

**CHAPTER IV**  
**CHARACTERISTICS OF NUTRIENT MANAGEMENT ADOPTION IN**  
**STUDY AREA**

This chapter will discuss the results of descriptive statistics which related to the household nutrient management practices adopted in paddy production in study area. Independent-t test was performed to determine the level of statistical significance between two groups of households according to the AgS division and INM adoption.

**4.1 Characteristics of paddy farming system in study area**

Data generated at household and field levels were subjected to descriptive analyses and the results were used to identify basic characteristics of the sampled households in two AgS divisions. Results are given in Table 4.1 and 4.2.

**4.1.1 Characteristics of surveyed household heads and households**

Based on the results; it showed that, the majority of paddy farmers was aging and well experienced in paddy cultivation. They were between 25 to 80 years old and mean age was 50 years. Surveyed household heads in Ambalantota AgS division were significantly younger than the surveyed household heads in Lunama AgS division. On average, respondents were with 20 years of experience in paddy cultivation. Among them only 1% was without formal education; and only 15% were with primary education (year 1-5). While 58% of the respondents were able to achieve lower secondary education (year 6-10); approximately 24% have obtained higher secondary education (year 11-12). Household heads with higher education was found as 2% in

study area. This indicated that they have enough knowledge to understand new farming techniques to promote paddy production. Almost all the surveyed farmers in Lunama AgS division were members in a farmer organization with significantly higher 14 years of membership; while it was only 87% of the sampled households in Ambalantota AgS division with 11 years of membership. But respondents in Ambalantota were able to keep significantly higher extension contacts compared to Lunama household heads. This showed comparatively weak and inaccessible institutional support in the form of extension services in Lunama division. This was further proven with revealing zero extension contacts by 49% of the surveyed household heads in that division (Table 4.1).

Table 4.1: Comparison of main characteristics of surveyed households

Socio economic characteristic	Ambalantota (N=60)	Lunama (N=59)	Total (N=119)	Level of Significance
Characteristics of the household head (HH)				
Average age (years)	46	52	50	0.01**
Sex – Male (%)	97	93	95	
Female (%)	03	07	05	0.39
Years of education (years)	9	8	9	0.05
Experience in paddy cultivation (years)	19	21	20	0.23
Membership in a farmer Organization (FO) – Yes (%)	87	100	93	
No (%)	13		07	0.00***
Years of membership in FO	11	14	12	0.02**
Perceptions on organic fertilizer application				
– Yes (%)	90	83	87	
No (%)	10	17	13	0.27
No: of trainings participated on INM practices (No:/2years)	2	1	1	0.22
No: of extension contacts (No:/season)	5	2	3	0.00***
Experience in organic fertilizer application (seasons)	9	11	10	0.55
Characteristics of the household				
Household labor availability (members 14-80 years)	3	4	4	0.09
Income from other sources (upees/month/season)	65,823	17,315	41,773	0.26

Note: \*\*, \*\*\* shows significant at 5% and 1% level of significance respectively

1 US\$ = Rs: 114 (May, 2009)

#### 4.1.2 Characteristics of production systems

Majority of the households in study area were growing At-362 variety (a high yielding, three and half month's variety with a potential yield of seven tons/ha) introduced by the DOA in 2002. It is with reddish pericarp and moderately resistance to brown plant hopper, rice blast and bacterial leaf blight and recommended growing all over the country. While almost all the surveyed households in Ambalantota; and 87% of the households in Lunama AgS division were cultivating this variety.

Three categories of paddy cultivating households, with regards to landownership could be identified in study area: Owners, non owners (tenants or leased) and households who cultivate their own land at the same time with leased lands. Table 4.2 shows that higher percentage of households was cultivating their own field in both divisions. It was higher in Lunama AgS division compared to Ambalantota; but with significantly small land extent of two acres. Nearly 35% of the households in both divisions were non owners. In both seasons, households in Ambalantota division have cultivated comparatively larger land extent compared to Lunama AgS division. Meantime, significantly higher number of households was engaged in cultivating their own land at the same time with leased land in Ambalantota AgS division. Significant differences also could be found in terms of method of harvesting and consumption behavior between both divisions. Results showed that significantly higher number of households in Lunama was doing manual harvesting while consuming significantly higher percentage of production as their own consumption compared to the surveyed households at Ambalantota AgS division. This suggests that paddy cultivating households in Lunama are small scale and subsistence oriented than the sampled households in Ambalantota AgS division.

