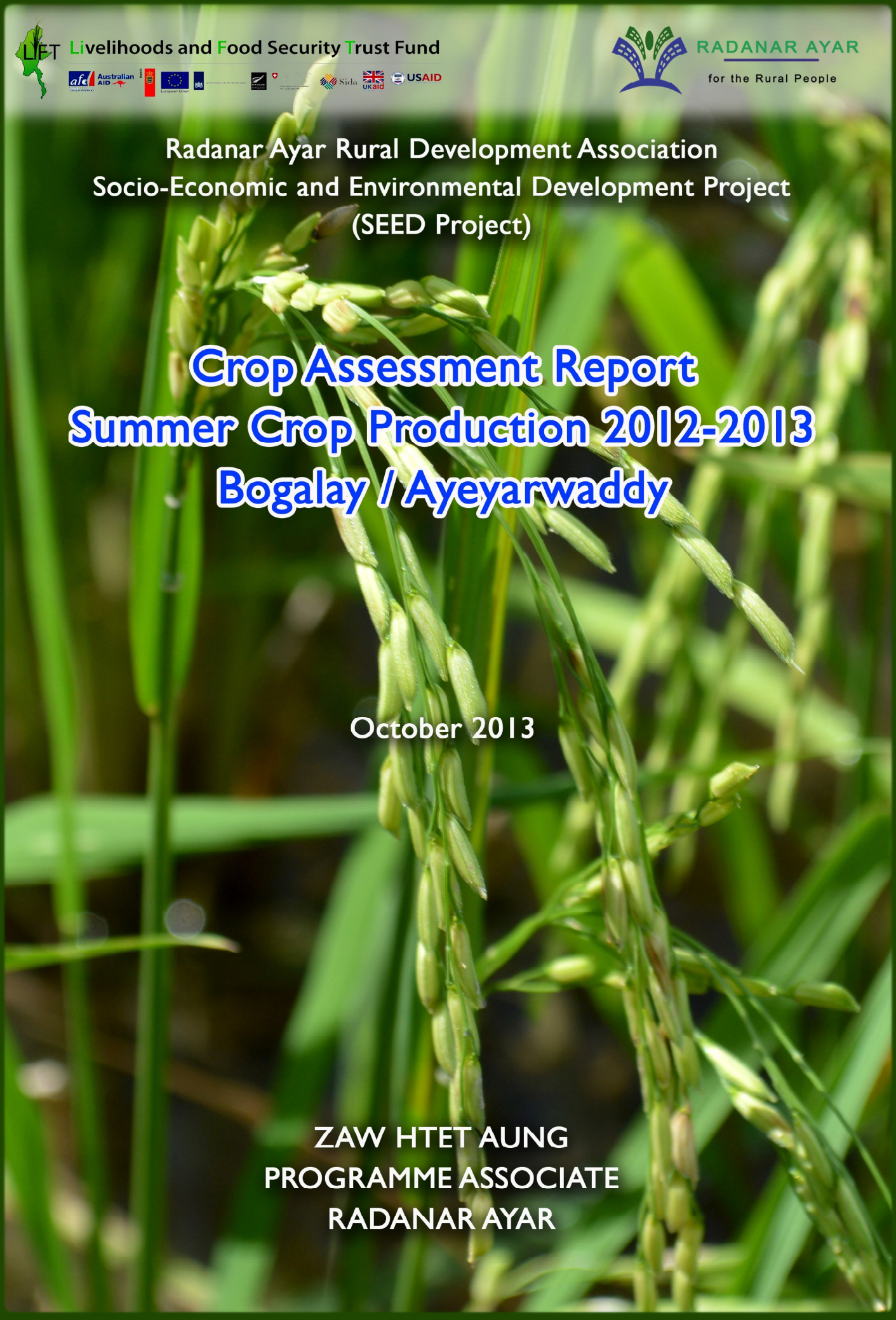

Livelihoods and Food Security Trust Fund

RADANAR AYAR
for the Rural People

Radanar Ayar Rural Development Association
Socio-Economic and Environmental Development Project
(SEED Project)

Crop Assessment Report
Summer Crop Production 2012-2013
Bogalay / Ayeyarwaddy

October 2013

ZAW HTET AUNG
PROGRAMME ASSOCIATE
RADANAR AYAR

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Disclaimer

This document has been produced with financial assistance from Australia, Denmark, the European Union, France, the Netherlands, New Zealand, Sweden, Switzerland, the United Kingdom, and the United States of America. The opinions in this report, however, should in no way be taken to reflect their official views.

CROP ASSESSMENT REPORT

SUMMER CROP PRODUCTION 2012-2013

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Paddy Plant in the field
Photo Credit: Radanar Ayar

CROP ASSESSMENT REPORT

SUMMER CROP PRODUCTION 2012-2013

INTRODUCTION

SEED which stands for Socio-Economic and Environmental Development Project is currently being implemented by Radanar Ayar with financial support of LIFT in order to improve socio-economic situation of farming community from 42 villages of Bogalay Township.

Bogalay is one of the areas in Myanmar where various rice varieties and crops were produced. It was also one of the seriously damaged areas by Cyclone Nargis in 2008. Many emergency agencies and development agencies (including international, national and local) have assisted and currently implementing for the area from the stage of relief till to that of rehabilitation.

Although over 3 years of recovering period, local food security and sustainable livelihoods remain major challenges impeding the full recovery of communities in Bogalay. The reason is not just because of the Cyclone, instead, the chronic issues affecting the livelihood and well-being of target communities especially farmers. These underlying issues are;

1. Poor quality of rice crops due to the poor quality of rice seeds,
2. Inability of rice producing farmers to realize the potential and benefits from their land,
3. Weakness in local capacities in terms of sustainable natural resource management and
4. Greater vulnerability of farming communities including landless labourers from saline areas.

SEED was designed as a project for farming community expecting the socio-economic status of farming communities would be improved in terms of increasing their seasonal income as its outcome. And they would be enhanced by improved technologies to tackle the challenges affected to the rural livelihoods and food security.

Therefore, SEED project elaborated four main themes under its logical framework – 1) seed multiplication, 2) quality crop production, 3) technical advisory & agricultural testing service provision and 4) second crop production. During 2012, the project had 188 seed producers for 200 seed multiplication acres and 730 crop producers for 1,000 crop production acres[1]. Among these, 500 acres of crop production were implemented in 2012-2013 summer crop season in collaboration with 500 farmers from 31 villages[2] of Bogalay.

Data collection, analysis and report of summer crop assessment 2012-2013 had to be conducted separately as both "Annual Programmatic Progress Report" and "Annual Review Report" couldn't cover the whole process for summer crop production. Then, starting from June 2013, data collection and analysis were conducted, and this summer crop assessment report emerged in October 2013.

[1] Radanar Ayar. (2013) "*Annual Programmatic Progress Report 2012"* [February 2013].
[2] Among 42 targeted villages of SEED Project, summer crop production cannot be cultivated in 11 villages because of saline water intrusion during December to April.

EXECUTIVE SUMMARY

SEED Project of Radanar Ayar was started to implement in January 2012 with the four main themes 1) seed production, 2) crop production, 3) technical advisory & agricultural testing service provision and 4) second crop production. According to Baseline Study of Radanar Ayar (2012)[3], Thee-Htat-Yin is the major variety (79% or over 1,700 out of 2,184 acres) for summer crop production and the majority of farmers (88% or 223 out of 297 farmers) sown the variety.

In summer crop season 2013 (December 2012 – April 2013), the project had 500 crop producers for 500 acres of quality crop production and the variety *Thee-Htat-Yin* (HYV)[4] was used. 31 villages from 15 village tracts were involved and total 386 crop producers participated in summer crop assessment (346 male and 40 female).

The project supported both in-kind and techniques to the farmers on acre basis. The range of technical support covers the whole process of production – selecting the quality seeds and land preparation to harvesting and post-harvest management. Among the techniques provided, plantation (hand transplantation and seeder), fertilizer application practices and fulltime roughing (2-3 times) are crucial to be adopted as they mainly affect the quality, yield and price of the products.

Among 386 respondents, 169 farmers (44%) practiced hand transplantation technique, 135 farmers (35%) used seeder for cultivating summer crop and the rest 82 farmers (21%) broadcasted the seeds. Among the respondents, 207 farmers (54%) followed the fertilizer application techniques exactly as the project advised and 162 farmers (42%) also followed the fertilizer application with some deviation while 17 farmers (4%) continued practicing as traditional method.

Average total cost per acre of project farms where hand transplantation was practiced is 135,404 kyat and where seeder was used for plantation is 132,983 kyat. It exceeds the average total cost of self-production which is 115,936 kyat per acre.

In farmers' self-producing farms, the average yield per acre is 91 baskets in 2013 summer and 78 baskets in 2012 summer (for the same variety). In project collaborated production, project farms yield 122 baskets per acre as maximum and average yield varies according to adopted techniques. In hand-transplantation followed by systematic fertilizer application with fulltime roughing yield 95 baskets per acre in average while seeder usage with the same technical following yield 91 baskets. Hand transplanted farms yield 4% more than self-production (2013) and 22% more than production (2012). Seeder-used farms yield the same with self-production (2013) and 17% more than production (2012).

Both for hand transplanted and seeder used farms with systematic fertilizer application improves the quality of the crop in over 10% of farms and the improvement in quality is described mainly by "weight-fullness" (42% of respondents described).

The range of prices for baskets of "*Thee-Htat-Yin*" varies between 2,900 to 6,000 kyat and the major portion of farmers (44% or 170 farmers) got the price between 3,501 and 4,000 kyat per basket. The average price for a basket is 3,675 kyat.

[3] Baseline Database of Radanar Ayar (2012)
[4] HYV = High-Yield Variety

In calculating Benefit-to-Cost Ratio (BCR) in order to know the profitability and worthiness of the production, hand transplanted farms with systematic fertilizer application and fulltime roughing result 2.12 BCR value. It means adopting those exact practices earn 2.12 times of net-income compared to a unit of cost of production. Seeder-used farms of the same practice result 1.46 BCR value.

In order to raise BCR value (apart from improving the yield); the cost of production should be minimized (less amount in using seed and fertilizer) and the roughing should be emphasized (to improve the quality of crop and get more price and income). For yield improvement, the specific technical adoption in different stages of production is critical. And all the series of techniques should be adopted completely in order to have improvement certainly.

In overviewing crop production, the techniques for improving yield and quality of the crop consume more investment and commitments than ordinary farming practices. However, the return on investment is higher and it is essential to keep good practices for long-term profitability (not for a single season).

Besides crop production analysis, non-production portions (farming tools service provision and social investment) are analyzed as they are related to and result of production. Harvesters, threshers and dryers were provided to farmers through farmer pools for reducing post-harvest losses. Seeders were provided for substitution to hand-transplantation in difficult water management areas. Air-tight bags were provided for storing the seeds and crops properly.

