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Rice Farmers Empowerment Using SRI (System of Rice Intensification)

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Abstract. Rice Farmers Empowerment Using SRI (System of Rice Intensification) was held in Namorambe and Cinta Rakyat Village involving two partners who work as rice farmers. The problems of Partners 1 in Namorambe Village are (a) number of seeds used 40-50 kg / ha, (b) seed age 20-25 days, (c) planting range 15x15 cm, (e) number of planting plants 4-5 seedlings (f) artificial fertilizer 400kg urea / ha + 150kg SP-36 / ha + 150kg KCl / ha, (g) watering elevation 20-25 cm. The problems of Partners 2 in Cinta Rakyat Village are (a) the remaining rice straw is not processed, (b) the haystack becomes the pest of rats and fungi, (c) the soil hardens and quickly dries, (d) the straw is burned. The program is implemented using participatory approach, training, extension method and descriptive approach method. Impact of empowerment at Partners 1 has been able to carry out the manufacture of paddy field plot of SRI method with production of 875 kg / 1000 m² (8.75 tons / ha); an increase in production of about 3.45 tons / ha or equivalent to 65.09%. Impact of empowerment at Partners 2 that has been able to produce organic fertilizer from the remaining straw; has been able to manage the remaining rice straw to prevent pests and diseases; not burn the rest of the straw; and able to utilize organic fertilizer to enrich the soil.

Keywords: organic fertilizer, paddy, SRI, system of rice intensification

Abstrak. *Pemberdayaan Petani Padi Sawah Dengan Metode SRI (System of Rice Intensification). dilakukan di Desa Namorambe dan Desa Cinta Rakyat dengan melibatkan dua mitra yang berprofesi sebagai petani padi sawah. Permasalahan Mitra 1 di Desa Namorambe yaitu (a) jumlah benih yang digunakan 40-50 kg/ha, (b) umur bibit 20-25 hari, (c) jarak tanam 15x15 cm, (e) jumlah tanaman perlobang tanam 4-5 bibit, (f) pengolahan tanah 2 kali, (g) pupuk buatan 400kg urea/ha + 150kg SP-36/ha + 150kg KCl/ha, (g) tinggi air 20-25 cm. Permasalahan Mitra 2 di Desa Cinta Rakyat yaitu (a) sisa jerami padi tidak diolah, (b) tumpukan jerami menjadi*

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sarang hama tikus dan fungi, (c) tanah mengeras dan cepat kering, (d) jerami dibakar. Program dilaksanakan menggunakan metode pendekatan partisipatif, metode pelatihan dan penyuluhan serta metode pendekatan deskriptif. Dampak pemberdayaan pada Mitra 1 yaitu telah mampu melaksanakan pembuatan demplot padi sawah metode SRI dengan produksi 875 kg/1000 m² (8,75 ton/ha); peningkatan produksi sekitar 3,45 ton/ha atau setara dengan 65,09%. Dampak pemberdayaan pada Mitra 2 yaitu telah mampu memproduksi pupuk organik dari sisa jerami; telah mampu mengelola sisa jerami padi untuk mencegah hama dan penyakit; tidak membakar sisa jerami; dan mampu memanfaatkan pupuk organik untuk menggemburkan tanah.

***Kata Kunci**: padi sawah; pupuk organik; SRI; system of rice intensification*

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1. Introduction

Namorambe District is one of the 22 sub-districts in Deli Serdang Regency. Geographically located at 20º 50 north latitude and 98º 50 east longitude with an altitude of 51-200 m above sea level. Administratively it borders Medan Johor District in the north, Sibolangit District in the south, Biru-Biru District, Deli Tua District in the east and Pancur Batu District in the west. This sub-district has an area of around 62.3 km² or 2.49% of the area of Deli Serdang district [1]. Namorambe District has 36 villages, of which 2 (two) villages are used as partner locations for community empowerment in The Science and Technology Program for The Community (IbM). Namorambe Village as the location of Mitra 1 and Cinta Rakyat Village as the location of Partner 2, each partner has 3 members.

Namorambe village has 190 ha of paddy fields or 15.26% of the total sub-district rice field area of 1,245 ha, an average production of 5.3 tons / ha and a total production of 695 tons contributes around 6.04% of the sub-district production of 10,768 tons with a population who work in this sector 480 people. Whereas Cinta Rakyat Village has 76 ha of paddy fields or 6.1% of the sub-district rice fields, an average production of 5.4 tons / ha with a total production of 406 tons contributing to the subdistrict rice production of 3.8% and the number of people working in this sector 390 souls. The production of the two villages is lower than the average production of Deli Serdang Regency 5.68 tons / ha [1] [2].