These findings are in accordance with the suggestions of Pandey, (1999); when income levels are low and the population density is high, agricultural production systems tend to be labor intensive and subsistence-oriented; and in contrast, when income levels are high and the population density are low, they are tend to be commercialized and mechanized with large farms (Table 4.2).

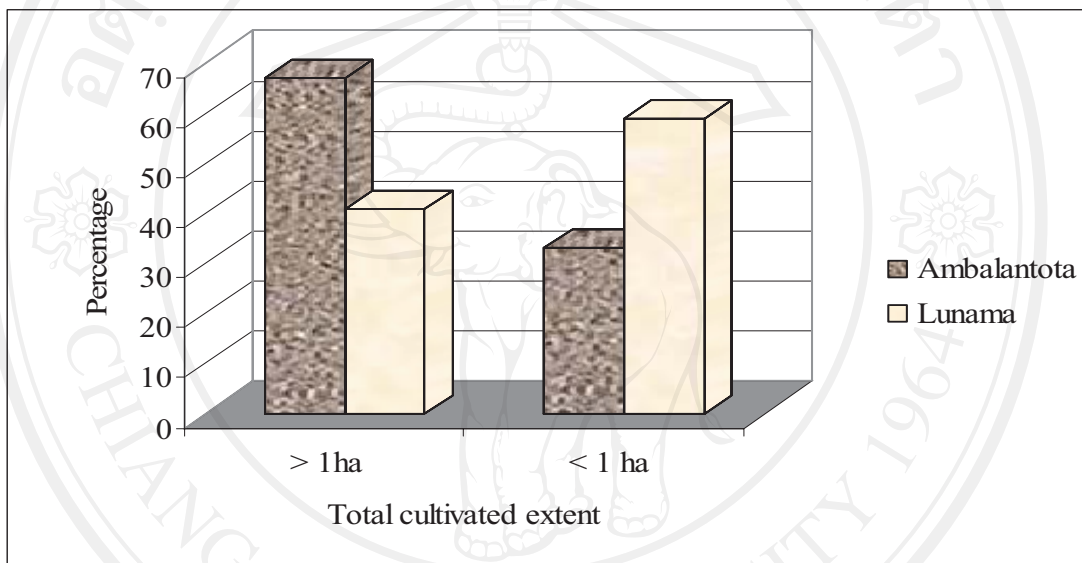


Figure 4.1: Percentage constitution of total land extent under paddy cultivation

Figure 4.1 demonstrates percentage distribution of the land extent under paddy cultivation in two AgS divisions. According to that; higher percentage of households (67%) were cultivating one hectare or more than that in Ambalantota; while higher percentage of households (59%) were cultivating less than one hectare of land extent in Lunama AgS division.

Table 4.2: Characteristics of production systems in two Agrarian service divisions

Characteristic	Ambalantota (N=60)	Lunama (N=59)	Total (N=119)	Level of Significance
Method of harvesting				
- Mechanical (%)	97	49	73	0.000***
- Manual (%)	03	51	27	
Crop rotation – Yes	05	16	10	0.051
No	95	84	90	
Population density (mem:/Ac)	1.8	3.2	2.5	0.001***
Yala season				
Average yield (Kg/Ac)	2,414	2,170	2,301	0.050
Amount of consumption (%)	16	24	20	0.007**
Ownership of land - Own (%)	50	61	56	0.230
- Tenant/Leased (%)	32	37	35	0.523
- Own+Tenant/Leased (%)	13	02	08	0.016**
Average Cultivated area - Own (Acres)	3.0	2.0	2.6	0.056
- Tenant/ Leased	4.2	3.0	3.7	0.117
Use of family labor (Man days/Ac)	3.3	4.9	4.0	0.152
Maha season				
Average yield (Kg/Ac)	2,387	2,179	2,295	0.064
Amount of consumption (%)	18	41	30	0.000***
Ownership of land- Own (%)	55	61	58	0.510
- Tenant/Leased (%)	32	37	34	0.523
- Own+Tenant/Leased (%)	13	02	08	0.016**
Average Cultivated area - Own (Acres)	3.1	2.0	2.5	0.018**
- Tenant/ Leased	4.0	3.0	3.5	0.163
Units of family labor used (Man days/Acre)	3.2	4.9	4	0.109

Note: \*\*, \*\*\* shows significant at 5% and 1% level of significance respectively

#### 4.2 Characteristics of nutrient management practices adopted by households

It is important to look at the current nutrient management practices adopted by households in study area to characterize those practices.

