities’ upland rice supply chain is a vehicle to reach household food security. Tapping of potential upland rice areas would help feed communities living in the rolling and mountainous terrains in the Philippines, thus, prop up rice production. By promoting upland rice farming, increase of production is hoped to happen (Philrice Magazine, 2015). Agricultural land degradation in the densely populated, steeply sloping upland regions of the Philippines has been recognized as a major environmental problem in previous three decades. With significant on-site and off-site impacts (Cramb, 1998), conservation farming systems have been developed, such as contour hedgerows of shrub legumes (Cramb, 2000 and Cramb, et al., 2000). Through these farming systems, small farmers in the country can expand their areas, thus, the attainment for the increased food production and income is possible to achieve. However, the development of the upland rice ecosystem was not given much attention. Practices on upland rice production remained relying on the farmer’s knowledge, particularly on the production aspects of traditional rice varieties. The development of the upland rice ecosystem and opportunity to augment the country’s rice supply to ensure food sufficiency of the upland farming communities was not given much focus. Hence, the researcher was moved to conduct a study pertaining to the upland rice production and conservation strategies in Arakan Valley Complex.

**II METHODOLOGY**

The researcher utilized pre-tested survey questionnaire answered by 76 upland rice farmers in Arakan Valley Complex, North Cotabato, ensuring the respondents answer in full confidentiality. Required protocols such as; asking permission to the Municipality Mayors, Barangay Captains, and the Municipal Agriculturists, and permit to travel were followed. The data gathered were tabulated, analyzed, discussed, and interpreted using descriptive and correlation research designs. The researcher used questionnaires that were categorized into four (4) parts: Part I of the instrument dealt on the Socio – Demographic and economic factors of the Farmers; Part II, on the Upland Rice Farming Cultural Management Practices; Part III, was for the farmer’s existing conservation strategies; and, Part IV for farmers’ incurred expenses from land preparation to marketing to determine the Return of Total Expenses (RTE). The researcher selected the area for the study using stratified sampling technique, the sense that only few farmers were engaged in upland rice farming. There were four (4) municipalities covered within the Arakan Valley Complex namely; Antipas, Pres. Roxas, Matalam North, and Arakan within the period of upland rice planting to harvesting for six (6) months from June to December 2016.



**Figure 1.** The map showing the locale of the study

**III PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA**

**Socio Demographic Profile**

Out of 76 upland farmers averaging six (6) members in the family, most (53 or 69.7%) were male, married (71 or 93.4%), high school level (32 or 42.1%), and, engaged in upland rice farming for more than 20 years, and most planted Dinorado as their traditional variety known for its good eating quality, aroma, and comparatively produced higher yield, and ability to resist pests and diseases (Table 1a).

Table 1b presents the socio-economic factors of the farmers where most of them were farming as the source of income. It is noted that most (55) owners of at least 1-2 hectares of land with a rolling (54) topography. They also have attended two (2) trainings and seminars related to upland rice conducted by the Municipal Department of Agriculture, and a member of an organization (42). Most (41) have earnings of 15, 000 and below.

**Table 1. Socio Demographic Profile of the Respondents**

A. Profile	Frequency (n=76)	Percentage(%)
1. Age (average = 50)		
2. Gender		
a. Male	53	69.7%
b. Female	23	30.3%
3. Civil Status		
a. Single	3	3.9%
b. Married	71	93.4%

c. Widow	2	2.6%
4. Educational Attainment		
a. No formal education	1	1.3%
b. Primary	0	0.0%
c. Elementary	18	23.7%
d. High School	32	42.1%
e. College	25	32.9%
f. Vocational	4	5.3%
5. Household size (Average = 6)		