Among 386 respondents, 100% farmers received and used the air-tight bags as they are provided sufficiently. For the other tools, they are very limited in number and services were provided under the management of farming pools. Seeders have been assessed by 32% of farmers (124 out of 386); harvesters by 3% (11 farmers); dryers and threshers by 5% (20 farmers) for each tool.

Under social investment, contribution in village development activities, religious activities and investment in children's education are analyzed for knowing how the farming community see and prioritize their out of routine activities especially on non-business sector. For 386 respondents, 58% (224 farmers) said they contributed to village development affairs (including village development fund of farmer pools). 20% (78 farmers) described that they mainly donated to religious activities and only 17% (64 farmers) invested in their children's education.

Recommendations were made separately for three peoples: crop producers (the farmers), farmer pools (farmers' representative groups) and the project. This report recommends the farmers to rely consistently on the techniques for long-term production improvement. It recommends the farmer pools to conduct crop monitoring along the production process especially for technical adoption. And the farmer pools are recommended for practicing collaborative approach for production and trading for more benefits.

The project is recommended to emphasize on providing selected technical aspects rather than focusing on wider range. The project is recommended to strengthen the farmer pools for sustainable and improved agriculture production. Finally, the project is recommended to have seasonal reports on crop production together with progresses and issues to be solved.

METHODOLOGY

In 2013 summer cropping season (December 2012 – April 2013), the project had 500 crop producers for 500 acres of quality crop production. And the summer crop producing villages are in 31 villages out of 42 total target villages of the project.

Questionnaires, Data Collection and Analysis

The assessment has been conducted and analyzed as a simple, quick and quantitative analysis focusing on technical adoption, yield, quality, net income and social investment. The questionnaires were developed by the present of technical team of the project for more fluent data collection and based on 10 main points:

1) Yield per acre (comparison between project and self-production)
2) Quality (Improvement situation and characteristics)
3) Income situation (based on price gained per basket compared between project and self)
4) Cost of production (comparison between project and self)
5) Social Investment (contribution in development fund or village development affairs, in religious activities and/or investment in education)
6) Assessing farming tools (thresher, seeder, reaper, sprayer, dryer, compost-pond and air-tight bags provided by the project)
7) Plantation technique used (hand transplant, seeder or broadcasted)
8) Fertilizer application technique (adopted or traditionally applied)
9) Roughing (how many times of roughing conducted)
10) Storing the crops (using air-tight bags or not)

Among the points, questions of 7 to 10 are attention to technical adoption. (*The questionnaire can be seen in* ***Annex II***). Although the assessment aims to conduct to all farmers in project's summer production **(Positive Sampling type of Control)**, only 386 out of 500 crop producers (77%) responded the questionnaires of crop assessment because of the restricted time availability in data collection. No focus group discussion (FGD) was conducted in this assessment as of quick and quantitative assessment. Although the questionnaires are likely to checklist, they are not closed or leading questions as it contains brief calculations and discussions.

Collected data were entered into simple spreadsheet and analyzed by using Microsoft Excel 2010. And the findings were interpreted by both the number of respondents and the percentage of it based on total records. Then the results are converted into figures using column-charts, bar-charts, line-charts, pie-charts and tables for more visualization.

Steps in Analyzing

Based on technical adoption – plantation, fertilizer and roughing, the different sets were extracted out for comparing yield, quality improvement and cost of production. For technical adoption, fertilizer application and roughing are the legends based on plantation technique because plantation is assumed as the primary technique in the series of technique.

Plantation has 3 clusters (hand transplant, seeder and broadcasting) and fertilizer application too (traditional, fully adopted and partially adopted). These clusters remain separately and formed 9 sets of adoption. For roughing, it includes "0", "1", "2" and "3" as frequencies. According to provided agricultural technique, "2" and "3" are recommended as minimal standard. Then, roughing has two clusters "YES" (has recommended frequencies – "2" or "3") and "NO" (do not have recommended frequencies – "0" or "1"). In linking to 9 sets after plantation and fertilizer, roughing provides 18 sets of technical adoption.

Table 1: Different Sets of Technical Adoption

Set	Plantation	Fertilizer	Roughing
1	Hand Transplant	Fully Adopted	YES
2	Hand Transplant	Fully Adopted	NO
3	Hand Transplant	Partially Adopted	YES
4	Hand Transplant	Partially Adopted	NO
5	Hand Transplant	Traditional	YES
6	Hand Transplant	Traditional	NO
7	Seeder	Fully Adopted	YES
8	Seeder	Fully Adopted	NO
9	Seeder	Partially Adopted	YES
10	Seeder	Partially Adopted	NO
11	Seeder	Traditional	YES
12	Seeder	Traditional	NO
13	Broadcasting	Fully Adopted	YES
14	Broadcasting	Fully Adopted	NO
15	Broadcasting	Partially Adopted	YES
16	Broadcasting	Partially Adopted	NO
17	Broadcasting	Traditional	YES
18	Broadcasting	Traditional	NO

For calculating cost of production (project farms), analyzing was made on plantation techniques and on different sets of technical adoption. Since some sets of technical adoption do not have data or enough data to be analyzed, cost of production on different plantation techniques were calculated separately. Since in collecting the data, the cost of production in project-collaborated farms were gathered as their actual expenses (excluding the value of inputs by the project). Those values of inputs supported by the project were included only in database after entry. For self-farming, all the cost were calculated to get average total cost and fixed as comparison to those of project farms.

In the section of yielding, there are two sources as compared data – yield data from 2012 summer (from baseline database) and yield data from 2013 summer (as self-production in this assessment). Among the different sets, the project farms only have 13 sets as there is no data for 5, 6, 12, 13, 15 and 17 set numbers.

Under quality improvement, there are two portions – assessing the situation of improvement and the characteristics described for the quality. The data of "YES" under Quality Improvement question were extracted separately from the rest two "NO" and "SAME". This means if there is "NO"

improvement in quality than their self-production, then it becomes the "SAME" (assuming there is no quality degradation because of provided certified-seeds and techniques).

Second portion of quality improvement is assessment on characteristics description on what is quality. This only needs to combine the data simply and interpret in percentage on each category "Weight", "Color" and "Purity". Although assessing improvement situation (first portion) based on different sets of technical adoption, the second portion does not consider those sets to avoid complication and unrelated data.

Analyzing on the prices gained has two different approaches: setting price ranges and prices according to technical sets. For the second approach, the prices data were categorized according to different technical sets ***(Table 1)***. For setting price ranges, the interval is set at 500. The minimum value is 2,900 and the maximum is 6,000. Therefore, there are 5 categories of price: [<=3000], [3001 to 3500], [3501 to 4000], [4001 to 4500] and [>=4501]. There is only a single data in each [5000] and [6000]. Therefore, they are put under [>=4501].

The price gained was collected as individual farmers getting only for their products without considering on the seasonal prices change. It means that the prices were at actual sold prices for their baskets of paddy during March to June 2013. It doesn't imply to compare by the seasonal factor, paddy demand and market situation.

In addition to crop production process, benefits-to-cost ratio (BCR) is analyzed according to calculated data received from yield (basket), price per basket (kyat) and cost of production (kyat). The average values from each section – yield, price and cost were taken according to different sets of technical adoption. The formula for BCR calculation is dividing net-income by total cost of production. Net-income is a result from extracting total cost from total income. Total income is calculated by multiplying yield (baskets) by price (per basket).

For non-production analysis, there is no consideration on sets of techniques as they stand separately from production. The numbers of supported farming tools are assessed by project database and documents. The percentages on each categories of farming tool are calculated on specific entries. The data from dryer and compost pond are combined as the single tool for multipurpose. In interpretation of the analyzed results, data from air-tight bags are omitted because it is not the service instead, provided tool to all farmers.

Social Investment analysis has 3 categories [village development, Religious and Education] (village development fund is assumed as a part of village development). It doesn't consider or based on sets of techniques and calculated specific percentages according to each categories.

Germinating the seeds before Seedbed Preparation
Photo Credit: Radanar Ayar

A. FINDINGS (CROP PRODUCTION)

I. General

The target villages of SEED Project are altogether 42 villages from 22 village tracts of Bogalay Township. Among them, 11 villages are located in salty-water zone where the saline water intrusion is intense during January to April and the farmers from those villages only have single cropping (monsoon production). Apart from the villages of salty-water zone, there are 8 villages in mixed-water zone (brackish zone) and 23 villages in fresh-water zone where the farmers have double cropping practice (monsoon and summer production).

In summer crop production 2013, total 500 farmers from 31 villages (of summer crop producing) collaborated with the project for quality crop production. In this study report, 386 out of 500 farmers (346 male and 40 female) participated as respondents to the questionnaires. This number is covered 77% of the 500 crop producing farmers from summer season *(See **Annex I** for detail list of villages)*.

II. Technical Adoption

There is a range of techniques provided and encouraged to farmers to adopt for better farming practices which covers the whole process of production – from seed selection to post-harvest management. However, the project focuses on the critical processing points and the study spotted on those areas;

a. Plantation technique (Hand transplant, using seeder and broadcasting the seed)
b. Fertilizer application (Fully adopted, partially adopted and traditional)
c. Roughing (at least 3 times)

a) Plantation Technique

Among the responded farmers, 169 out of 386 farmers (44%) practiced hand transplantation technique while 135 farmers (35% of 386 farmers) used seeders in plantation stage. The rest 82 farmers (21% of 386 farmers) broadcasted the seed in summer crop production ***(Figure A-1)***.

b) Fertilizer Application

For summer crop production 2013, the farmers were supported with organic and inorganic fertilizers on an acre basis. Among 386 farmers of summer production, 54% (207 out of 386) followed the exact techniques provided by the project for fertilizer application and 42% (162 out of 386) adopted project's techniques with deviation in timing. The rest 4% of farmers (17 out of 386) continued their traditional fertilizer application techniques in 2013 summer production ***(Figure A-2)***.

Summer crop producers were supported with ½ bag of 50 kg T-Super, ¼ bag of 50 kg Potash and 1 bag of 50 kg Urea (Nitrogen) on an acre basis.

c) Roughing

The project recommended the rice producing farmers to conduct 3 times of roughing during the process of production. However, there is only a small portion of farmers who conducted 2 to 3 times roughing. 94% of farmers (364 out of 368) conducted only single roughing or no roughing during the summer crop production ***(Figure A-3)***.

Roughing is recommended to conduct 3 times – first time in Maximum Tillering Stage, second time in Panicle Initiation Stage and third Time in Ripening Stage.

In overviewing the technical adoption, only a small portion of farmers conducted 2-3 times roughing during the course of production. And there is no farmer who broadcasted the seed at the stage of plantation conducted the fulltime roughing. In comparing between farms with different plantation techniques, farmers who used the seeders are more practicing in full time roughing (2-3 times) than the other farmers. 5% (8 out of 169) of hand transplanted farmers and 10% (14 out of 135) of seeder-used farmers conducted 2-3 times roughing ***(Figure A-4)***.

