

Farmer Perception of Sustainable Agriculture Practices in Hinthada Township

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Abstract

This study is an analysis of the sustainable agricultural practices of farmers in Hinthada Township. The aim of the study is to present the best sustainable agriculture practices and whether these farmers in the township are using sustainable agricultural practices, or not and what practices are used. In my research, the obtaining data were analyzed by the spatial analysis for the sustainable agriculture practices, Cluster analysis was for conducted choosing the sample area in the township. Spearman's Rank Correlation Method was applied to know the correlation of farmers' characteristics and sustainable agricultural practices. In this study, 104 administrators or who well-know about the agricultural practices were asked the sustainable agricultural practices of a suitable sample questionnaire. The study found that two thirds of the some village tracts is using minimum tillage, leaving residues in the field after harvesting is being used in some parts of the study area and crop rotation, mix cropping and composts and green manures are being used in few areas. The main finding of this research is that the lack of sustainable farming practices in agriculture is related to the physical condition of the farm and little sustainable agricultural knowledge and experiences of farmers in farming but some farmers are adopting at least some sustainable agricultural practices due to the fact that they know the impact of industrial farming method. Besides, the government and extension agencies are interested in these issues, farmers are more interested in sustainable agriculture.

Keywords: sustainable agriculture, farming practices, minimum tillage, physical condition

INTRODUCTION

The commercial farming practices are destroying the soils of nutrients, making up soils nutrients to deplete, and depleting fossil energy and other nonrenewable resources. Also, the chemical pesticides, herbicides and fertilizers, which are essential for industrial farming practices, can pollute groundwater, rivers and streams, and destroy valuable natural farmlands. Sustainable agriculture Practice is "an agriculture that is implementing of meeting the needs of the current situation while leaving equal or better opportunities for the future" (Ikerd,2008). Most farmers were very much aware of those issues mentioned earlier. Some farmers are interested in organic farming and other alternative forms of agriculture practices, but most farmers delay the use of sustainable agricultural practices in the future because of the less beneficial practices. They keep thinking that industrial agriculture is more profitable and that it is necessary to feed the population of the world.

Hinthada is the capital of Hinthada District once, Hinthada was the main socio-economic centre of Hinthada district. It is one of the busiest trading cities in Lower Myanmar and an important port on the Ayeyarwaddy River. The growth of trade has led to better productivity in the city's backbone areas; it is convenient for both water and land transportation. Hinthada township is the largest exporter of pulses and bean in Ayeyarwaddy Region. The whole area of the township is a flat plateau with an area of 378.695 square miles. Agriculture is the chief economy for most people in Hinthada Township, 69 per cent of working force engages in agriculture and fishing. Paddy and pulses cultivation in the study area has long been based on subsistence farming, particularly in Le land and Kaing Kyun Land where farmers make earn for their livings. Due to its fertile township, rice is the most widely grown crop. In some areas, efforts are being made to grow two crops per year, beans, maize, chili and tobacco are grown in Kaing Kyun. Therefore, for better productivity, the township agricultural lands ought to be safety and rich fertile.

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Study Area

Hinthada Township is located on the western bank of the Ayeyawady River, occupying part of the northern portion the Ayeyawady Delta. The township comprises 21 wards in the urban area, 10 village circles in the rural area. Ten Village circles consist of Ingayan, Danbi, Myogwin, Talokehtaw, Shagel, Nakeban, Kyaungwin, Myoma-West, Myoma-East and Duya. It has an area of about 980.82 square km (378.695 sq mile). Hinthada Township is situated between 17° 15' and 17° 50' North Latitudes and 94° 10' and 95° 35' East Longitudes.

Being part of the Ayeyarwady Deltaic Region, the township has no salient topographic feature, manifested by the combination of Ayeyarwady River Valley, Ngawun River Valley and Daka Creek. Black gram was cultivated than other pulses and beans. The region has monthly mean temperature of 27.8° C during the period from 2017-2018. The temperature on November and December are favorable for the cultivation of Black gram and other pulses. It has Tropical Monsoon Climate (Am) in Study area but in some years in the township, it has tropical Savanna (Aw). This climatic condition is suitable for cultivation of Paddy, Blackgram (Matpe) and other beans cultivation.

Research Problem

Agriculture plays an important role in the economy of Hinthada Township. Although most population engaged in agriculture, farming practices are unsystematic, less economical and less ecologically friendly. Agriculture practices in Hinthada Township do not lead to sustainable agriculture Practices.

The main aim of the research paper is

to present the leading sustainable agriculture practices for local inhabitants

Objectives of this study area are:

- To investigate the agriculture practices of the local farmers
- To examine negative effects of present agriculture practices
- To explore the best agriculture practices for local farmers

Sources of Data and Methodology

Primary and secondary data were used to collect the relevant data for this research. Ten village tracts in study area were investigated by field observation to know the condition of sustainable agriculture practice based on their location, relief and farmer population and farm size. Primary data were collected by structured questionnaires, interviews and group discussion in order to understand the socio-economic status of the village and current farming practices. The structured questionnaires were distributed to 104 village tracts administrators or who well-know about the agricultural practices in township. In order to obtain the necessary data for those village tracts that questionnaires were not returned, we personally visited those village tracts and sometimes, got the data through acquaintances. And then, the villagers were interviewed in each village tract with key informants such as village heads and the elderlies. Group discussion had been made with government officials from General Administrative Department, staff from Agriculture Department, village heads and the elderlies, etc to get thorough understanding on variation in using agricultural practices of Hinthada Township. And then 30 percent questionnaires is used to acquire for perception of farmers in sustainable agriculture practices. Total number of ten village tracts farmer in study area is 1676 people but farmers five hundred and three were chosen respectively according to **Gonzales Method** ($n=N/1+Ne^2$) and used random sampling method. In this research, the obtaining data were analyzed by the spatial analysis for the sustainable agriculture practices, Cluster analysis for

the choosing the sample area in the township. Spearman’s was conducted Rank Correlation Method was applied to know the correlation of farmers’ characteristics and sustainable agricultural practices. In this study, 104 administrators or who well-know about the agricultural practices were asked the sustainable agricultural practices of a suitable sample questionnaire.