**Table 2. Socio-Economic Profile of the Respondents**

B. Socio Economic Profile	Frequency (n=76)	Percentage (%)
1. Member of an Organization		
a. Yes	42	55.3%
b. no	34	44.7%
2. Trainings/Seminars Attended in Upland Rice (Average = 2)		
3. Source of income		
a. Farming	76	100%
b. Employed	7	9.5%
c. Self-employed	6	7.9%
4. Years in farming		
a. 4 years and below	7	9.2%
b. 5 – 10 years	11	14.5%
c. 11-15 years	13	17.1%
d. 16 – 20 years	8	10.5%
e. 20 years and above	36	47.4%
5. Upland Rice Farming Experience		
a. 4 years and below	17	22.4%
b. 5 – 10 years	22	28.9%
c. 11-15 years	7	9.2%
d. 16 – 20 years	2	2.6%
e. 20 years and above	27	35.5%
6. Farming Tenure		
a. Owner	55	72.4%
b. Hired caretaker	3	3.9%
c. Tenant	15	19.7%
d. lessee	3	3.9%
7. No. of Hectares cultivated		
a. Less than 1 ha	7	9.2%
b. 1-2 has.	35	46.1%
c. 3 has	14	18.4%
d. More than 3 has	19	25.0%
8. No. of Hectares devoted to upland		
a. Less than 1 ha	16	21.1%
b. 1-2 has.	51	67.1%
c. 3 has	2	2.6%
More than 3 has	6	7.9%
9. Topography of Area		
a. Plain	13	17.1%
b. Rolling	54	71.1%
c. Hilly	11	14.5%
d. Mountainous/steep	8	10.5%
10. Crops commonly planted		
a. Rice	74	97.4%
b. Corn	71	93.4%
c. Vegetable	48	63.2%
d. Plantation crops	43	56.6%
e. Cash crops	15	19.7%
11. Reasons of planting crops		
a. Family consumption	74	97.4%
b. Economic value	15	19.7%
c. Source of income	70	92.1%
d. Environmental reasons	13	17.1%
e. Suitability in the area	12	15.8%
12. Seeds of Upland Rice grown		
a. Traditional Seeds	75	98.7%
b. Certified Seeds	1	1.3%
13. Traditional Varieties of Upland Rice Grown		
a. Dinorado		
b. Hinumay	71	93.4%
c. UPL Rice 5	18	23.7%
d. Asuzena	7	9.2%
e. Palawenia	9	11.8%
f. Tapol/Malagkit Rice	7	9.2%
g. Guyod	10	13.2%
h. Davao Rice	3	3.9%
	4	5.3%

**Cultural Management Practices**

Farmers have their farming practices and practical knowledge and activities such as land preparation, planting, fertilizing, spraying, harvesting, cooking and eating. These activities through which they are made side by side signify ideology-making. It is a distinctive human process (Wolf, 1984 as cited by Bhandari, 1993). The tables following the discussions were the farmers' cultural management practices such as seed variety selection, land preparation, care and maintenance, pest management, harvesting, threshing, drying, marketing practices, farm nutrient management, and post-harvest management indicated the data respectively.

**Seed and Variety Selection**

Table 2 reflects the data on seed and variety selection practices of the respondents. It is evident that they personally store seeds and highly consider the size which is an indication that these are healthier. On the other hand, they moderately practice exchanging seeds with other farmers much more on buying certified seeds and known for high yielding ones. The result implies that most of the farmers remained practicing the traditional way in acquiring grains for seeds purposes. The farmers themselves do some kind of observation, experimentation and evaluation in their own way.

**Table 3. Cultural Management Practices of Upland Rice on Seed and Variety Selection**

Farm Practices	Mean	Description
1 On farm selection considering bigger and healthier panicles	2.53	Highly practiced
2 Exchanging with other variety from other farmers	2.09	Moderately practiced
3 Use of personally stored seeds	2.54	Highly practiced
4 Buying certified seeds	1.53	Moderately practiced
5 Used of high yielding seeds	2.00	Moderately practiced

Scale	Description
2.50 – 3.00	Highly Practice
1.50 – 2.49	Moderately practice
1.00 – 1.49	Low practice

**Land Preparation, Care and Maintenance, and Pest Management**

Table 3 reveals that respondents highly practices slashing grasses in the area for planting. Other land preparations which the respondents' moderately practice were use of herbicides, zero and shallow tillage and burning grasses. As noted, the respondents' practices in land preparation would mean that they are aware of soil conservation strategies. The data in Table 4 disclosed that the respondents highly practice handweeding but they continue using inorganic fertilizers such as UREA, Ammonium Phosphate and other kind considering the right amount. They also make use of herbicides to eradicate unwanted herbs and pesticides to avoid damages on the growing rice. This implies that the rice farmer-respondents consider not only the welfare of their rice plants but also the soil.