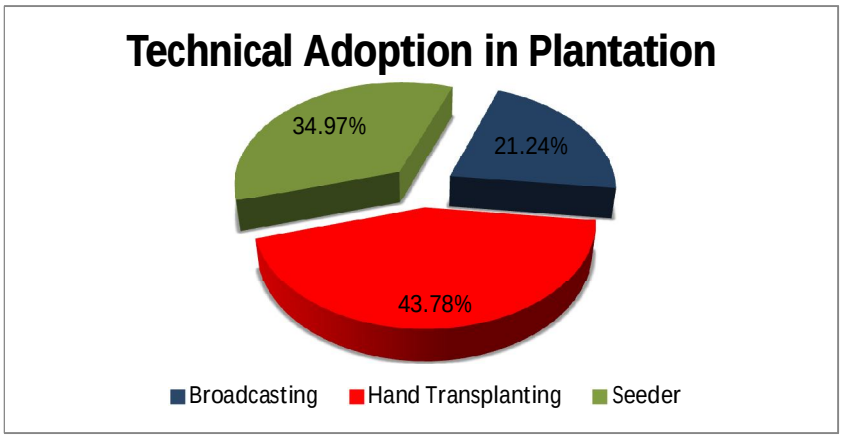

Figure A-1: Technical Adoption in Plantation

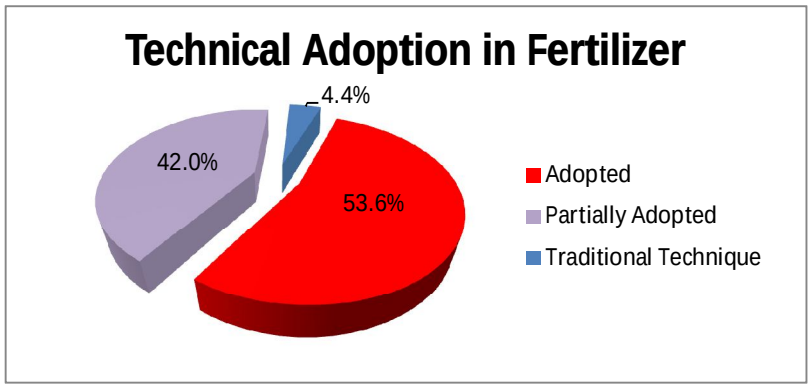

Figure A-2: Technical Adoption in Fertilizer Application

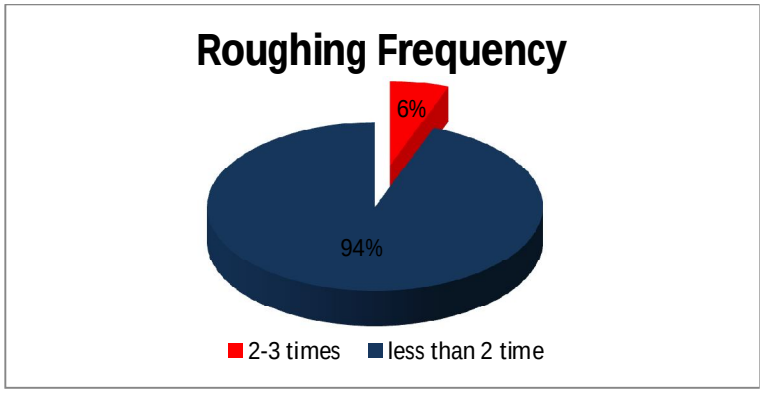

Figure A-3: Roughing adopted by Farmers

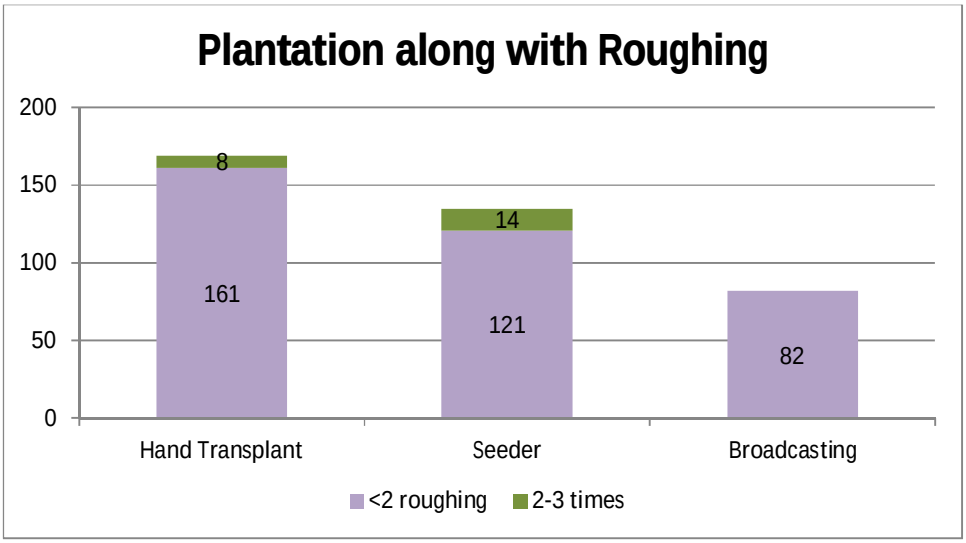

Figure A-4: Roughing frequencies based on Plantation Technique Adopted

III. Cost per Acre

The average cost per acre of summer crop production varies according to different technical adoption. There are overall 18 categories of technical adoption based on three techniques focused by the project: Plantation, Fertilization and Roughing. Among 18 categories, there is no respondent farmer in 5 specific categories ***(Table A-1)*** and ***(Figure A-6)***.

Total cost of production for project farms are calculated including the value of in-kind support (seed and fertilizers) from the project.

As long as the technical adoption was different, the average total cost per acre comes to be different. The highest average cost is 146,480 kyat per acre where hand transplanted and fertilizer application techniques are fully adopted. The lowest average cost is 100,929 kyat per acre where the seeds were broadcasted and fertilizers were fed according to traditional methods. However, both of the highest and lowest costs didn't follow full-time roughing (2 to 3 times).

Apart from the costs' ranking, there is no farmer who conducted full-time roughing in broadcasted farms and even in hand-transplanted but with fertilizers applied traditionally. In addition, the average costs of hand-transplanted farms with full-time roughing are lower than those with no roughing (or less than 1 time) which is not reasonable. Therefore the technical adoption in roughing is neglected for comparing average total cost of the production.

Comparing Project Farms and Self-Producing Farms

Average cost of production per acre in farmers' self-producing farm is 115,936 kyat. This calculation was made without consideration on techniques adopted. In comparing among different average costs, those of broadcasted farms from project farmers cost 104,668 kyat per acre which is below the average cost of self-producing. And the main plantation techniques adopted – hand transplanted farms and seeder-used farms cost over the average cost of self-producing 135,404 kyat per acre and 132,983 kyat per acre respectively ***(FigureA-5)***. Based on these average costs, hand-transplanted farms have to cost 16% more and seeder-used farms have to cost 14% more than farmers' self-production.

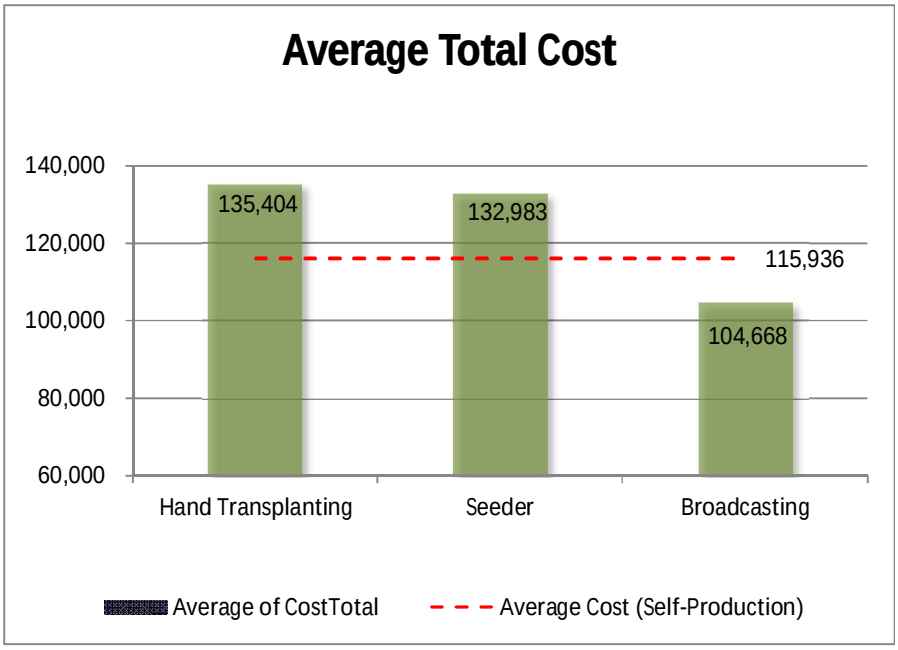

Figure A-5: Comparing Average Total Costs (Plantation Techniques)

Table A-1: Comparing Average Total Cost per Acre (Different Technical Adoption)

Sr	Plantation Technique	Fertilizer Application Technique	Roughing (2-3 times)	Average Cost per acre (Kyat)	Remark
1	Hand Transplant	Fully Adopted	YES	105,000	
2	Hand Transplant	Fully Adopted	NO	146,480	
3	Hand Transplant	Partially Adopted	YES	116,250	
4	Hand Transplant	Partially Adopted	NO	120,626	
5	Hand Transplant	Traditional	YES	N/A	
6	Hand Transplant	Traditional	NO	103,750	
7	Seeder	Fully Adopted	YES	130,556	
8	Seeder	Fully Adopted	NO	137,275	
9	Seeder	Partially Adopted	YES	133,750	
10	Seeder	Partially Adopted	NO	123,827	
11	Seeder	Traditional	YES	130,000	
12	Seeder	Traditional	NO	N/A	
13	Broadcasting	Fully Adopted	YES	N/A	
14	Broadcasting	Fully Adopted	NO	108,944	
15	Broadcasting	Partially Adopted	YES	N/A	
16	Broadcasting	Partially Adopted	NO	104,903	
17	Broadcasting	Traditional	YES	N/A	
18	Broadcasting	Traditional	NO	100,929	
*	**Average Total Cost per acre (Self-Producing)**			**115,936**	