RESULTS AND FINDINGS

Analysis on the Farmer Perception of Sustainable Agriculture Practices in Hinthada Township

Criteria for Selection of Sample Village Tracts

There were several criteria for selecting sample village tracts. Because of time and financial constraints, only 10 village tracts were selected for the study on Sustainable Agricultural Development of Hinthada Township. Main criteria are: Area extent of village tracts, net sown area, cultivated areas of Le (paddy) and Kaing (various crop), farm size, family size, number of farmers, cropping pattern, cropping intensity, yield per acre and physical condition of each village tract. Base on the above ten criteria groups are classified according to Hierarchical Cluster group.

In this study, 10 village tracts were selected as samples based on 9 criteria and analysis from pilot study. Questionnaires were distributed to these 10 village tracts by using structural questioner for actual number of farmers. For instance, 1676 farmers were selected as samples among of 505 farmers according to Zonal Method. In this way, total 503 questionnaires were distributed to 10 sample village tracts. Fig (3)

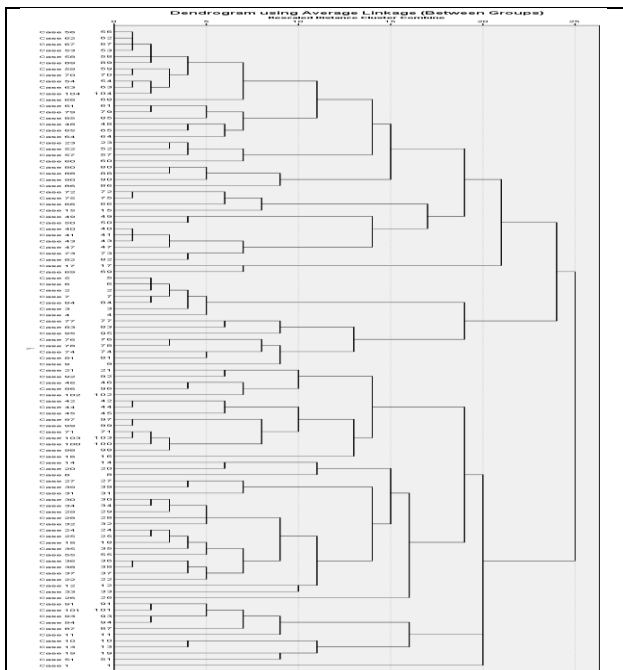


Figure 1. Cluster groups dendrogram of Hinthada Township
Source: Based on questionnaires

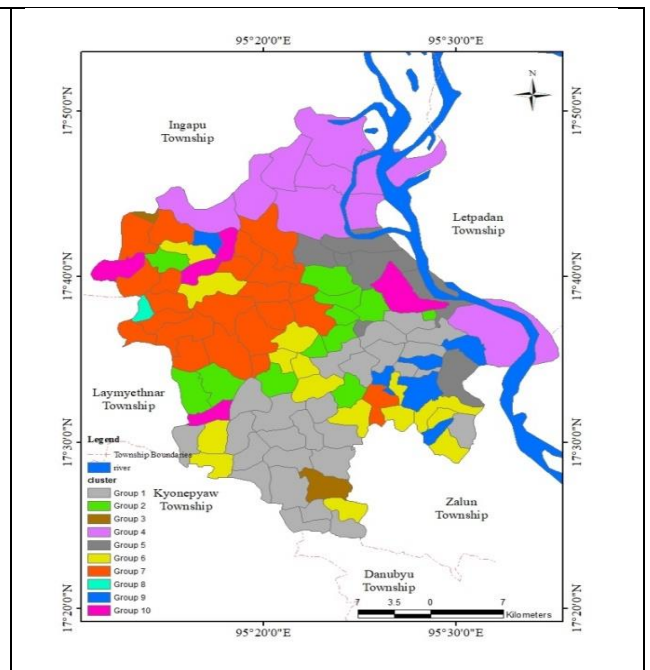


Figure 2. Cluster Groups of Hinthada Township

Practicing Farmers in Sustainable Agriculture

According to the results, of the my study area 104 village tracts are using some sustainable agricultural practices, mostly minimum tillage, leaving residues in the field after harvesting period , crop rotation, mix cropping and compost manure figure (4)