It is presented in Table 5 that cultural management practices like pest management is given thorough consideration because it has great brunt in growing upland rice. It indicates that use of pesticides having the highest mean of 2.34 describes that farmers depend on chemicals in controlling pests and diseases that infested the rice plant while growing until it become harvested. It is reasonable that application of pesticides or use of traps could help farmers achieve the rice production attainable according to their expectation of harvest at the end of cropping.

**Table 4. Cultural Management Practices of Upland Rice on Land Preparation**

Farm Practices	Mean	Description
1 Clearing the area with the use of herbicide	2.24	Moderately practiced
2 Slashing grasses in the area for planting	2.50	Highly practiced
3 Zero tillage ( <i>Tudak</i> )	2.17	Moderately practiced
4 Burning grasses ( <i>Kaingin</i> )	1.80	Moderately practiced
5 Shallow tillage	1.92	Moderately practiced

**Table 5. Cultural Management Practices of Upland Rice on Care and Maintenance**

Farm Practices	Mean	Description
1 Hand weeding	2.53	Highly practiced
2 Using herbicides to eradicate weeds (by spraying)	2.34	Moderately practiced
3 Use of fertilizer(UREA, Ammophos, etc)	2.36	Moderately practiced
4 Use of Organic Fertilizer (e.g. Animal Manure, Waster materials, concocted FFJ and FPJ, and other organic fertilizer)	1.63	Moderately practiced
5 Use of pesticide to control damage cause by pests	2.28	Moderately practiced
6 Application of the right amount of organic fertilizer	2.41	Moderately practiced
7 Application of inorganic fertilizers at the right growing stage	2.17	Moderately practiced
8 Recycling rice hull as organic fertilizer.	1.76	Moderately practiced
9 Scattering decompost manure in the area for planting	1.72	Moderately practiced
10 Scattering decompost rice hay and straw in the area.	1.92	Moderately practiced
11 Filing leaves and cut grasses between the plants as compost	1.95	Moderately practiced

Scale	Description
2.50– 3.00	Highly Practice
1.50 – 2.49	Moderately practice
1.00 – 1.49	Low practice

**Table 6. Cultural Management Practices of Upland Rice on Pest Management**

Farm Practices	Mean	Description
1 Use of traps	1.71	Moderately practiced
2 Use of pesticides	2.34	Moderately practiced
3 Use of indigenous materials to trap insects	1.76	Moderately practiced
4 Scaring birds using image of man to scare crows	1.92	Moderately practiced

Scale	Description
2.50– 3.00	Highly Practice
1.50 – 2.49	Moderately practice
1.00 – 1.49	Low practice

**Harvesting, Threshing and Drying**

Table 6 shows the farm practices like manual labor using sickle in harvesting rice obtained the highest mean of 2.79 (highly practiced), others attained moderately practiced, and only the used of mechanical harvester got the low practiced. It entails that farmers in the study have not experienced harvesting with the use of technologically-advanced machines like other countries, especially industrialized countries like United States of America. What they have and only available, is the traditional way of harvesting, using sickle. After harvest, the next method is to properly thresh rice and dry the grains at the right moisture for storing or right after the harvest, it will end up to market. It is shown in Table 7 that mechanized thresher were mostly used by the farmers especially if they harvested in volume, with the mean of 2.13 and only used foot in threshing when they harvested less and, seeds are set aside for next planting.