N/A – there is no respondent for specific category

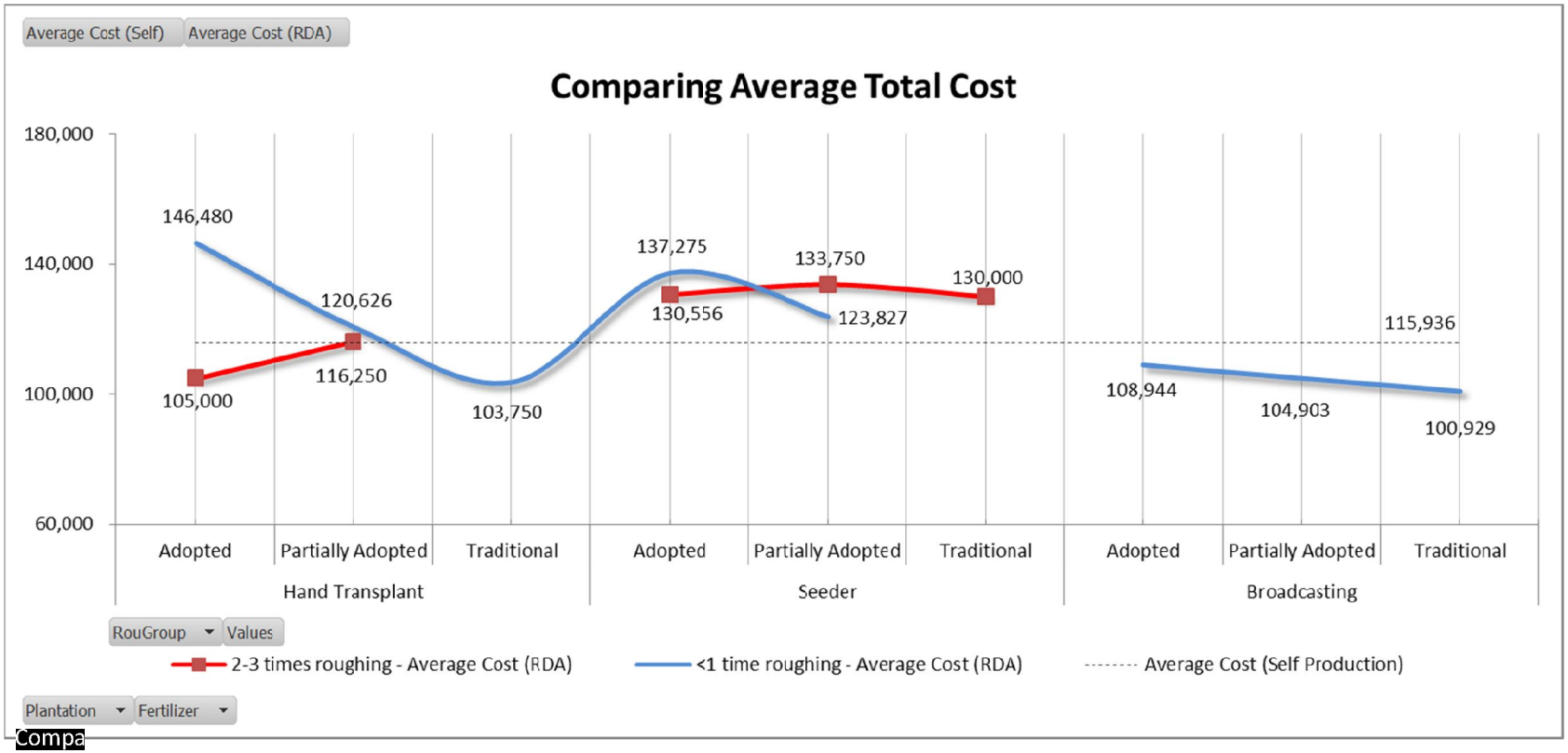

Figure A-6: Comparing Average Total Cost (Different Technical Adoption)

IV. Yielding (baskets per acre)

a. Average Yield per Acre (Summer Crop 2012)

In previous year (summer crop 2012), the maximum yield of *Thee-Htat-Yin* variety is 120 baskets per acre and minimal yield is 11 baskets per acre. The average yield of *Thee-Htat-Yin* is summer crop 2012 is 78 baskets per acre (Radanar Ayar, 2012)[5].

b. Average Yield per Acre (Farmers' Self-Production)

As the comparison yield to production with the project, the average yield of farmers' self-production in 2013 summer for *Thee-Htat-Yin* variety is 91 baskets per acre (120 baskets per acre for maximal yield and 50 baskets per acre as minimal yield). And the average yield in summer 2013 improved 17% more than that of 2012 summer.

c. Broadcasted Project Farms

The broadcasted project farms in summer 2013 yield 91 baskets per acre in average which is 17% of baskets more than summer 2012 production and same with farmers' self-producing farms.

Among the broadcasted farms of the project, the farms where fertilizer application techniques are fully adopted yield 92 baskets per acre in average. The farms treated with fertilizer traditionally and those by partially adopted techniques yield 91 baskets and 90 baskets per acre respectively ***(Figure A-7)***.

There is no available data for consideration on technical adoption of roughing (frequency of roughing) as there is no respondent farmer who broadcasted the seeds and followed by fulltime roughing (2 to 3 times of roughing).

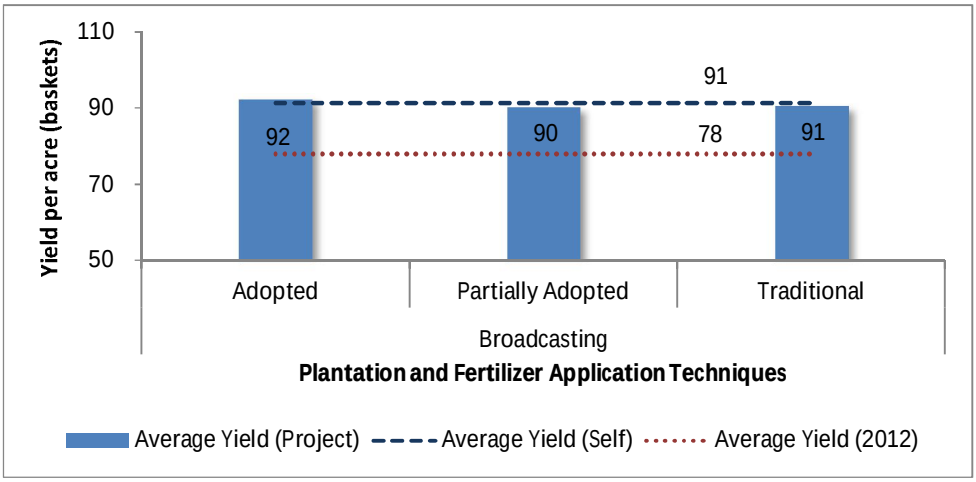

Figure A-7: Yield Comparison (Broadcasted Farms of Project)

[5] Radanar Ayar (2012), *Baseline Database of Radanar Ayar* (2012).

d. Seeder-Used Project Farms

Average yield of seeder-used project farms is 92 baskets per acre which is one basket more than farmers' self-production and 18% of baskets more than 2012 summer production. Among the seeder used farms, there are different average yields according to different technical adoption – fertilizer application techniques and frequency of roughing.

For not adopting fulltime roughing, seeder-used farms where fertilizer application technique was fully adopted yield 93 baskets per acre and those where fertilizer application was partially adopted yield 80 baskets per acre in average ***(Figure A-8)***. For adopting fulltime roughing, seeder-used farms where fertilizer application technique was fully adopted, partially adopted and not adopted yield 91 baskets, 96 baskets and 98 baskets per acre in average respectively ***(Figure A-9)***. This shows that adopting fertilizer application technique is important when there is no practice of fulltime roughing. However, if the fulltime roughing is being practiced, the yield becomes increase whatever the fertilizer application technique is.

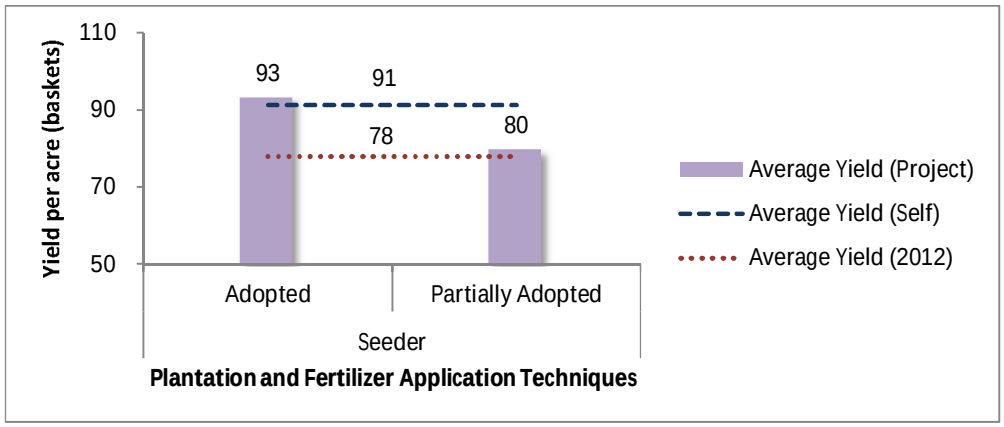

Figure A-8: Yield Comparison (Seeder-used and less than 2 time roughing)

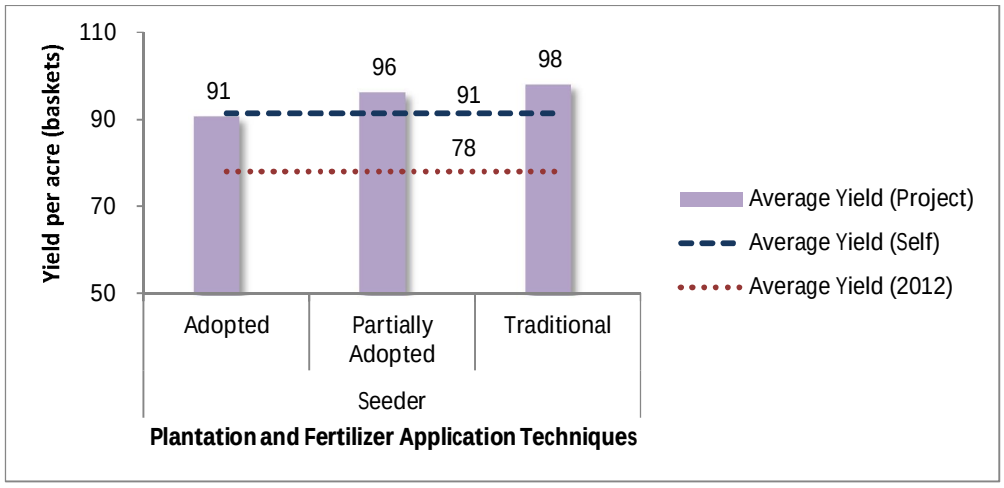

Figure A-9: Yield Comparison (Seeder-used and 2-3 times roughing)

e. Hand-Transplanted Project Farms

The average yield of hand transplanted project farms is 88 baskets per acre which is 3% less than average yield of self-producing farm and 13% more than average yield from 2012 summer production. The reason of reducing in average yield for hand-transplanted farms than self-producing is inappropriate proportion of farmers who adopted the supported techniques and those who do not adopted the techniques. According to the database for analyzing crop assessment, there are only 2% of total hand-transplanted farmers (4 out of 169) who adopted fulltime roughing and fertilizer application technique and another 2% who adopted fulltime roughing but partially adopted in fertilizer application technique.