Only chemical fertilizers were used in paddy cultivation by 8% and 22% of surveyed households in Ambalantota and Lunama AgS divisions respectively. On average, 83%, 12%, 11% and 13% of households were adopted in rice straw, green manure, farm yard manure and paddy husk charcoal application respectively. Results of table 4.3 revealed that there was a significant difference in households' adoption of rice straw application and INM practices between two AgS divisions at 10% level of significance. Significantly higher extension contacts, mechanical harvesting and owned land extent cultivated may be the driving forces behind for this situation in Ambalantota AgS division.

Table 4.3: Household adoption of organic materials under INM in paddy production

Organic material	Agrarian Service Division (N=119)				Significance Level of difference
	Ambalantota (N=60)		Lunama (N=59)		
	No: of farmers	Percentage	No: of farmers	Percentage	
Rice straw	54	90	45	76	0.04*
Green manure	09	15	04	07	0.15
Farm yard manure	07	12	06	10	0.79
Paddy husk charcoal	07	12	08	14	0.76
Adoption of INM	55	92	46	78	0.04*

Note: \* Shows 10% level of significance



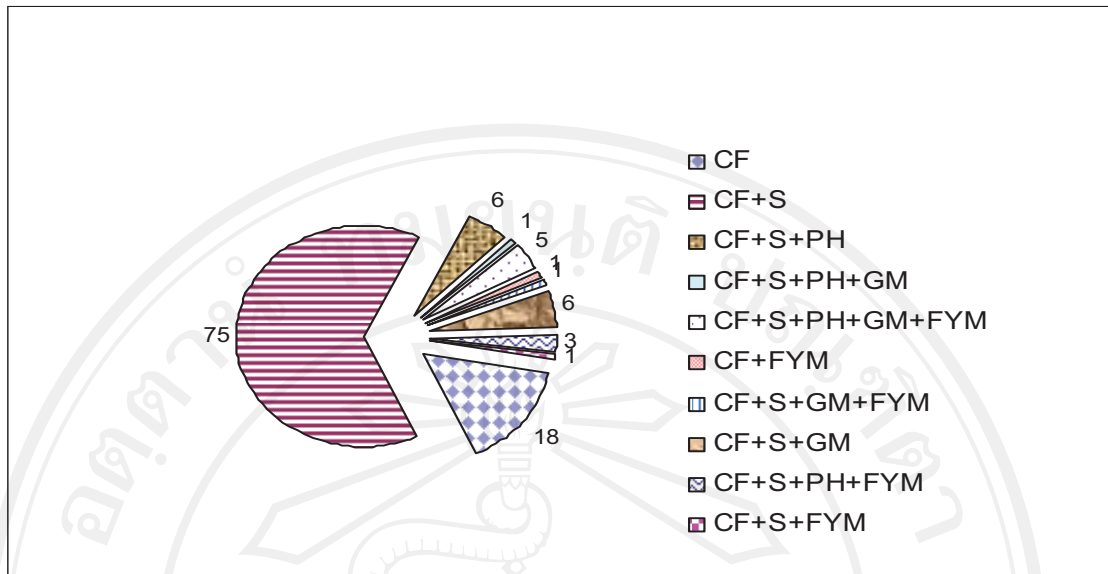


Figure 4.2: Nutrient management practices adopted by surveyed households

Figure 4.2 clearly describes the current situation of nutrient management practices adopted by paddy cultivating households in study area. Among them, 18 households (15% of surveyed households) applied only chemical fertilizers (CF). Majority of them; 75 households (63%) applied chemical fertilizers with straw incorporation (CF+S). Six households (5%) applied the above two fertilizers with paddy husk charcoal (CF+S+PH); and again another six with green manure (CF+S+GM). Five households (4%) applied chemical fertilizers along with all the other four types of organic fertilizers (CF+S+PH+GM+FYM). Three households (2%) applied chemical fertilizers, paddy husk charcoal and farm yard manure with rice straw incorporation (CF+S+PH+FYM). Only one household (1%) was found applying the other practices such as chemical fertilizers and farm yard manure (CF+FYM), both of them with straw incorporation (CF+S+FYM), all of those three with green manure (CF+S+PH+GM) and all other types except paddy husk (CF+S+GM+FYM).