Drying rice of the right moisture will help the produced rice be stored longer while waiting for the price to become high. Table 8 reflects that using mat or trapal obtained the highly practiced method in the area. This only explains that implements like concrete solar dryer were not available in some areas of the study that are considered remote areas not accessible to roads and other facilities in rice production.

**Table 7. Cultural Management Practices of Upland Rice on Harvesting**

Farm Practices	Mean	Description
1 Manual using Sickle (Kumpay/Garab)	2.79	Highly practiced
2 Big bundle	2.17	Moderately practiced
3 Small bundle	1.93	Moderately practiced
4 Harvest and thresh at right moisture content	2.39	Moderately practiced
5 Use of Mechanical harvester	1.23	Low practiced

**Table 8. Cultural Management Practices of Upland Rice on Threshing**

Farm Practices	Mean	Description
1 Mechanized thresher	2.13	Moderately practiced
2 Use of proper machine settings	1.71	Moderately practiced
3 Manual : a. Foot threshing	2.05	Moderately practiced
4 b. Bamboo slats	1.29	Low practiced

**Table 9. Cultural Management Practices of Upland Rice on Drying**

Farm Practices	Mean	Description
1 Multiple pavement solar dryer	1.97	Moderately practiced
2 Mat or trapal	2.51	Highly practiced
3 Air Drying	1.12	Low practiced
4 Mechanical dryer	1.12	Low practiced

<i>Scale</i>	<i>Description</i>
2.50 – 3.00	Highly Practice
1.50 – 2.49	Moderately practice
1.00 – 1.49	Low practice

**Post-Harvest, Farm Nutrient Management, and Marketing Practices**

Table 9, 10, 11 illustrate all the indicators in post – harvest management, farm nutrient management and marketing practices obtained moderately practiced except for the soil analysis and involvement in an organization giving higher price to the rice produce (Local/Cooperative) had been minimally practiced. The farmer-respondents of Arakan Valley specifically Antipas, Arakan, Pres. Roxas and Matalam considered the practices in overseeing their farms at the extent of producing rice only for their family consumption, the excess would rather be sold for household’s needs like paying debts in farm inputs. Alongside, marketing practices pointed out on hoarding having obtained the highest mean of 1.81, was rated fairly with moderately practiced which implies if rice produce will be stored at their storehouses waiting for market price to become high will mean higher income will be achieved. Thus, support to the findings of Agduyeng, NP., et al. (2001) that respondents were sometimes forced to their produce due to immediate need of money for other household needs.

**Table 10. Cultural Management Practices of Upland Rice on Post – Harvest Management**

Farm Practices	Mean	Description
1 Incinerating rice straws	1.62	Moderately practiced
2 Filing rice straws	1.97	Moderately practiced
3 Scattering rice straws in the rice field	2.17	Moderately practiced
4 Drying rice straws before filing for compost	1.92	Moderately practiced
5 Returning decompost rice straws on field	1.91	Moderately practiced
6 Harrowing the rice field before plowing	2.18	Moderately practiced
7 Allowing the rice straw to dry up before plowing	2.16	Moderately practiced

**Table 11. Cultural Management Practices of Upland Rice on Farm Nutrient Management**

Farm Practices	Mean	Description
1 soil analysis	1.36	Low practiced
2 Application of recommended organic fertilizer	1.85	Moderately practiced
3 Proper application of fertilizer (organic and inorganic)	2.25	Moderately practiced
4 Application of recommended decomposed waste in the field	1.88	Moderately practiced

**Table 12. Cultural Management Practices of Upland Rice on Marketing Practices**

Statement	Mean	Description
1 Directly sell rice to the market after harvest (Wet Palay)	1.64	Moderately practiced
2 Store rice in the storehouse and wait until the price will become high (Hoarding)	1.81	Moderately practiced
3 Sell rice in volume to attain high price to private traders	1.56	Moderately practiced
4 Involve in an organization giving higher price to the rice produce (Local/Cooperative)	1.39	Low practiced

<i>Scale</i>	<i>Description</i>
2.51 – 3.00	Highly Practice
1.50 – 2.49	Moderately practice
1.00 – 1.49	Low practice

**Upland Rice Conservation Strategies**

Conservation of moisture and nutrient of the soil are already known to farmers as they are producing rice. The inevitability to produce rice for family consumption and income will leave farmers of no option but to plant rice with application of the high priced synthetic (inorganic) fertilizer, known for causing acidity and salinity of the soil. Conservation strategies such as; zero tillage, contour farming, terracing, green manuring, multiple cropping, multi – storey, and crop rotation, and other strategies are helpful ways to attain such disparities in upland rice production.