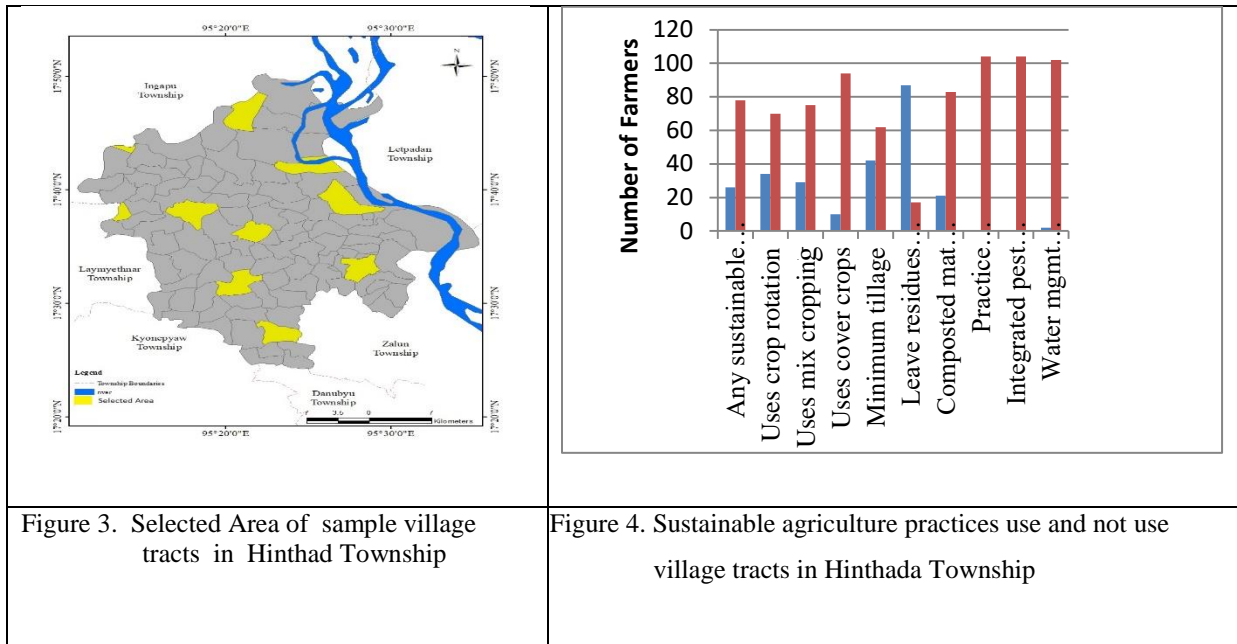


Figure 3. Selected Area of sample village tracts in Hinthad Township

Figure 4. Sustainable agriculture practices use and not use village tracts in Hinthada Township

Farmer’s Perception in Urban Area

As shown in Table(1), farmers in urban areas had the highest perception on the sustainable agriculture practices. According to No. (11) and (24), they strongly agree the concepts of “ use of chemical pesticides and fertilizer is suitable for killing pesticides.” and ‘Agricultural Techniques should be used to increase production’. So, it was found out that they perceived as the use of modern agricultural technologies is good for increasing production. They also described that systematic use of technologies can help them to save time and money especially labour. However, they like using chemical pesticides and fertilizer. The second was ‘Minimum tillage is suitable for our farm’. It can be said that they have known and totally agreed to the importance of tillage system. And the third was ‘Chemical fertilizer is better for crop growth’.

Table 1. Ranking of Farmers’ Perceptions in Urban Area

No	Questions	SA	A	U	DA	SDA	TOTAL	RANK
1	Everyone understands sustainable agricultural practices.	0	5	0	30	4	84	23
2	Sustainable agricultural practices are used for sustaining our farms	20	19	0	0	0	176	6
3	Sustainable agriculture practices are not economically profitable	0	9	0	20	10	86	22
4	Sustainable agriculture practices can be applied on small family farms.	0	6	0	23	10	80	25
5	Sustainable farming practices are not easy to apply	16	23	0	0	0	172	9
6	Farmers should be encouraged to apply sustainable farming practices	9	30	0	0	0	165	13
7	Sustainable farming methods require less chemicals	0	4	0	30	5	81	24
8	Crop Rotation and Mix Cropping improve soil fertility	17	22	0	0	0	173	8

No	Questions	SA	A	U	DA	SDA	TOTAL	RANK
9	Crop Rotation and Mix Cropping require more labor than other practices.	18	21	0	6	0	186	1
10	Harvesting crops and leaving them in the field improve soil quality	19	20	0	0	0	175	7
11	Use of chemical Pesticides and fertilizer is suitable for killing pesticides	30	9	0	0	0	186	2
12	Cow dump and residues are used for refilling soil quality	0	16	0	18	5	105	21
13	Minimum tillage is suitable for our farm	26	13	0	0	0	182	4
14	Use of chemical fertilizer and pesticide can cause poor soil quality	10	29	0	0	0	166	12
15	Integrated pest management cannot be practically used.	12	27	0	0	0	168	10
16	SAP is to work our sustainable farm	12	22	0	5	0	158	14
17	Chemical fertilizer is better for crop growth	25	14	0	0	0	181	5
18	Cover crop is not easy to grow for soil quality	5	30	0	4	0	153	15
19	Present working on agriculture is satisfied	4	25	0	10	0	140	19
20	Upon the fertilizer use for our farm is a satisfactory	15	14	0	10	0	151	16
21	Government loan is enough for our farm	7	20	0	13	0	141	18
22	Market is convenient for selling agricultural products	20	15	0	4	0	168	11
23	Government agricultural Plan is convenient for our township	2	27	0	10	0	138	20
24	Agricultural Techniques should be used to increase production	30	9	0	0	0	186	3
25	Current agriculture is not SAP	0	32	0	7	0	142	17

Index: SA=Strongly Agree, A=Agree, U=Undecided, DA=Disagree, SDA=Strongly Disagree