For not adopting fulltime roughing, 86 baskets, 73 baskets and 100 baskets are average yields from farms where fertilizer application was adopted fully, partially and traditionally respectively ***(Figure A-10)***. For adopting fulltime roughing, 95 baskets and 88 baskets are average yields from farms where fertilizer application was adopted fully and partially respectively ***(Figure A-11)***.

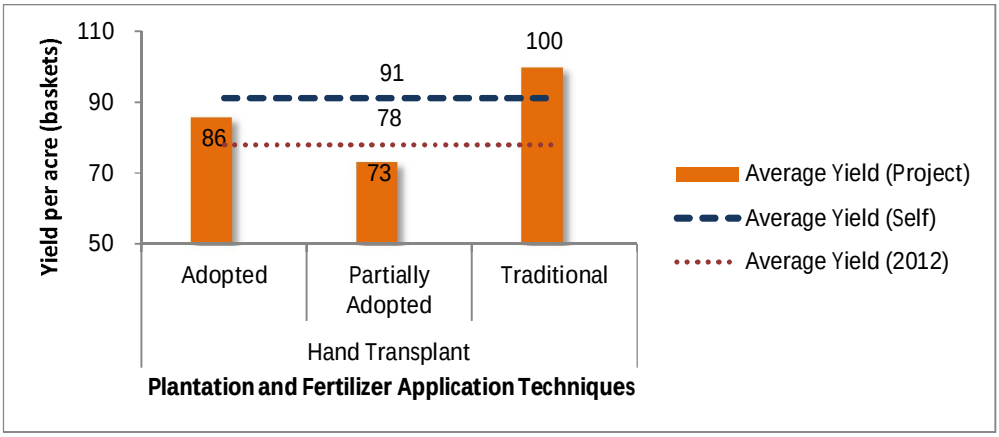

Figure A-10: Yield Comparison (Hand Transplanted and less than 2 time roughing)

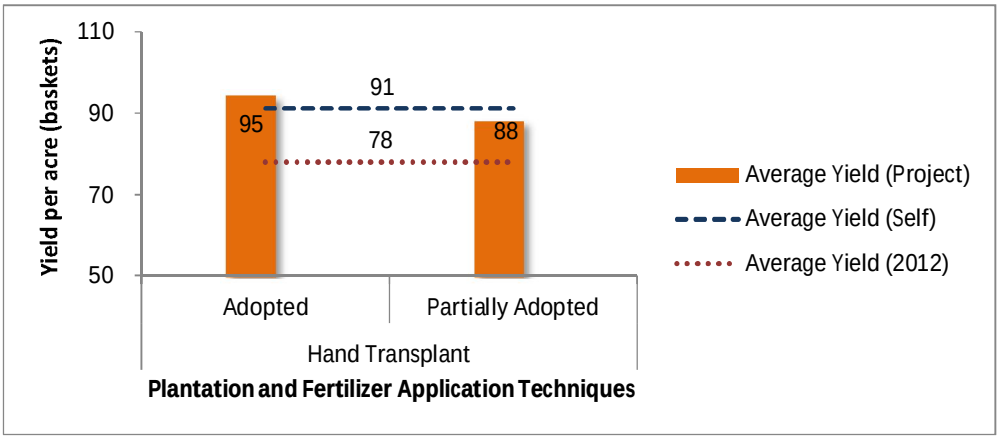

Figure A-11: Yield Comparison (Hand Transplanted and 2-3 times roughing)

f. Yield Summary

The different technical adoptions – plantation (hand transplant, seeder and broadcasting), fertilizer application (fully adopted, partially adopted and traditional) and roughing (fulltime roughing), make different yielding (the maximum yield is 120 baskets per acre). Although each of the specific technical aspects provides different results, there is always uncertainty to improve the yield unless all the techniques are fully adopted or practiced.

The strong evidences can be seen in sub-topic ***Seeder-used Project Farms*** that "adopting fertilizer application technique is important when there is no practice of fulltime roughing. However, if the fulltime roughing is being practiced, the yield becomes increase whatever the fertilizer application technique is".

Another point can be seen in ***Figure A-10*** that the average yields of hand-transplanted farms with fully and partially adopted fertilizer application technique even less than farms with traditional fertilizer application because fulltime roughing was not being adopted.

On the other hand, in ***Figure A-11***, acres of fulltime roughing but with partially adopted fertilizer application technique yield lower than those acres with fully adopted fertilizer application technique.

After excluding the variations on specific technical adoptions, the hand-transplanted farms where fertilizer application technique is fully adopted and fulltime roughing is practiced yielded 95 baskets per acre in average ***(Figure A-12)***. This average yield exceeds 4% more than that of self-production and 22% more than that from 2012 summer crop production.

Therefore, the specific technical adoption on different stages of production is critical for improving the yield. In addition, all the series of techniques should be adopted completely in order to have improvement certainly.

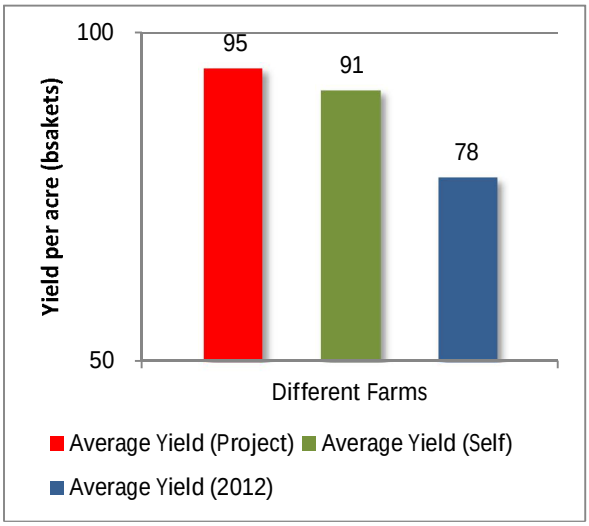

Figure A-12: Yield Comparison (Complete Technical Adoption)

V. Quality of the Product

In overviewing the improvement in quality of the crop produced in summer crop 2012, 49% of responded farmers (188 out of 386) improved in the quality of crop and 51% of responded farmers (198 out of 386) get the same quality as their self-producing crop ***(Figure A-13)***. The quality is standardized based on the value of farmers specified on the crop produced – purity situation (free from off-type seeds, free from inert materials and free from unfilled seeds), having good color and weight fullness compared to their ordinary products.

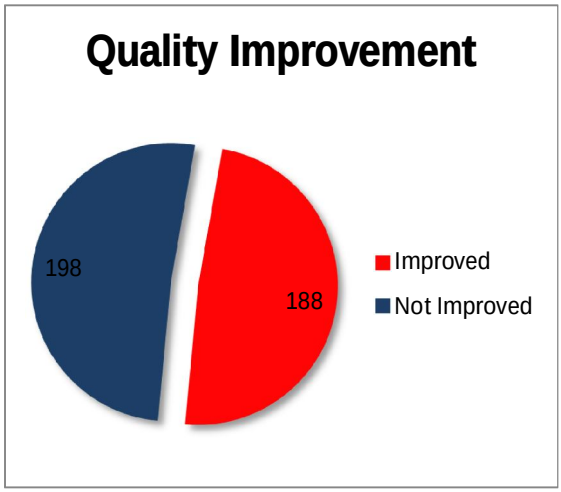

Figure A-13: Proportion of Farms with improved in quality and Farms the same in quality

The quality improvement situation can be seen from different technical adoptions too. According to ***Table A-2***, both of yield and quality improvements can be compared among different series of technical adoption.Amongst the series of technical adoption, there is no available data for 5 sets – 5, 12, 13, 15 and 17 ***(Table A-2)***. Again in set 1, 3, 6, 7, 9, 11, 14 and 18, the number of respondents does not exist even 5% of the total respondents (19 farmers). For the rest sets of technical adoption (set 2, 4, 8, 10 and 16), the quality is improved in over 10% of the farms except in set 16 (broadcasted, fertilizer application technique was partially adopted and no fulltime roughing was adopted). Then the yield is improved in over 10% of the farms except in set 4 (hand transplanted, partially adopted fertilizer application and no fulltime roughing).

In set 2 and 8, hand transplanted and seeder used farms where fertilizer application technique is fully adopted, 84% and 67% of the farms improved in quality respectively and 33% and 55% of the farms improved in yield respectively.

Characteristics of Quality Rice Crop

For the production of quality rice crop, project provided certified-seeds (CS) to the farmers. The characteristics of quality rice crop are mainly defined in terms of weight, color and purity. Among the respondents, 42% of farmers (161 out of 386) described their crop in quality in terms of weight-fullness. 35% of farmers (135 out of 386) defined their quality of crop is improved as purified. 31% of farmers (119 out of 386) said the crop they produced by the project support have good color and appearance, and then they assumes that the quality is improved than the crops from self-production.

Table A-2: Improvement Percentage (Quality and Yield) according to Technical Adoption

Sr	Planta-tion	Fertili-zer	Rough-ing	No. of Acres	Quality Improved Acres	Quality Improved %	Yield Improved Acres	Yield Improved %
1	HT	Ad	YES	4	3	**75**	2	**50**
2	HT	Ad	NO	101	85	**84**	33	**33**
3	HT	Pa	YES	4	3	**75**	1	**25**
4	HT	Pa	NO	58	9	**16**	5	**9**
5	HT	Tr	YES	N/A	N/A	**N/A**	N/A	**N/A**
6	HT	Tr	NO	2	0	**-**	2	**100**
7	Sd	Ad	YES	9	6	**67**	4	**44**
8	Sd	Ad	NO	84	56	**67**	46	**55**
9	Sd	Pa	YES	4	3	**75**	2	**50**
10	Sd	Pa	NO	37	12	**32**	5	**14**
11	Sd	Tr	YES	1	1	**100**	1	**100**
12	Sd	Tr	NO	N/A	N/A	**N/A**	N/A	**N/A**
13	Bc	Ad	YES	N/A	N/A	**N/A**	N/A	**N/A**
14	Bc	Ad	NO	9	7	**78**	3	**33**
15	Bc	Pa	YES	N/A	N/A	**N/A**	N/A	**N/A**
16	Bc	Pa	NO	59	3	**5**	21	**36**
17	Bc	Tr	YES	N/A	N/A	**N/A**	N/A	**N/A**
18	Bc	Tr	NO	14	0	**-**	10	**71**

N/A – there is no respondent for specific category

HT = Hand Transplant, Sd = Seeder, Bc = Broadcasting
Ad = Fully Adopted, Pa = Partially Adopted, Tr = Traditional

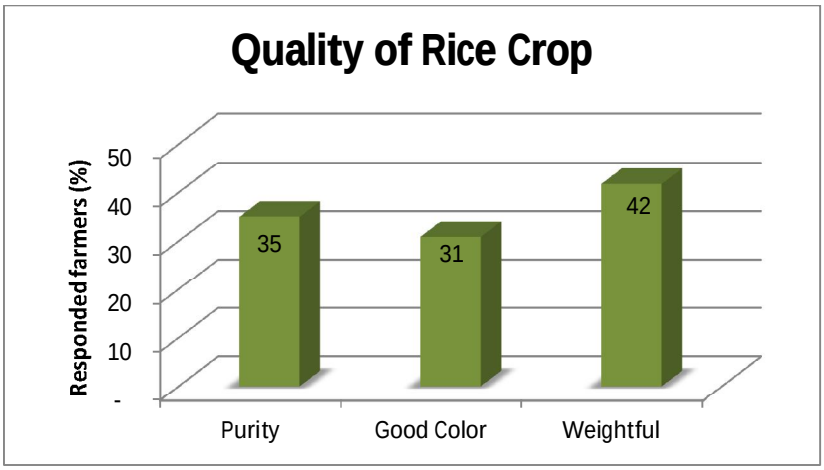

Figure A-14: Quality Defined by Farmers on Quality of Rice Crop

VI. Price Gained (kyat per basket)

The maximum price gained among the farmers produced in 2013 summer crop (*Thee-Htat-Yin Variety*) is 6,000 kyat per basket and the price was gained only by two farmers from Thit Hpyu Chaung and Kwin Waing Villages. The lowest price is 2,900 kyat per basket and that was gained by a farmer from Kaing Taw (East) Village.