Table 12 and 13 show that all practices except for planting pineapples in the contour line to reduce soil erosion (low practiced) was moderately practiced by the farmers in the area. This is an indication that adoption of improved technology or conservation strategies mentioned have been gradually low due to continuous use of land for upland rice cropping. Farmers are hesitant to adapt the strategies because, their areas are too small and limited, or the knowledge are not enough to perform such practices, and some strategies needs longer time, patience, and effort to achieve its good outcomes (Casey, 2004)

**Table 13. Farmer’s Existing Upland Rice Production Conservation Strategies**

Conservation Strategies	Mean	Description
1 Zero Tillage	2.16	Moderately practiced
2 Contour Farming	1.96	Moderately practiced
3 Terracing	1.74	Moderately practiced
4 Green Manuring	1.93	Moderately practiced
5 Multiple Cropping	2.09	Moderately practiced
6 Multi-Story	1.63	Moderately practiced
7 Crop Rotation	2.36	Moderately practiced

**Table 14. Farmer’s Existing Upland Rice Production Other Practices of Conservation Strategies**

Other practices of Conservation Strategies	Mean	Description
1 Alley Cropping or intercropping	2.03	Moderately practiced
2 Planting steep or eroded areas to trees or grasses	1.99	Moderately practiced
3 Use of Nitrogen-fixing plants as border	1.93	Moderately practiced
4 Incorporating organic materials	1.93	Moderately practiced
5 Mulching	2.04	Moderately practiced
6 Canals and soil traps along the slope	1.89	Moderately practiced
7 Planting of taro in deep holes as soil traps in badly eroded areas	2.01	Moderately practiced
8 Interval planting of rice and legumes/vegetables	2.07	Moderately practiced
9 Planting peanut after harvesting rice	1.91	Moderately practiced
10 Scheduling rest period to the upland rice area alternately	2.25	Moderately practiced
11 Planting vegetables under tall plants	1.78	Moderately practiced
12 Planting pineapples in the contour line to reduce soil erosion	1.29	Low practiced

<i>Scale</i>	<i>Description</i>
2.52 – 3.00	Highly Practice
1.50 – 2.49	Moderately practice
1.00 – 1.49	Low practice

**Upland Rice Production**

To determine the upland rice production, yield and return of total expenses (RTE) were examined in relation to the average expenses of the respondents per area intended for upland rice.

**Yield and Return of Total Expenses (RTE)**As described in Table 1b, majority (51) of the farmers area devoted to upland rice were within the range of 1 – 2 hectares. It can be viewed in Table 14 that the average yield incurred by all respondents reached to PhP 34, 980.00 with an average return of total expenses (RTE) of PhP 17, 465.00.The data show that almost half of the total gross income of the farmers that is equivalent to an average amount of PhP 17, 515.00 expenses, enough for starting capital for the next round of planting.

**Table 15. Farmers’ incurred Expenses, Yield and Return of Total Expenses**

Farm Practices	Average
<b>1. Land Preparation</b>	
1a. Clearing	2, 149.34
1b. Plowing	1, 392.76
1c. Harrowing	601.32
<b>2. Planting</b>	
2a. Drill/Hill Method	1, 620.66
2b. Seeds	1, 050.66
2c. Fertilizer	3, 304.67
<b>3. Care and Maintenance</b>	
3a. Off – Barring	403.95
3b. Weeding (Handweeding or Spraying)	1, 978.29
3c. Side Dressing or Hilling – up	471.71
<b>4. Pest Management</b>	
4a. Insecticides	723.68
4b. Use of Traps	23.68
<b>5. Harvesting</b>	
5a. Manual labor	1, 451.84
5b. Mechanized Harvester	63.55
5c. Sacks	387.30
<b>6. Threshing</b>	1, 719.14
<b>7. Drying</b>	348.22
<b>8. Marketing</b>	625.92
<b>9. Total Expenses</b>	<b>17, 515.00</b>
<b>10. Total Yield (in pesos)</b>	<b>34, 980.00</b>
<b>11. Return of Total Expenses (Income)</b>	<b>17, 465.00</b>