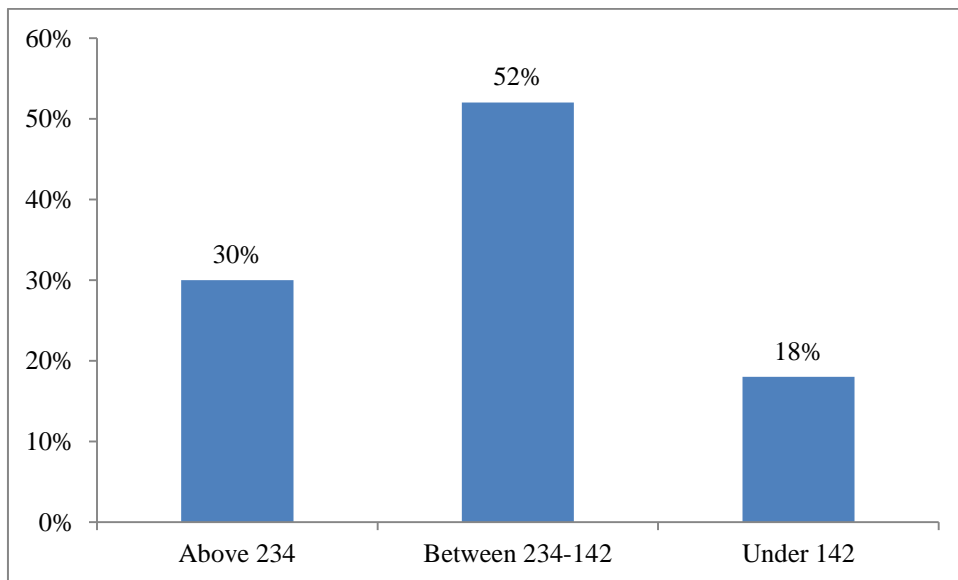


Figure 5. Farmers' perceptions in Urban Area

Source: Based on questionnaires

Farmers' perceptions were classified into three groups, high perception, medium perception and low perception. Figure 5 shows that the majority of the 52% of the farmers had medium perception on sustainable agriculture practices followed by high perception 30 % and the lowest is 18 % farmers' low perceptions. Most of the respondents of the study area knew the importance of sustainable agriculture. Many of them were agreed to the necessity of practicing sustainable agriculture to maintain a proper environment for agricultural production.

Pe Gyi Kyun Village Tract

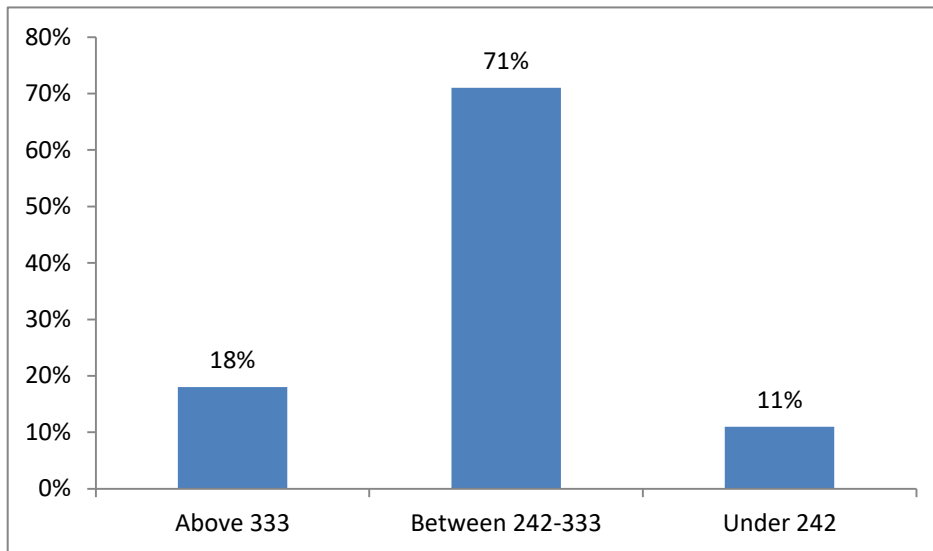


Figure 6. Farmers' perceptions in Pe Gyi Kyun Village Tract

Source: Based on questionnaires

Figure (6) indicates that the majority of the 71% of the farmers had medium perception on sustainable agriculture practices followed by 11% low and 18 % high respectively. It is observed that 89% of the respondents in Pe Gyi Kyun area had medium to high perception on sustainable agriculture. Although many of them agreed to use modern farming methods and techniques, they opined that the practices are difficult to apply. They also described that it can have direct influence on soil and water conservation and it can save time and money especially the growing period. They also strongly agreed that crop rotation and mix cropping practices are necessary for our sustainable farm.

Ta Loke Htaw Village Tract

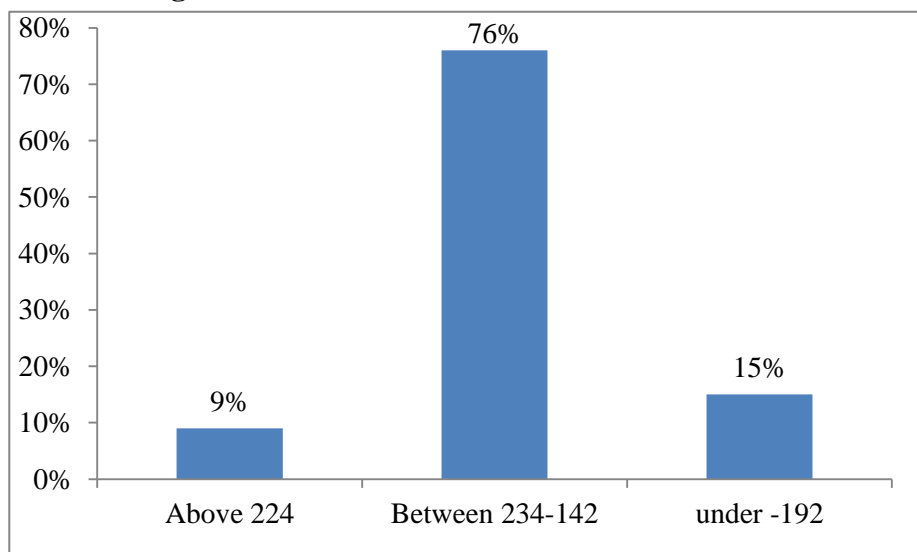


Figure 7. Farmers' perceptions in The Ta Loke Htaw Village Tract

Source: Based on questionnaires

Figure (7) illustrates that the majority of the 76% of the farmers had medium perception on sustainable agriculture practices followed by 9% high and 15% low perception respectively. They also described that good market condition helps them gain fair prices for their products

and to protect price reduction. Farmers regarded it as a good way to maintain the stability of product prices and farming income. They also agreed that sustainable agricultural practices should be applied to their farms for future generation.