### 4.3 Household evaluation of Integrated Nutrient Management

Advantages of the adoption of INM were elicited from participating households in both AgS divisions; to get a view of farmers' evaluation. Results of the descriptive statistics are summarized in Figure 4.3.

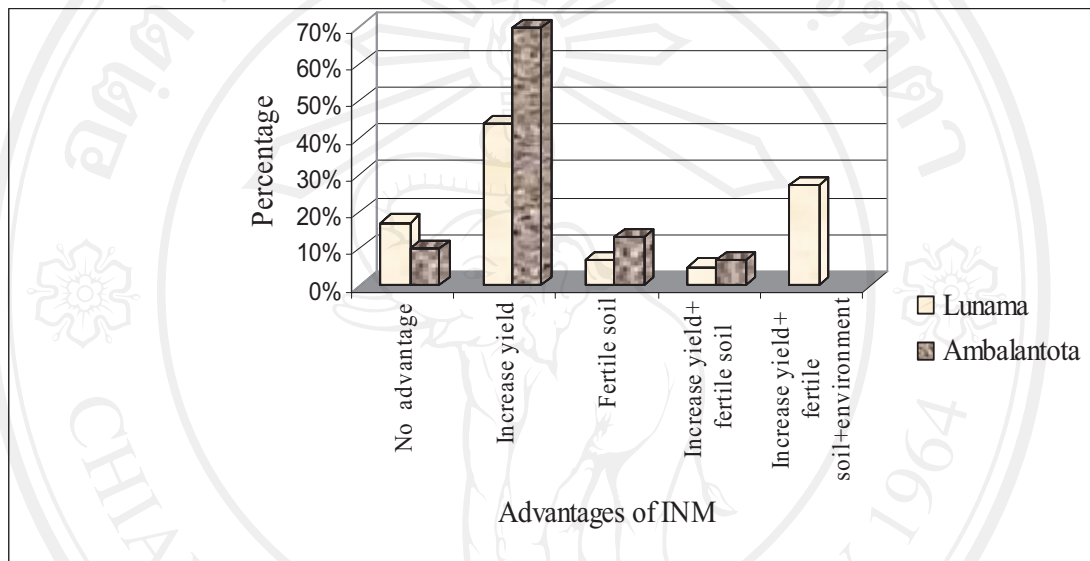


Figure 4.3: Household evaluation on the adoption of INM practices in study area

Households who were interviewed in both AgS divisions considered that the increase of paddy yield as their main advantage of INM adoption; but this perception was comparatively higher among the households in Ambalantota AgS division with compared to Lunama AgS division. In addition to yield increase, other beneficial effects were also perceived; such as improve soil fertility and as an environment friendly procedure for enhancing productivity. But comparatively increased percentage of households in Lunama AgS division was with the belief of that the adoption would not result any advantage for them.

#### 4.4 Characteristics of households with related to the INM adoption

Descriptive statistics based on survey data, were used to identify the socioeconomic and demographic profile of the INM adopters and non adopters.

As shown in Table 4.4; although insignificant; INM adopted household heads were comparatively elder than the non adopted household heads, as it was dominated by rice straw adopters. But in general; although it was non significant, they had a higher level of education, experience in paddy cultivation and number of extension contacts. Adopters showed twice as many contacts with extension services within a season than non adopters. It is interesting to notice the significant difference of positive perceptions between the adopted and non adopted household heads. Positive perceptions among the adopters were nearly three times higher than that of non adopters. Therefore it shows how importance of farmers' perception on technology adoption. The adopted households were also rich with higher labor availability and income from other sources, with compared to non adopters.

Table 4.4: Comparison of main characteristics between adopters and non adopters

Socio economic characteristic	Adopters (N=101)	Non adopters (N=18)	Total (N=119)	Level of Significance
Characteristics of the household head (HH)				
Average age (years)	50	46	50	0.160
Sex – Male (%)	96	89	95	0.205
Female (%)	04	11	05	
Years of education (years)	9.0	8.6	9.0	0.512
Experience in paddy cultivation (years)	21	18	20	0.399
Membership in a farm organization (FO) - Yes (%)	93	94	93	0.832
No (%)	07	06	07	
Years of membership in a FO	12.1	11.6	12	0.817
Perceptions on organic fertilizer application – Yes (%)	96	33	87	0.000***
No (%)	04	67	13	
No: of trainings on (No:/2 years)	1.5	0.9	1	0.265
Characteristics of the household				
Extension contacts (No:/season)	3.5	1.7	3	0.126
Household labor availability (members 14-80 years)	4	3	4	0.243
Household income from other sources (Rs/month/season)	48,122	6,150	41,773	0.484