\*data based on average land area intended for upland of 1 – 2 has per respondent

**Conservation Strategies of Upland Rice Production on Yield and Return of Total Expenses (RTE)**

With the data gleaned in Table 15, only green manuring was found out to be significantly related to upland rice production in terms of yield.

It was found out that farm nutrient management had a significant relation to yield but of negative correlation. It connotes that soil analysis as the best predictor is rarely practiced by the farmers resulted to wrong application of fertilizer, and lower yield and income in upland rice.

**Table 16.** Conservation strategies and upland rice production on Yield and RTE

Conservation Strategies		Return on Total Expenses	Yield
Zero Tillage	Pearson Correlation	-0.072	-0.155
	Sig. (2-tailed)	0.536	0.180
	N	76	76
Contour Farming	Pearson Correlation	-0.014	-0.086
	Sig. (2-tailed)	0.905	0.460
	N	76	76
Terracing	Pearson Correlation	-0.145	-0.201
	Sig. (2-tailed)	0.212	0.082
	N	76	76
Green Manuring	Pearson Correlation	-0.173	<b>-0.226*</b>
	Sig. (2-tailed)	.135	.049
	N	76	76
Multiple Cropping	Pearson Correlation	-0.132	-0.156
	Sig. (2-tailed)	0.255	0.178
	N	76	76
Multi-Story	Pearson Correlation	-0.128	-0.145
	Sig. (2-tailed)	0.271	0.212
	N	76	76
Crop Rotation	Pearson Correlation	0.059	0.044
	Sig. (2-tailed)	0.612	0.707
	N	76	76
Overall Conservation Strategies	Pearson Correlation	-0.140	-0.215
	Sig. (2-tailed)	0.229	0.062
	N	76	76
Other Conservation Strategies	Pearson Correlation	-0.128	-0.201
	Sig. (2-tailed)	0.270	0.082
	N	76	76

**Cultural Management practices and Rice Production**

With the data gleaned in Table 16, only green manuring was found out to be significantly related to upland rice production in terms of yield. This result finding accepted the null hypothesis of the study that states, “conservation strategies do not significantly relate to the production in attaining the Return of Total Expenses (RTE).”

Finding revealed that upland rice production on yield is significantly related to conservation strategies on green manuring. This implies that during the conduct of the study, most farmers were aware that green manuring helped bring back soil fertility but should require longer period of time of application, accompanied with thorough effort in gathering sown crop parts to wither in the field so that they serve as a mulch and soil amendment. If continuously done, it will revive soil fertility and moisture would be of great help in higher rice production and could attain better income for the family with less fertilizer inputs applied. Montales (2017) said in an interview that he stopped the practice of green manuring in his farm due to the presence of commercial fertilizer that are lesser cost and effort spent. This is also agreed by Lupas (2017) who is also practicing green manuring but unable to continue because it takes longer time of waiting and due to necessity, he is forced to buy inorganic fertilizer that are easily absorb by rice. In the same manner, Tamparong (2017) supported the above statements that green manuring, though it is very economical and effective way of conserving soil fertility and can increase rice production, is not anymore practiced. According to him, there are many organic fertilizers like vermicast, mikovam and other organic fertilizers, are now available in the market that are lower in cost and very effective to cash and plantation crops. Oonyu (2011) affirmed that one of the factors having adversely affected rice yield is the declining soil fertility levels and lack of technical awareness. Thus, contribution of rice growing to household income has therefore sharply drooped due primarily to the declining soil fertility levels and poor farming practices. It is evident in Bunch (2012) journal in one experiment carried out during a drought in southern Honduras, maize fertilized with chemical fertilizer died one month into the drought, maize fertilized with animal manure died about two months later, and maize fertilized with jackbean still managed to produce a rather small harvest.