Thebwet

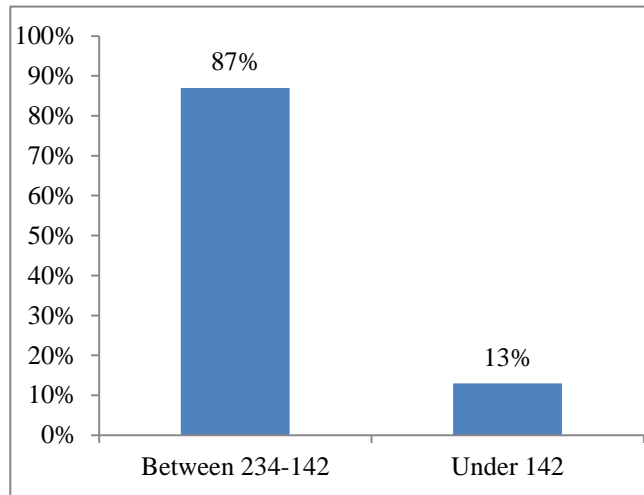


Figure 8. Farmers’ perceptions in Thebwet Village Tract
Source: Based on questionnaires

The farmers’ perceptions were classified into three groups, who have high perception (farmers did not found in Thebwet village tract), medium perception and low perception .As shown in the Figure(8), the majority of 87% had medium perception on sustainable agriculture practices followed by 13 % were low perception farmers respectively. It is noticed that farmers in this area have known the benefits of sustainable agricultural practices and applied practically. It can be said that most of the farmers of the study area knew the benefits of using chemical fertilizers and pesticides and the importance of tillage method. They also agreed that application of sustainable agricultural practices to their farms is good for their future generation.

Lahar Kyaw

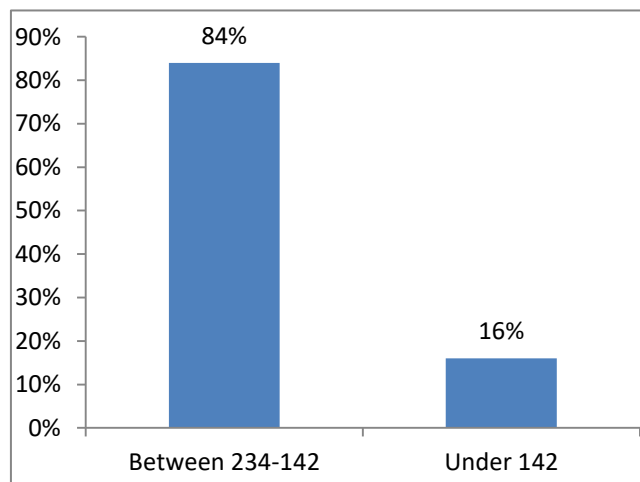


Figure 9. Farmers’ perceptions in Lahar Kyaw Village Tract
Source: Based on questionnaires

The farmers' perceptions were classified into three groups. Although the highest perception of farmers was not found in Lahar Kyaw Village Tract, medium perception and low perception could be seen. Figure (9) also indicates that majority of 84 % of farmers highly perceived on sustainable agriculture practices and under 16 % totally disagreed the importance and application of sustainable agricultural practices. Most farmers completely contradicted that using fertilizers is a satisfactory answer for their farms. It also seems that they may not know the importance of sustainable agricultural practices and the disadvantages of using chemical fertilizers. Therefore, farmers should be informed about the sustainable agricultural practices. It also noticed that market for selling their commodities is inconvenient to farmers in the study area.

Duya Village Tract

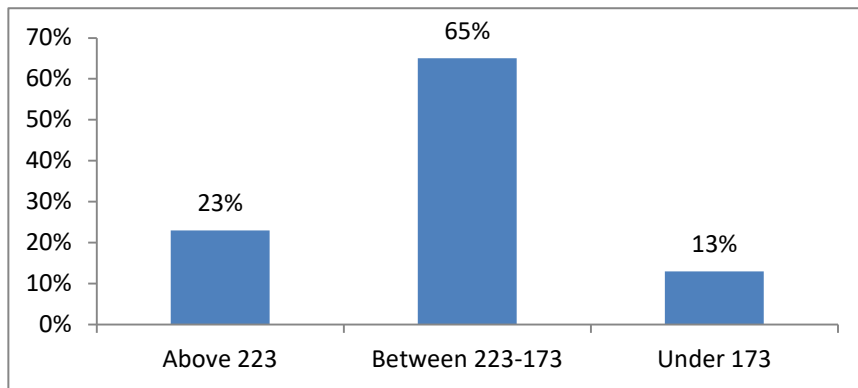


Figure 10. Farmers' perceptions in Duya Village Tract

Source: Based on questionnaires

The farmers' perceptions were classified into three groups; high perception, medium perception and low perception. 23% farmers had high perception, 65% had medium perception and under 13% had low perception on sustainable agriculture practices respectively. It can be seen that although they have known the negative impact of using chemical fertilizers, they were still using fertilizers for better crop yield. They also knew that practicing minimum tillage is an effective solution to improve soil quality and agricultural productivity.