Among the 386 responded farmers, 1% of them (4 farmers) got the price between 5,000 and 6,000 kyat per basket (the highest prices) and another 1% got the price between 2,900 and 3,000 kyat (the lowest prices). There are 19% of total respondent (72 out of 386) gained the price between 4,001 and 4,500 kyat per basket while 36% of total respondent (138 out of 386) could sell their crop between 3,001 and 3,500 kyat per basket. The major portion of the farmers – 44% (170 farmers) of 386 respondents, could sell their crop between 3,501 and 4,000 kyat per basket ***(Figure A-15)***. Overall average price for *Thee-Htat-Yin* variety in 2013 summer crop production is 3,675 kyat per basket.

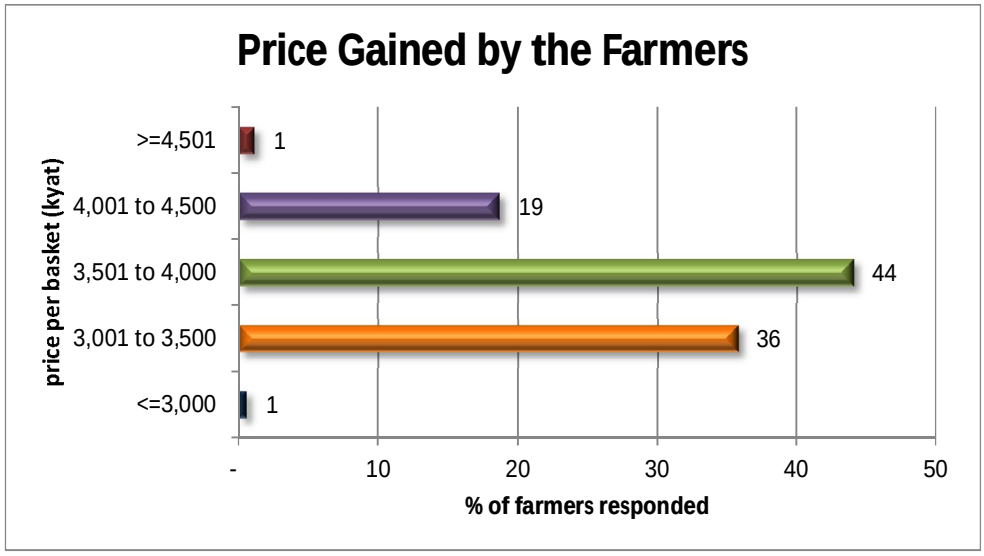

Figure A-15: Price per basket of Thee-Htat-Yin

Prices according to Technical Adoptions

The average prices of crops produced from farm where the fertilizer application technique was fully adopted are higher than those of crops from other farms – partially adopted or fertilizer was feed traditionally. Based on a basket of *Thee-Htat-Yin*, 3,808 kyat, 3,649 kyat and 3,867 kyat are average prices per basket for hand transplanted, seeder-used and broadcasted farms respectively ***(Figure A-16)***.

The average prices of crops produced from from where the fertilizer application technique was partially adopted are 3,616 kyat, 3,627 kyat and 3,566 kyat per basket for hand transplanted, seeder-used and broadcasted farms respectively.

From the farm where fertilizers were fed traditionally, the average price of crop produced by hand trandplantation is 3,650 kyat per basket, that of crop by seeder is 3,400 kyat per basket and that of broadcasting is 3,614 kyat per basket.

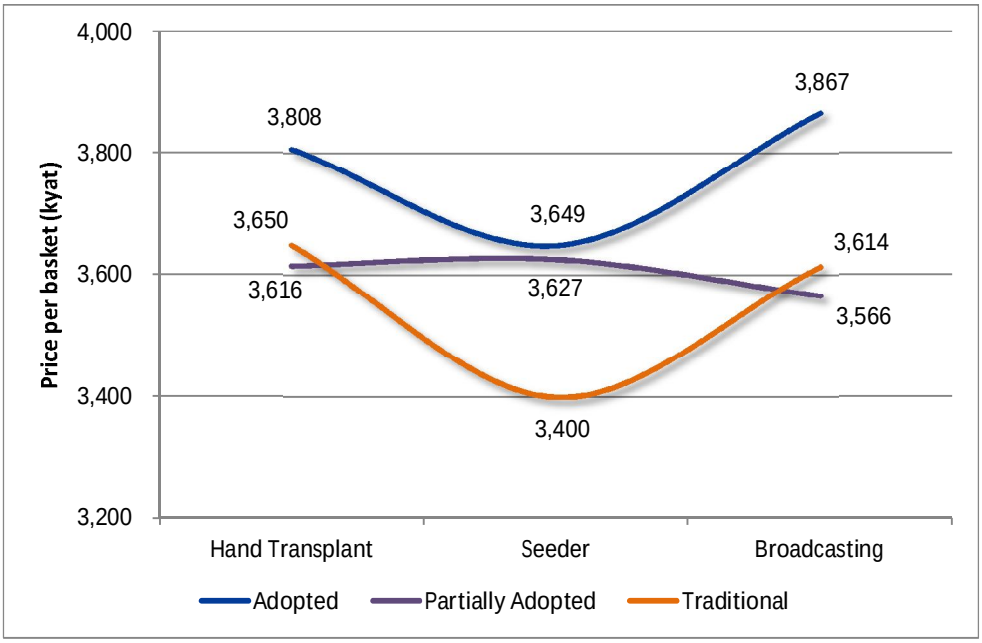

Figure A-16: Average crop prices according to different technical adoption

Benefit-to-Cost Ratio (BCR)

Analysing Benefit-to-Cost Ratio is a way of evaluating that estimates the value of activities to determine whether those activities are worth to undertake. The advantage is its simplicity – it is easy to understand (O'Farrell, 2013)[6]. BCR provides the knowledge in analysing the relative profitability rather than the whole income or net-income alone.

It is calculated on all of the benefits came out by the product in proportion to all of the costs along the course of production. Therefore, the calculation is made by dividing net-income by total cost of production (all the possible costs including seed, land preparation, fertilizer, labor, processing, roughing and harvesting). The net-income is obtained by substracting total cost of production from total income which is

Definition of 'Benefit Cost Ratio - BCR'

It is a ratio attempting to identify the relationship between the cost and benefits of a proposed project. Benefit cost ratios are most often used in corporate finance to detail the relationship between possible benefits and costs, both quantitative and qualitative, of undertaking new projects or replacing old ones.

Investopedia. (2013) Definition of 'Benefit Cost Ratio – BCR', [Online], Available: http://www.investopedia.com/terms/b/bcr.asp [2013].

[6] O'Farrell, Renee. (2013) Advantages and disadvantages of cost benefit analysis. [Online], Available: http://smallbusiness.chron.com/advantages-disadvantages-cost-benefit-analysis-10676.html [2013].

attained by multiplying yield (baskets produced) and price gained (kyat per basket).The more value in result as BCR, the more profitable and worthy the business or the production is.

According to sets of technical adoption on plantation, fertilizer application and roughing, different BCRs can bee seen. Under fulltime roughing techniques, hand transplanted practices make more BCR value than seeder using practices whatever the fertilizer application is adopted or not ***(Figure A-17)***. 2.12 for hand transplantation and fertilizer application technique shows that the adoption of these practices provide the benefits at 2.12 times on the cost invested. And that drops to 1.66 while fertilizer application technique was partially adopted. For seeder used production, the BCR value are not much different among fully adopted, partially adopted and traditional fertilizer application – 1.46, 1.45 and 1.56 respectively.

$$BCR = \frac{(Yield \times Price) - Total\ Cost}{Total\ Cost}$$

Under no roughing technique (or one time roughing), broadcasting and fertilizer adoption provide more BCR value than the other plantation techniques. And hand transplantation shows less BCR value than the other plantation techniques except in production with traditional fertilizer application technique ***(Figure A-18)***. This is another evidence to prove the "Yield Summary" on page 17 that the complete series of technical adoption is required in improving the agricultural production.

In order raise the BCR value (apart from improving the yield);the cost of production should be minimized (less amount in using seed and fertilizer) and the roughing should be emphasized (to improve the quality of crop and get more price and income).

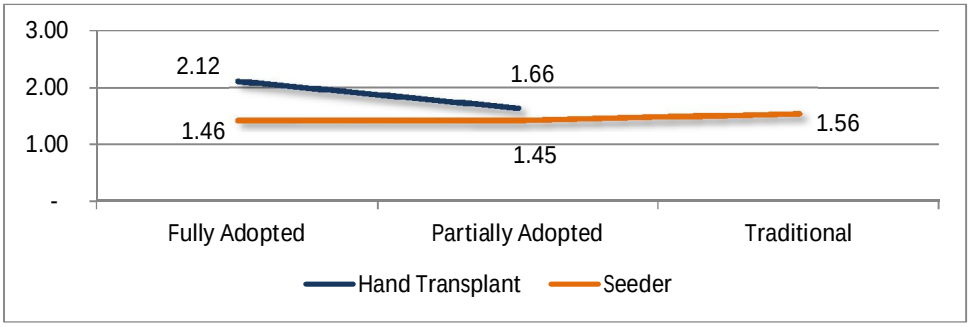

Figure A-17: BCR in different technical adoption (Fulltime Roughing)

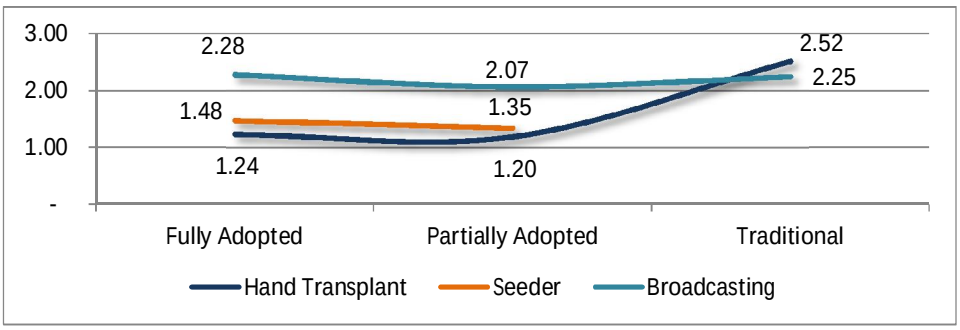

Figure A-18: BCR in different technical adoption (less than 2 roughing)

Systematic Hand Transplantation
Photo Credit: Radanar Ayar

B. FINDINGS (NON-PRODUCTION)

Apart from crop production together with technical adoption, costs of production, prices of crop produced, net-incomes and BCR, there are two portions in related to it – farming tools service provision which supports the fluency of crop production and assessing the level of social investment after production.