**Table 17.** Cultural management of upland rice production and yield and return of total expenses (RTE)

Cultural Management Practices		Yield	RTE
Seed Variety Selection	Pearson Correlation	0.051	0.054
	Sig. (2-tailed)	0.662	0.643
	N	76	76
LandPreparation	Pearson Correlation	0.098	0.134
	Sig. (2-tailed)	0.400	0.249
	N	76	76
Care and Maintenance	Pearson Correlation	-0.194	-0.161
	Sig. (2-tailed)	.093	0.164
	N	76	76
Pest Management	Pearson Correlation	-0.047	-0.046
	Sig. (2-tailed)	0.690	0.692
	N	76	76
Harvesting	Pearson Correlation	-0.101	-0.067
	Sig. (2-tailed)	0.386	0.564
	N	76	76
Threshing	Pearson Correlation	-0.061	-0.118
	Sig. (2-tailed)	0.602	0.310
	N	76	76
Drying	Pearson Correlation	-0.100	-0.149
	Sig. (2-tailed)	0.392	0.199
	N	76	76
Post-Harvest Management	Pearson Correlation	-0.132	-0.077
	Sig. (2-tailed)	0.257	0.506
	N	76	76
Farm Nutrient management	Pearson Correlation	<b>-0.230*</b>	-0.179
	Sig. (2-tailed)	0.046	0.122
	N	76	76
Marketing Practices	Pearson Correlation	0.188	0.208
	Sig. (2-tailed)	0.104	0.072
	N	76	76

**Cultural Management practices and Upland Rice Production**

The data shown in 17, illustrate that cultural management practices in terms of farm nutrient management and marketing practices significantly influenced rice production particularly on yield. Marketing practices showed to be significantly influence upland rice production in terms of yield thus, storing rice while waiting for the market price to increase found out to be the best predictor that helped improve farmers' production. This explains further that the higher the market price will be, will eventually increase farmers' income (in pesos) out of yield. Canvassing prices in the market is one way that marketing practices will influence rice production. With this, farmers have many options where to sell their products with the highest bidder trader.

In conjunction to Table 18, farm nutrient management significantly influence rice production but in negative correlation. Result showed that soil analysis turned out to be the best predictor in attaining higher production in upland rice. It implies that correct and proper usage of fertilizer is relevant in achieving lower or higher production in rice. To determine the soil deficiency and the amount of nutrient present in the soil will not over/under fertilize the crops essential nutrient uptake.

**18. Cultural management practices of the upland rice production on Yield**

Cultural management practices	Coefficients				
	$\beta$	Std. Error	$t$	Sig.	
1 (Constant)	36197.73	41471.57	0.87	0.39	
Seed Variety Selection	23894.86	14142.55	1.69	0.10	
Land Preparation	21456.97	10919.32	1.97	0.05	
Care & Maintenance	-7017.46	10157.30	-0.69	0.49	
Pest Management	-16901.53	12380.01	-1.37	0.18	
Harvesting	-22017.25	13111.33	-1.68	0.10	
Threshing	7249.41	15613.91	0.464	0.64	
Drying	-10940.18	15643.78	-0.699	0.49	
Post-Harvest Mgt.	-2349.51	10688.16	-0.220	0.83	
Farm Nutrient Mgt.	-20845.37	8798.74	<b>-2.37*</b>	0.02	
Marketing Practices	27658.99	8672.18	<b>3.19**</b>	0.00	

\*\* highly significant

\* significant at 5%

**Conclusions**

It is concluded that among the variables stated in the cultural management practices, farm nutrient management and marketing were merely observed by the farmers in the area. However, some practices in the area are not applicable and are lacking too, no weigh of the practices were as less important. Furthermore, from the start of land preparation to marketing, all were very essentials in expecting higher income for the family consumption and income.