Eike Pyet Village Tract

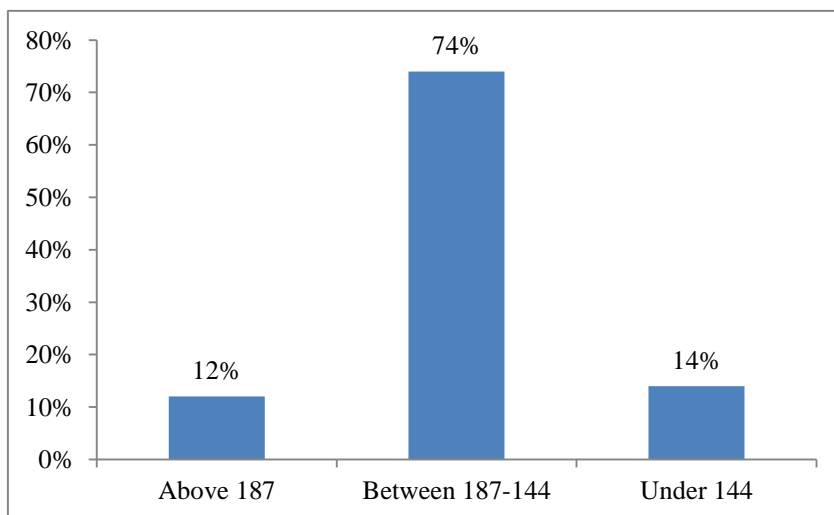


Figure 11. Farmers' perceptions in Eike Pyet Village Tract

Source: Based on questionnaires

High perception of the farmers in Eike Pyet is 74%, medium perception is 14% and low perception is 13%. It can be said that they did not clearly understand sustainable agricultural practices and they had negative attitudes towards the practices. It is likely that the famers in the study area may regard any new practice as risky.

Ma Dot Taloke Kone Village Tract

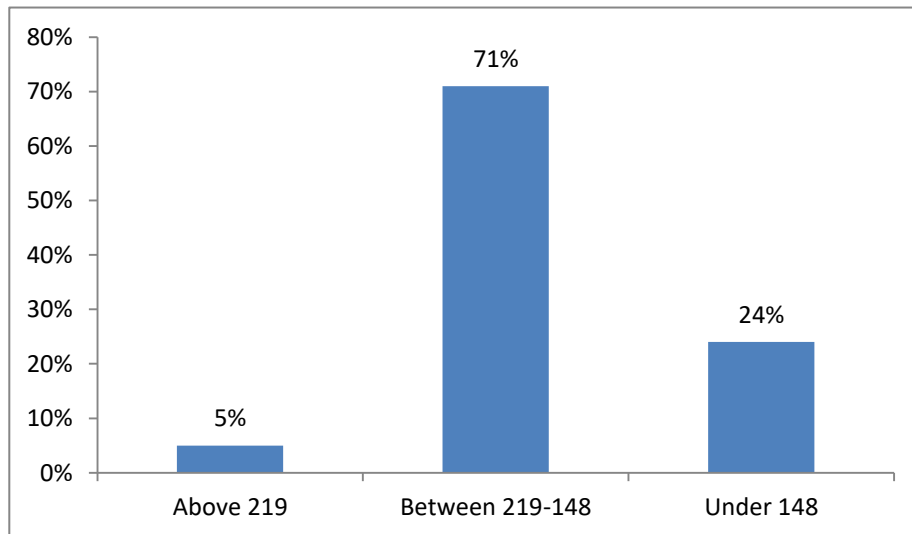


Figure 12. Farmers’ perceptions in Ma Dot Ta loke Kone Village Tract

Source: Based on questionnaires

High perception of farmers was found in Ma Dot Ta loke Kone Village Tract. 71% are medium perception and 24% and under 5% are low perception. This showed that they may have positive perception on any new sustainable agricultural practices and they may also regard any new practice as safety and more productive. It is generally believed that good market conditions increase profits.

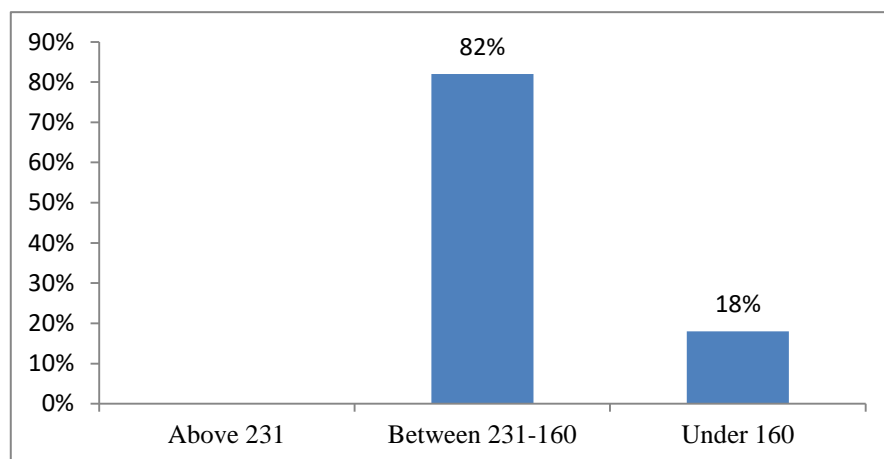


Figure 13. Farmers’ Perceptions in Ma Yan Cho Village Tract

Source: Based on questionnaires

The farmers’ perceptions were classified into two groups, medium perception and low perception .High perception of farmers was not found in the study area. 82% farmers’ medium perception and under 18% low perception can be seen in figure (13).