I. Farming Tools and Service Usage

The project provides farming tools – reaper, thresher, flat-bed dryer, seeder, sprayer and air-tight bags to farmer pools (FP). And individual farmer can access those tools under management of farmer pools ***(Table B-1)***[7].

Farmer Pools are organized with 7 to 10 members of farmers in each of 42 target villages. They are representatives to farmers and to village too.

Table B-1: Farming Tools supported to Farmer Pools

Sr.	Farming Tools	Number Supported	Type of Support
1	Reaper (for Stubble)	1	One time support to FP. Farmers can borrow from FP
2	Reaper (for Harvesting)	2	Seasonally hire to FP. Farmers can borrow or a farmer can contract for a season.
3	Thresher	18	One time support to FP. Farmers can borrow or a farmer can contract for a season.
4	Flat-bed Dryer	5	Installed in 5 villages.***Compost can also be made in these ponds***. Farmers can use under management of farmer pools.
5	Seeder	25	One time support to FP. Farmers can borrow from FP.
6	Sprayer	50	One time support to FP. Farmers can borrow from FP.
7	Air-tight Bags	1,000	One time support to crop production farmers.

Most of the farming tools (except air-tight bags) are provided to farmer pools and they manage for the service provision to individual farmers. From the provided services,

[7] Data source: Project Database and Documents of Radanar Ayar

farmer pools raise their development fund seasonally. The charges for the services are at the lowest price as possible or the same as ordinary purposes.

Among 386 respondents to this assessment, not all farmers received those services because the farming tools are relatively insufficient to number of acres cultivated and harvested. With the exception for air-tight bags (100% - 386 farmers received the bags), there are different percentages of farmers receiving the services of farming tools ***(Figure B-1)***. Only 3% of respondents (11 out of 386) have access to harvester and 5% of respondents (20 out of 386) have access to thresher or dryer/compost pond.For sprayer, 13% of farmers (52 out of 386) could use the sprayer. For summer cropping season 2013, seeders were used by 32% of respondents (124 out of 386).

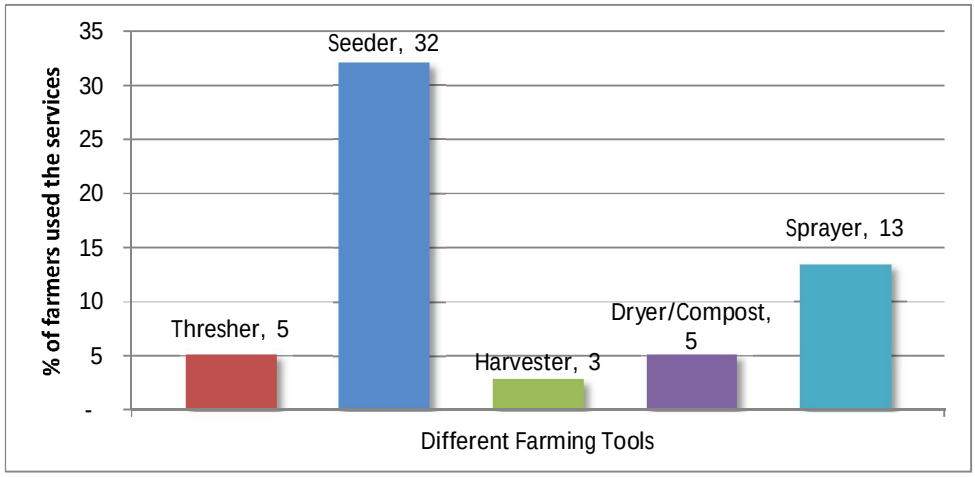

Figure B-1: Accessibility to Farming Tools by Farmers

II. Social Investment

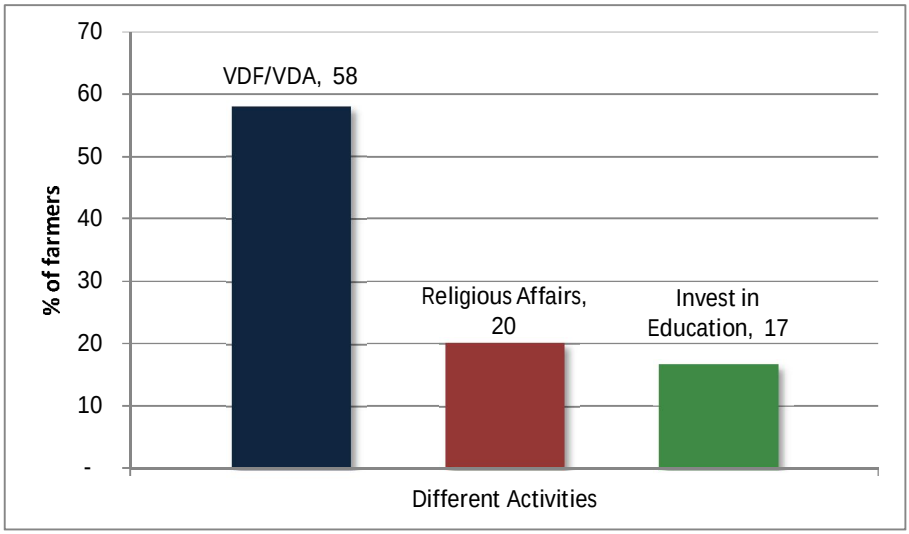

Figure B-2: Investment in Different Social Activities

Social Investment

Although measuring or finding out the achievements in production or net-income could be numerical, that of social investment is difficult to be formulated. Normally, the members of farming community use their incomes for paying-back their debts and making investments to their farms seasonally. The SEED project assumes that the farmers become able to invest more in social sector apart from production process once they earn more income due to improved farming practices.

VDF is a fund managed by farmer pools. It is raised by collecting an agreed and specified percentage on the total amount calculated on in-kind supports to each farmer. The percentages are different from village to village (briefly 20% to 50%).

By the project (Radanar Ayar, 2013)[8], the investment in social sector is defined by 3 different activities – contribution in village development affairs, religious affairs and investment in children's education. Village development affairs (VDA) include contribution to village development fund (VDF) and other development associated affairs such as building or repairing the village bridge.

From 386 respondents, 58% (224 farmers) of them contributed to village development affairs (including VDF). 20% respondents (78 out of 386) used their income spread to religious affairs or related activities. And 17% farmers (64 out of 386) invested their money also in their children's education.

The results on analyzing social investment doesn't mean they only use their income in described activities or the major costs in daily life. Instead, this simply wants to know how they see and prioritize their out of routine activities especially on non-business sector.

[8] Radanar Ayar (2013), *Radanar Ayar's Database for Annual Review 2012*

Paddies waiting to be threshed
Photo Credit: Radanar Ayar

C. CONCLUSION

The crop analysis on 2013 summer crop production was conducted focusing at the improvement of yield, quality and net-income along with the cost based on technical adoptions provided by the project. The variety of the project production in this season and the whole analysis is on *"Thee-Htat-Yin"* because it is the major variety that the farmers used as summer crop production.

Generally, the farmers have limitations to adopt all the series of techniques for better farming because of adverse weather, skilled-labor shortage and the nature of crop season (such as hand transplantation is difficult to be adopted in summer season due to difficulties to control water). Thus, the technical focus in this analysis has to sit in different sets – plantation (hand transplant, seeder or broadcasting), fertilizer application (fully adopted the proper technique, partially adopted the proper technique or traditionally applied) and roughing (practicing fulltime roughing or not).

Altogether 386 project farmers participated in this assessment and only 44% (169 farmers) of them used hand transplantation method. 54% (207 farmers) of the respondents adopted the fertilizer application techniques exactly what the project provided. However, in roughing, only 6% (4 farmers) of respondents adopted the technique. Although the project mainly drives for hand transplanting, there are some barriers for adoption it in plantation ***(See Exhibit 1)***.

According to different technical adoption, the total cost of production becomes varied. Average total cost per acre of a hand-transplanted farm is 135,404 kyat and it exceeds that of self-producing farm (115,936 kyat per acre in average). And roughing is not a representing point to decide the average total cost.

The improvements in yield and quality also depend on the different technical adoption. For seeder-used farms, roughing is important for yield improvement. Though, for hand-transplanted farms, the complete series of technical adoption is required to improve the yield. Both for hand transplanted and seeder used farms with either fully or partially adopted fertilizer application technique improves the quality of the crop in over 10% of the farms. And the quality is improved in terms of "weight-fullness" defined by 42% of respondents.

An interesting point is that there are improvements of yield in both project farms and self-producing farms compared to the past year (summer 2012). The average yield from self-producing farms (2013 summer) even more 17% of yield (13 baskets) than in 2012. The reason is possibility of quality seeds usage by the farmers ***(See Exhibit 2)*** and the technical adoption (hand transplanting, fertilizer application, roughing and post-harvest management) are extended to other acres (non-project supported acres of the project farmers).

The range of prices for baskets of crop produced varies between 2,900 to 6,000 kyat and the major portion of farmers (44% or 170 farmers) got the price between 3,501 and 4,000 kyat per basket. The range of prices collected are of farmers getting for their paddies in actual trading and exclude considering on comparing of different factors – market price, paddy demand and seasonal factors.

In reviewing BCR (Benefits-to-Cost Ratio), seeder-used and hand-transplanted productions have less BCR value than the broadcasting. This is because of the undifferentiated price gained (market system related to proper pricing is weak) among the products originated from different technical adoption.

In summarizing, the techniques for improving yield and quality of the crop consume more investment and commitments than ordinary farming practices. However, the return on investment is higher and it is essential to keep good practices for long-term profitability (not for a single season).

Exhibit 1: **Main Barriers for Hand Transplantation**

Hand Transplantation is one of the good practices for improving agricultural production and there are some barriers in adopting the technique.

1) **Labor shortage:** As summer crop is started in January (as latest), it is very closed the seasonal ending of monsoon crop (November and December) when the labor demand is highest for monsoon season post-harvest period.
2) **Difficult water control:** Water controlling is difficult in summer season (difficult to have water in farm), therefore, seedbed preparation and hand transplantation is difficult to be adopted.