The general findings revealed that upland rice production particularly on yield were found significantly influenced by cultural management practices on farm nutrient management and marketing practices. It is also found out that conservation strategies pertaining to green manuring was found out to be significantly related to upland rice production. However, it is poorly practiced.

**Recommendations**

Based on the conclusion, the following are recommended :

1. Soil analysis is highly regarded to correct soil deficiencies for the proper application of fertilizer. It is recommended to farmers especially in Arakan Valley Complex to do soil sampling in their area to achieve improved production in upland;
2. Infestations and bad weather conditions are farmers most anticipated problems in rice farming. It is therefore recommended to adopt a diversified farming, a technology where planting different crops (fruit, root and plant), raising livestock, and backyard gardening;
3. FIt is recommended to be involved and be a member of any organizations likes cooperative or association. It is one way of acquiring farm implements that may help farm operations easier and giving special price to your products as a member;
4. Green manuring is one way of conserving soil moisture and very important to retain soil fertility as well as help improve rice production;
5. Attend seminars and trainings to be updated with the new farming techniques especially in organic rice farming;
6. The Department of Agriculture (DA) shall have programs strengthening grass root initiatives by conducting seminars and workshops as well as doing close-monitoring intervention to farmers-recipients to ensure adaptability of the program introduced;
7. To conduct similar studies related to the upland rice production and conservation strategies.

**V REFERENCES**

AGDUYENG, N.P et. Al. 2001. Socio – economic aspects of upland rice production and marketing in Sen. Ninoy Aquino, Sultan Kudarat. Food and Agriculture Organization of the United Nations. International Information System for the Agricultural Science and Technology.

BORDEY, Flordeliza H. 2015. Philrice Magazine Quarterly Publication. April to June 2015. Rice for All. Part One. Volume 26 No. 2

BOROME0, Teresita H. 2006. On – Farm Conservation of Plant Genetic Resources: ‘Genes in the Field.’ A Philippine Journal of Crop Science (PJCS) Aug. 2006. 31 (2): 15-21. Copyright 2006. Crop Science Society in the Philippines.

BUNCH, ROLAND. 2012. Restoring the Soil. A Guide for Using Green Manure/Cover Crops to improve the Food Security of smallholder Farmer. Canadian Food grains Bank. Winnipeg, Canada. CP Printing Solutions. www

CASTILLO, Gelia T. 2008. Rice Crisis and Climate Risk Management. The CURE Approach. International Rice Research Institute, Philippines. Email: c/o [s.arellano@cgiar.org](mailto:s.arellano@cgiar.org). pp99-109.

CEESAY, Mustapha M. 2004. Management of Rice Production Systems to Increase Productivity in The Gambia, West Africa. Dissertation. Cornell University. Gambia, West Africa.

CRAMB, R.A and CULASERO, Z. 2004. Landcare and Livelihoods: The Promotion and Adoption of Conservation Farming Systems in the Philippine Uplands. International Journal of Agricultural Sustainability.

ILA’VA, Vele Pat. 2015. Promotion of Smallholder Rice Production (Phase2). Handbook for Upland Rice Farming in Papua New Guinea. Department of Agriculture and Livestock (NDAL), Government of Papua New Guineaand Japan International Cooperation Agency (JICA).

OONYU, J. 2011. Upland rice growing: A potential solution to declining crop yields and the degradation of the Doho wetlands Butaleja district – Uganda. African Journal of Agricultural Research Vol. 6 (12), pp. 2774-2783.

Stewart, Robert (2016) <https://www.britannica.com/technology/agricultural-technology/Regional-variations-in-technique#ref558325>

SHEMAHONGE, Mohamed Ibrahim. 2013. Improving Upland Rice (Oryza sativa L.) Performance through enhanced soil fertility and water conservation methods at Ukiriguru Mwanza, Tanzania. Dissertation. Sokoine University of Agriculture, Morogoro, Tanzania.