Myo Gwin Village Tract

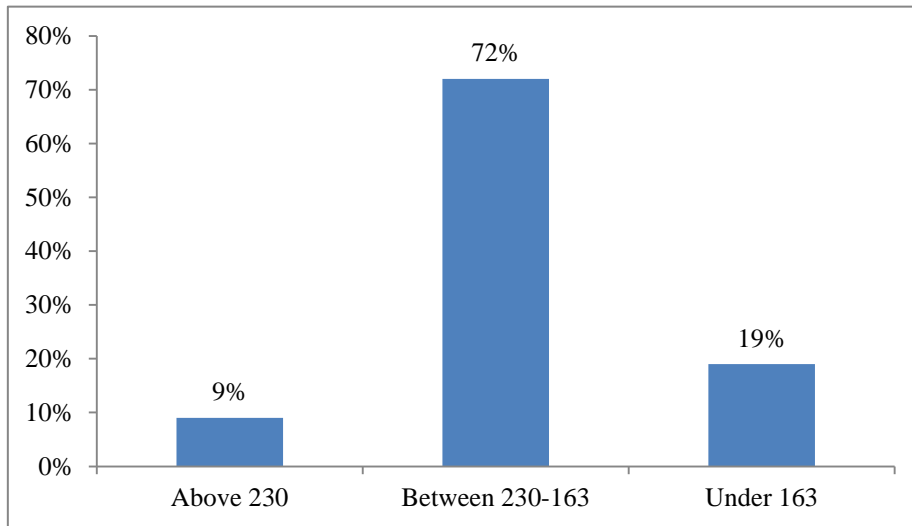


Figure 14. Farmers' Perceptions in Myo Gwin Village Tract

Source: Based on questionnaires

The farmers' perceptions were classified into three groups, high perception, medium perception and low perception. Figure (14) shows that only 9 % of the farmers had high perception, 72 % had medium perception on sustainable agriculture practices and 19 % were low perceptions of farmers respectively.

Relationship between Selected Characteristics of the Farmers and Their Perception

Coefficient of correlation was computed in order to explore the relationships between the selected characteristics of the farmers and their perception on sustainable agricultural practices. Relationships between the selected characteristics of the farmers and their perception on sustainable agricultural practices have been described in Table(2).

The level of education had positive relationship with farmers' perceptions on sustainable agricultural practices when 'r' value was 0.046. It means that the higher the level of education of the farmers, the higher their attitude towards sustainable agricultural practices, it means that educated farmers had better practice of sustainable agriculture. Education helps to gain knowledge and thus increased their power of understanding. Thus, with the increase of level of education, sustainable agricultural practices increase.

There was a positive relationship between the age and farmers' perceptions on sustainable agriculture practice as 'r' value was 0.200. Older farmers are adopting traditional farming methods and its practices are associated with sustainable farming practices. Farming experience had positive relationship with farmer's perception, r value was 0.225. More experienced farmers understand and can apply the whole agricultural system, which is relevant to sustainable farming practices.

There was a positive relationship between farm size and farmers' perception on sustainable agriculture practices as 'r' value was 0.078. It indicates that the higher the farm size, the higher the response on sustainable agricultural practices, that is farmers with medium and large farm size had more response on sustainable agriculture practices. Farmers who had more farm can take more risk than those had less farm acres. This risk bearing ability also increased the response towards sustainable agricultural practices.

Table 2. Relationship between characteristics of the farmers and their perception on sustainable agriculture practices of Hinthada Township

	Total Score	Education	Age	Farm Experience	Family Size	Really Farmers	Farm Size	Annual Income	
Correlation	Total Score	1.000	.046	.200	.225	.043	-.107	0.078	.042
	Education	.046	1.000	-.110	-.305	.015	.005	-.016	-.023
	Age	.200	-.110	1.000	.257	.110	.087	.112	.115
	Farm Experience	.225	-.305	.257	1.000	-.082	-.054	-.078	-.076
	Family Size	.043	.015	.110	-.082	1.000	.586	.362	.370
	Really Farmers	-.107	.005	.087	-.054	.586	1.000	.317	.321
	Farm Size	0.78	-.016	.112	-.078	.362	.317	1.000	.993
	Annual Income	.042	-.023	.115	-.076	.370	.321	.993	1.000

Source: Based on questionnaires

Family size had a positive relationship with the farmers' perception on sustainable agriculture practices as 'r' value was 0.043. The annual income of the farmers had positive relationship with perception on the sustainable agricultural practices as 'r' value was 0.042. It means that the higher the level of income of the farmers, the higher their perception on sustainable agricultural practices. The increase of farmers' annual income will lead to more investment in agriculture than less annual income farmers which will lead to more sustainable agriculture. Really Farmers of the farm had negative relationship with perception on sustainable agricultural practices with computed 'r' value was -107. The number of farmer families was not concerned with sustainable agricultural practices, as even with a small number of farmer families, farming was possible with the help of agricultural technologies.

FINDINGS AND DISCUSSION

Only five sustainable agricultural practices such as crop rotation, mix cropping, minimum tillage, leave residues in the field, composted mat or manure, are practicing in Hinthada Township. Most of the farmers in the study area were older age (between 20 and 60) having small family size, small farm holding and having primary level of education with low to medium annual income and medium farming experience. Thus, the low participation of educated young farmers in agriculture is an obstacle to sustainable agriculture development. The government should implement guaranteed crop markets and encourage farmers to involve educated young people in agriculture. More than 73.4 percent of the farmers had medium attitude towards sustainable agricultural practices compared to 16.8 % having low attitude and 10.6% had high attitude towards sustainable agricultural practices in sample ten village tracts. Therefore, in sample areas, the positive perception of farmers on sustainable farming practices had medium situation. Thus, there is a good potential for sustainable agriculture practices development in Hinthada Township. The findings revealed that farmers had a moderate attitude towards SA practices.