Note: \*\*\* shows significant at 1% level of significance

1US\$ = Rs: 114 (May 2009)

Table 4.5 shows that the average yields obtained by adopters were comparatively higher than that of non adopters; meantime they comparatively use

higher amount of production for their own consumption and also have a higher percentage of landownership while using higher amount of their own labor. However, the average land extent cultivated by owner farmers was almost same for the adopters (1.7 Acres, n=101) and non adopters (1.7 Acres, n=18). Although it was insignificant; higher numbers of adopters were found engaged in crop rotation. Method of harvesting was significantly higher among the adopters; which made it easier to rice straw application through mechanical harvesting.

Table 4.5: Characteristics of production systems with related to INM adoption

Socio economic characteristic	Adopters (N=101)	Non adopters (N=18)	Total (N=119)	Level of Significance
Characteristics of the production system (Maha season)				
Average yield (Kg/Ac)	2,323	2,130	2,295	0.223
Amount consumed (%)	30.0	25.1	30.0	0.545
Ownership of land - Own (%)	58	56	58	0.495
Tenant/Leased (%)	35	33	34	0.478
Own+Tenant/Leased (%)	07	11	08	0.541
Cultivated area (Acres)				
- Own	1.7	1.7	1.7	0.965
- Tenant/ Leased	1.5	1.3	1.5	0.737
Units of family labor used (Man days/Acre)	4.05	2.99	4.04	0.481
Method of harvesting				
- Mechanical (%)	78	44	73	
- Manual (%)	22	56	27	0.003 ***
Crop rotation – Yes (%)	11	06	10	
- No (%)	89	94	90	0.472

Note: \*\*\* shows significant at 1% level of significance

#### 4.5 Non adoption of Integrated Nutrient Management practices

Survey data provided general information on reasons for the non adoption of INM practices by households in study area. Descriptive statistics were used to identify major reasons for the non adoption of rice straw, green manure, paddy husk charcoal and farm yard manure application; and the results are displayed in Figure 4.4 and 4.5 with regards to Ambalantota and Lunama AgS divisions respectively.

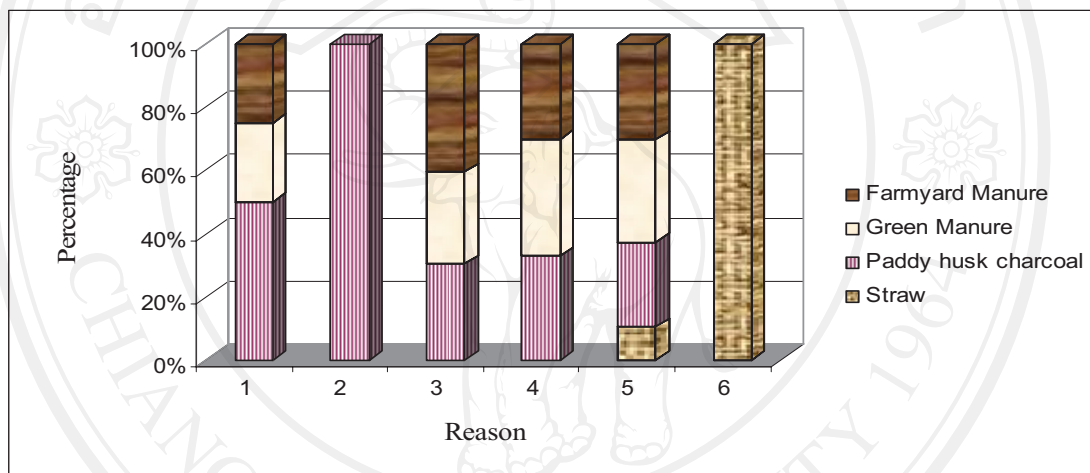


Figure 4.4: Reasons for the non adoption of organic fertilizer applications in Ambalantota AgS division

Major reasons expressed by respondents for the non adoption were as follows:

- 1) Not aware
- 2) No enough trainings
- 3) No enough materials or equipments
- 4) No adequate labor resources
- 5) No motivation to apply
- 6) Others