Seeders as second and suitable option: Seeder is another option for plantation and it is suitable also for summer crop production (with less water in the farm).

Baseline Report of Radanar Ayar - 2012

Exhibit 2: **Renewing the Generation of *Thee-Htat-Yin***

Thee-Htat-Yin was started to use as summer crop variety since 1993 enforced by the Government of Myanmar and the replication to many years after that (till 2008) had made degradation in quality. Due to *Nargis* Cyclone incidence in 2008, the variety *Thee-Htat-Yin* was totally lost in generation and therefore, Myanmar Rice Industry Association (MRIA) – Bogalay (later changed to MRF – Myanmar Rice Federation) effort to trade the quality seeds of *Thee-Htat-Yin* variety between available sources (the Government Seed Farms) and the farmers in 2010. After that, the farmers of summer crop production had access to renew the seed generation of *Thee-Htat-Yin* and its yield became improved than the other varieties.

U Thein Aung (Chairman of Myanmar Rice Federation) - Bogalay

D. RECOMMENDATION

For Crop Producers

The farmers should rely on and adopt the techniques provided by the project especially for long-term production improvement. The farmers should have proper farming records including the costs on each stage of production.

Farmers should process (harvesting, threshing, drying and packaging) and sell the quality crops separately those from ordinary production in order to get proper demarcated prices. Farmers should cooperate with farmer pools for better trading (including pricing) of their products.

For Farmer Pools

Farmer pools should monitor deeply in technical aspects those the farmers are going to be practiced.Farmer pools should collaborate in finding out the ways to solve the issues for adopting good practices.Farmer pools should create the channels for multiplying agricultural good practices among the farmers.

Farmer pools should practice collaborative working and trading on behalf of farmers so that it will provide two benefits: 1) farmer pools will become more institutionalized groups representing the farming community and 2) the benefit of individual farmer can be increased through cooperative production and trading.

For the Project

The project should emphasize on providing selected technical aspects rather than focusing on the wider range. And the project should encourage the farmers to change towards good practices consistently. Then, regular monitoring should be focused on technical adoption of the farmers in each and every step.

The project should be contingent on the strength of farmer pools for imposing the farmers to adopt new techniques. Another or additional tool may be modeling successive peers among farmers. Therefore, the most significant changes and achievements should be tracked regularly and applied as lesson learns.

Progress monitoring and reporting on crop production at proper intervals (quarterly or each section of a cropping season) should be carried out in order to know the situation of technical adoption and different results.

Farm harvested by Project Supported Harvester
Photo Credit: Radanar Ayar

Project Supported Thresher in the Field
Photo Credit: Radanar Ayar

ANNEX 1: PARTICIPATED VILLAGES LIST

Participated Villages in Summer Crop Assessment

Sr	Tract	Village	PCode	Agro-Eco Zone	Male	Female	Total
1	Aye Ywar	Pay Chaung	150596	Fresh	8		8
2	Aye Ywar	Ma Gyi Chaung	150593	Fresh	4		4
3	Boe Di Kwe	Kun Thee Chaung	150865	Fresh	12	3	15
4	Boe Di Kwe	La Ba Ta Pin	150870	Fresh	13		13
5	Boe Yaung	Boe Yaung	150910	Fresh	15		15
6	Boe Yaung	Kyon Kha Yaing	150915	Fresh	16	2	18
7	Boe Yaung	Ah Kha	150913	Fresh	19	2	21
8	Hay Man	Leik Ka Bar	151914	Mixed	19	3	22
9	Hay Man	Ngwe Taung	151912	Mixed	13	1	14
10	Hay Man	Za Yat Hla	151909	Mixed	23	4	27
11	Hay Man	La Tar Chaung	151910	Mixed	18	1	19
12	Hay Man Nyi Naung	Hmaw Chaung	158692	Mixed	14		14
13	Hpa Yar Chaung	Kwin Waing	152281	Fresh	15	4	19
14	Ma Laut	Ka Na So Chaung	157191	Mixed	4	2	6
15	Ma Laut	Kaing Taw (East)	157190	Mixed	4		4
16	Ma Laut	Myit Tan	157189	Mixed	5		5
17	Ma Yae Ywar Thit	Shwe Bo Su	157343	Fresh	15		15
18	Ma Yae Ywar Thit	Thit Hpyu Chaung	157345	Fresh	10	2	12
19	Mya Thein Tan	Sin Kwin	157800	Fresh	6		6
20	Nyi Naung Wa	Nyi Naung Wa	158694	Fresh	2		2
21	Peik Sa Lat	Peik Sa Lat	150596	Fresh	5		5
22	Sa Pae Kone	Nga Pi Tone Hle	159703	Fresh	15	3	18
23	Tha Byu Kone	Kyaung Chaung	161517	Fresh	4	1	5
24	Tha Byu Kone	Yan Kin Su	161518	Fresh	3		3
25	Tha Byu Kone	Kyun Ka Lay	161516	Fresh	3	1	4
26	Tha Kan Wa	Kyon Hpar	161572	Fresh	15	3	18
27	Thar Paung	Gyat Chaung	162119	Fresh	6		6
28	Thit Hpyu Chaung	Kan Su	162614	Fresh	12	1	13
29	Thit Hpyu Chaung	Tha Gyi Ah Su	162618	Fresh	6	1	7
30	Thit Hpyu Chaung	Ku Lar Gyi Chaung	162615	Fresh	24		24
31	Thit Hpyu Chaung	Da None Chaung	162624	Fresh	18	6	24
	Total	**31**			**346**	**40**	**386**

ANNEX II:QUESTIONNAIRE OF CROP ASSESSMENT

(Myanmar Version)

၂၀၁၂-၂၀၁၃ ခုနှစ် နွေစပါးစိုက်ပျိုးမှု အကဲဖြတ်မှတ်တမ်း

ကျေးရွာအုပ်စု- ကျေးရွာ- အမည်-

တစ်ခက အထွက်နှုန်း	တင်း/ဧက(ရတနာဧရာ)	တင်း/ဧက(ကိုယ်ပိုင်)
အရည်အသွေး တိုးတက်မှု (ရတနာဧရာ)	ရှိ ◻ ၊ မရှိ ◻ ၊ တူညီ ◻	
	အလေးချိန် ◻ ၊ အရောင် ◻ ၊ သန့်စင်မှု ◻ ◻	
ဝင်ငွေတိုးတက်လာမှု	တစ်တင်းဈေးနှုန်း (ရတနာဧရာ)	တစ်တင်းဈေးနှုန်း (ကိုယ်ပိုင်)
အသုံးစရိတ်လျော့ချနိုင်မှု	တစ်ဧကကုန်ကျစရိတ်(ရတနာဧရာ)	တစ်ဧကကုန်ကျစရိတ်(ကိုယ်ပိုင်)
လှုပ်ရှားလုပ်ငန်းများတွင် ပိုမိုပူးပေါင်းပါဝင်နိုင်မှု	ကျေးရွာရန်ပုံငွေ ထည့်ဝင်နိုင်မှု ◻	ဘာသာရေး အလှူအတန်း များတွင် ပါဝင်နိုင်မှု ◻
	ကျေးရွာဖွံ့ဖြိုးရေးလုပ်ငန်း များတွင် ပါဝင်နိုင်မှု ◻	ပညာရေးအတွက် ပိုမို သုံးစွဲလာနိုင်သည် ◻
ရတနာဧရာမှ ပံ့ပိုး ပစ္စည်းများသုံးစွဲရရှိမှု	မြေဩဇာ ◻	မျိုးစေ့ချက်ရိယာ ◻
	ဂိုက်သိမ်းစက် ◻	ဆေးဖျန်းပုံး ◻
	ဘက်စုံသုံးအခြောက်ခံစက် ◻	မြေဆွေးကန်အသုံးပြုခြင်း ◻
	လေလုံအိတ် ◻	

နည်းပညာများ လိုက်နာကျင့်သုံးမှု	
စိုက်ပျိုးနည်းစနစ်	လက်စိုက်စနစ် ◻ ၊ မျိုးစေ့ချက်ရိယာ ◻ ၊ ကြဲပက်စနစ် ◻
မြေဩဇာ အသုံးပြုခြင်း	မိမိဖလာနည်းအတိုင်းသုံးသည် ◻ ၊ ရတနာဧရာဏ်နည်းစနစ်အတိုင်း (အတိအကျ လိုက်နာသည်) ◻ ၊ ရတနာဧရာဏ်နည်းစနစ်အတိုင်း (အတိအကျ မလိုက်နာ) ◻
မျိုးကွဲဖယ်ခြင်း	( ) အကြိမ်
သိုလှောင်ခြင်း	မိမိဖလာနည်းခြင်းသိုလှောင်သည် ◻ ၊ လေလုံအိတ်အသုံးပြုသည် ◻ ၊ မသိုလှောင်ပါ ◻

မြေဆိုမှုကို အထူးကျေးဇူးတင်ရှိပါသည်။

(English Version)

2012-2013 Summer Crop Assessment

Village Tract **Village** **Name of Farmer**

Yield per Acre	Baskets (Project)		Baskets (Self)	
Quality Improvement	YES ☐	NO ☐	SAME ☐	
	by Weight ☐	by Color ☐	by Purity ☐	
Income Calculation	Price per basket (Project)		Price per basket (Self)	
Farming Cost	Cost per acre (Project)		Cost per acre (Self)	
Social Involvement	Contribution in VDF	Donation in Religious Affairs	Involvement in Village Development	Investment in Children's Education
Farming Tools from Project	Thresher	Seeder	Reaper	Sprayer
	Dryer	Compost	Air-tight Bag	

Technical Adoption

Plantation	Hand Transplant ☐	Seeder ☐	Broadcasting ☐
Fertilizer Application Technique	Traditionally ☐	Fully Adopted ☐	Partially Adopted ☐
Roughing	☐ times		
Storage	Traditionally ☐	Use Air-tight Bags ☐	Not Stored ☐

Thanks for answering!

ANNEX III: FERTILIZER APPLICATION TECHNIQUE

Fertilizer Application Technique for Summer Crop Production 2013

Sr.	Stage/Timing	Potash	T-Super	Urea (Nitrogen)*	Compost**
1	Basal (or) Land Preparation	¼ bag of 50 kg	½ bag of 50 kg	X	5 to 6 bags of 50 kg (at least)
2	First Top Dressing (or) 10 days after transplanting	X	X	1/6 bag of 50 kg	X
3	Second Top Dressing (or) Before Maximum Tillering Stage	X	X	1/3 bag of 50 kg	X
4	Third Top Dressing (or) Early Panicle Initiation Stage	1/8 bag of 50 kg	X	1/6 bag of 50 kg	X
5	Fourth Top Dressing (or) At the beginning of Heading	X	X	1/3 bag of 50 kg	X

* Urea (Nitrogen) should be applied together with Potash.
** Compost is not recommended to use in swamp area.

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