Coefficient of correlation test mentioned that education, age, farm size, family size, farmers experience and annual income showed positive relationship with the perception of the farmers on sustainable agricultural practices. The age of farmers and the experience of farmers had a high relationship with farmers' perceptions on sustainable agricultural practices. But

annual income of the farmers with low relationship was founded. In addition, despite of the large number of family members, the actual number of people engaged in agriculture was inversely related to sustainable agriculture practices. According to the questioners results of the study area, most farmers answered that ploughing with the minimum tillage practices were the best practices and suitable for their farm because using this agricultural practices not only saves farmer's money but also reduces the planting period caused by climate change. In addition, farmers should be informed about the selection of seasonal and short-lived varieties crops. It was found that farmers have a weak understanding of sustainable farming practices. Therefore, the government should inform future generations on sustainable agricultural practices for the soil fertility. In addition, farmers cannot accurately calculate the benefit of harvesting period due to the grantee of crop prices. Therefore, they are not fully satisfied with working in agriculture and use of chemical fertilizers and pesticides. If the government fixes crop prices, productivity and standards of living will also be increased.

CONCLUSION

Total population of farmers in Hinthada township are 1676 farmers according to Myanmar Agricultural Development Bank (Hinthada). Agriculture is the chief economy for most people in Hinthada Township, 69 per cent of working force is connected with engaged in agriculture. Therefore, the large number of farmers involved in agriculture is an advantage for agriculture in Hinthada Township. Sustainable agriculture practices in Hinthada Township are mainly practiced crop rotation, leaving residues in the field after harvest, and the use of no tillage or minimum tillage. By establishing rotations, the farmers now plant other crops, such as soybeans, chili, maize and other pulses, which replenish soil nutrients and reduce the need for chemical fertilizers. Most of the farmer in study area leaving residues in the field after harvest method are practicing nearly all cultivated land. A few farmers are experimenting with called zero tillage method. In summary, relief, drainage and soils have largely effect on the sustainable agricultural practices. The differences of education, farm size, farm experience and age result to the unbalanced of sustainable agricultural practices. The correlation analysis indicated that education, farm size, annual income and age positive relationship with the perception of the farmers towards sustainable agricultural practices, that means higher the above-mentioned characteristics of the farmers, higher was their perception regarding sustainable agriculture practices.

Acknowledgments

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References

- Abolhasan Sadati and et al (2010): Farmer's Attitude on Sustainable Agriculture and its Determinants: A Case Study in Behbahan County of Iran, Faculty of Agricultural Economics and Development
- Altieri, M. & Nicholls (2005). Agroecology: Principles and strategies for designing sustainable farming systems. In Agroecology and the search for a truly sustainable agriculture. Mexico: United Nations Environment Programme

Bagheri and et al (2008): Perceptions of Paddy Farmers towards Sustainable Agricultural Technologies: Case of Haraz Catchments Area in Mazandaran province of Iran, University of Mohaghegh Ardabili

Dave Kovacic (2009): Towards sustainable agriculture: Dudley smith farm revision, new timothy marten BLA college of fine and applied arts university of Illinois at urban a-Champaign

Feenstra, G. (2007). Sustainable Agriculture. <http://sarep.ucdavis.edu/concept.htm> (Retrieved on July 12, 2000)

Gonzales (1993). Method of Research and Thesis Writing,Valenzuela,Metro Manila

Komol Singha and et al (2015) :Sustainability of Rice Cultivation: A Study of Manipur Sikkim University, Gangtok, India

Menale Kassie, Precious Zikhali, Kebede Manjur, Sue Edwards9 2009):Adoption of sustainable agriculture practices: Evidence from a semi-arid region of Ethiopia, Natural Resources Forum 33 (2009) 189–198ainable

Mithun Kumar Ghosh and Shaikh Shamim Hasan (2013). Farmers’ Attitude towards Sustainable Agricultural Practices in Bangladesh, ISSN: 1998-2003,

M. Umanath and et al(2016) : Farmers’ Perception on Environmental Degradation due to Indiscriminate use of Modern Practices: A Case Study from Madurai District, Tamil Nadu, Tamil Nadu Agricultural University

Sahil Bali, Kajal, Jaimit ChaudhariL(2016): A set of case studies on sustainable agricultural practices in Chhotaudepur, District prepared as part of internship programme Tata Institute of Social Sciences, Mumbai An Institutional engagement

Thin Thin Myat (2008): Sustainable Agriculture in Rural Area: A Case Study of Lewe Township(Unpublished Ph.D. Dissertation), Geography Department, University of Yangon

Urmilla Bob (2016): Sustainable Agricultural Practices in Smallholder Farming Systems: A Case Study of Smallholder Farmers in the Ugu District, KwaZulu-Natal, South Africa, University of KwaZulu-Natal, South Africa Su

၁။ မြေဆီလွှာအဟာရဓာတ်စစ်ဆေးဆောင်ရွက်သည့်စီမံချက်(၂၀၁၇) ၊ ဟင်္သာတမြို့နယ်

၂။ ဟင်္သာတမြို့နယ် ပြန်တမ်း-၂၀၁၉မတ်လ(၁၀)ရက်လယ်ယာမြေနှင့်ဆိုင်သော မြေအသုံးချမှုဆိုင်ရာအချက်အလက်များ (၂၀၁၇), ဟင်္သာတမြို့နယ်လယ်ယာမြေစီမံ ခန့်ခွဲရေးနှင့်စာရင်းအင်းဦးစီးဌာန