Descriptive analysis of the survey results revealed that; in Ambalantota AgS division there was a need of awareness programmes on organic fertilizer application in paddy cultivation besides rice straw (the first bar of figure 4.4). Main constraint that farmers have pointed to when questioned about the non adoption of paddy husk charcoal application was inadequate trainings; and it is depicted in the second bar of figure 4.4. Therefore the most necessitate training programme in that area was on paddy husk charcoal application. Inadequacy of equipments (kunthani) to prepare paddy husk charcoal and labor shortages also were limitations for the adoption; and they were depicted in the third and fourth bars of the figure. Inadequacy of materials has limited the adoption of farm yard manure and green manure. Since the application of organic fertilizer is laborious in nature, labor shortages have affected the adoption of all the other organic fertilizer applications besides rice straw. However, some farmers who had access to organic manure such as farm yard manure were found not applying them into their field. Therefore less motivation of households has affected to the non adoption of all types of organic fertilizers in this area. Poor soil conditions, pest attacks from rodents, fungal attacks of the previous crop and burning of rice straw by others-sometimes the tractor owners; were the obstructions of rice straw application in that division.

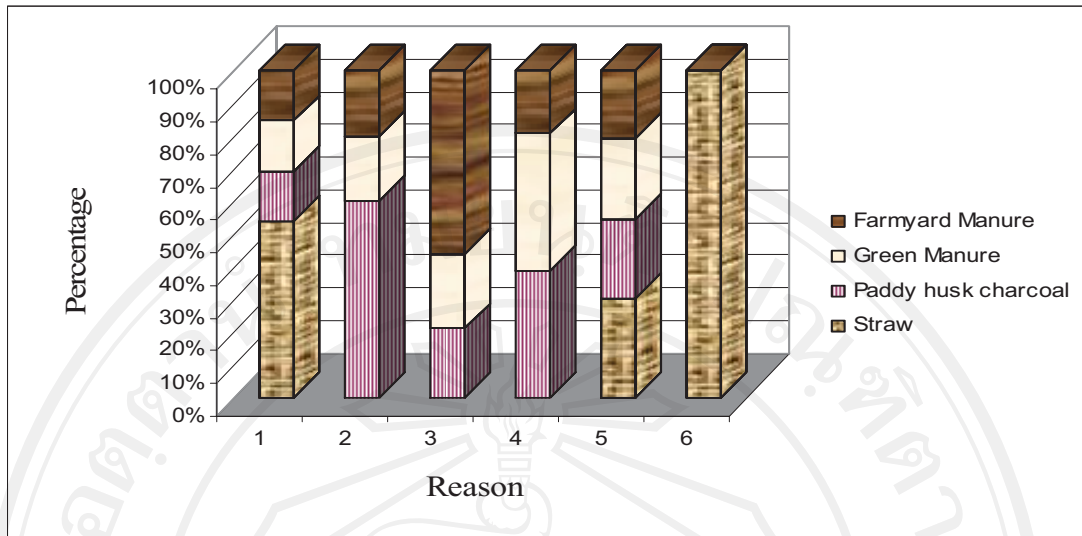


Figure 4.5: Reasons for the non adoption of organic fertilizers in Lunama AgS division

Results with regards to Lunama; indicated that the households in that AgS division were also in need of awareness on organic fertilizer application in paddy cultivation. Surprisingly there were some farmers still with the lack of awareness of rice straw application. Farmers in this division also had mentioned the need of training programmes especially on paddy husk charcoal application. Situation with regards to the other reasons for the non adoption was more or less same with the above situation in Ambalantota AgS division.

The most visible feature for the non adoption was less motivation; and it has affected to each kind of organic fertilizer application practices in both divisions.

#### 4.6 Summary of the chapter

Significant differences could be noticed among the household head and household characteristics between two surveyed divisions; with regards to INM



adoption. Household heads in Ambalantota division were with significantly lower membership in farmer organizations. But they showed significantly higher extension contacts. While they were with significantly higher own land extents under paddy cultivation; they used lower amount of their production for own consumption, compared to the surveyed households at Lunama AgS division. Only 85% of households were found to be adopted in INM practices in study area. Even though 83% of them have adopted straw application, they were in infant stages of technology adoption with regards to green manure, farm yard manure and paddy husk charcoal application. Inadequate trainings and less motivation could be noticed as major reasons with regards to the non adoption of most of the types of organic fertilizers studied.