The results of interviews and discussions that have been conducted before, there are similarities in the social, cultural and economic fields between the two villages. In the

social field, kinship was established between the community when there were traditional ceremonies and repairs to irrigation carried out in mutual cooperation. In the field of culture, there is a habit of farming management systems with family management, where there is a division of labor between fathers, mothers and children. Father was involved in land processing work, pest and disease control and harvesting, while the mother did camouflage, planted, weeded, and the child helped the father and mother after school. In the economic field, the main occupation of the community is rice farmers, but because current production is no longer sufficient, the community has varied side jobs such as farm laborers, carpenters and selling.

Some of the problems faced by Partner 1 are : (1) aspects of production: rice cultivation techniques which include (a) the number of seeds used 40-50 kg / ha is still too much, (b) the age of seeds used is too old, 20-25 days , (c) the spacing used is 15x15 cm too tight, (d) the number of plants for planting holes is 4-5 seeds too much, (e) processing of land is done twice because of hard soil, (f) artificial fertilizer (factory) 400 kg urea / ha + 150 kg SP-36 / ha + 150 kg KCl / ha is still too much, (g) use of large amounts of water which is 20-25 cm high during the planting period; and (2) management aspects: (a) do not have planning, implementation, evaluation and (b) do not have bookkeeping to find out the profit and loss of the farming business owned. While Partner 2 has problems : (1) aspects of production: (a) the remaining rice straw and corn are stacked without being processed into compost, (b) haystacks become a nest of rat and fungi (fungi), (c) the soil hardens and dries quickly, (d) burning straw causes decomposing micro organisms to disappear; and (2) management aspects: (a) do not have planning, implementation, evaluation and (b) do not have bookkeeping to know the profit and loss of farming.

In general, the level of welfare of Mitra 1 and Mitra 2 farmers should increase because they have human and natural resources. The intended human resources are energy, intellectual skills or personality. Whereas natural resources possessed as natural components are; land, water, air, minerals, animals / livestock and plants / plants [3]. But in reality the economic conditions of farmers are still low. Some causes are (1) limited access to productive resources, capital, infrastructure, and technology, (2) lack of facilities and infrastructure, (3) government institutional capacity and socio-economic institutions are still limited, (4) lack of linkages between urban and rural economic activities [4].

The facts show that rice farming using the SRI (system of rice intensification) method in several regions has produced 8-9 tons / ha, so that it can be offered as a solution to

overcome partner problems. Some of the technological advantages applied to the SRI method: (1) the use of rice seeds 8-10 kg / ha lower than ordinary lowland rice, (2) less water use where the water level is only 3 cm and every 3 days is dried, so that lack of water can be overcome, (3) the use of artificial fertilizers (factories) is less because the rice straw produced can be used as organic fertilizer, (4) tillage can be done 1 (one) time because before processing the soil, first given organic fertilizer so that the soil loose and (5) can reduce rodent pests and diseases because composted rice straw can break the food chain [5][6][7][8].

Based on the description above, the problems of Partner 1 and Partner 2 can be overcome through the implementation of The Science and Technology Program for The Community which is implemented in the form of training activities, counseling and production of SRI (system of rice intensification) rice field demonstration plot.

2. Methods

2.1 Participatory Method

Participatory methods are used in implementing the program, where Partner 1 and Partner 2 collectively identify needs, problems and resolve problems. Direct meetings, interviews and discussions have been held 3 times to determine the problems and solutions offered to overcome the problem. In Table 1, the results of the participatory approach are presented with Partner 1 and Partner 2. The problems, activity plans, and contributions of Partner 1 and Partners 2 are presented in Table 2 and Table 3.

2.2. Training methods (demplot) and counseling

A. Training method

The training method is used, so that partners have the ability to carry out activities individually or in groups when the activities take place or repeat activities. Some of the training activities carried out are :

(1) planning of rice field activities using the SRI method;

(2) selection of lowland rice seeds using the SRI method;

(3) paddy field seed nursery using SRI method;

(4) soil wetland cultivation using SRI method;

(5) spacing of paddy fields using the SRI method;

(6) planting of lowland rice seeds using the SRI method;

(7) fertilizing rice fields using the SRI method;

(8) watering paddy field using the SRI method.

Table 1. Results of the participation approach with Partners 1 and Partners 2

Place	Topic	Result
Meeting 1 The house of one of the Partners 1 (morning) and Mitra 2 (afternoon), was attended by an empowerment team of 3 people, the partner group 1 (3 people) and the group 2 partners (3 people)	Program socialization, social, cultural and economic conditions at partner locations	1. There is a high social relationship in the community during traditional ceremonies and irrigation improvements in mutual cooperation. 2. There is a habit (culture) of division of labor between father, mother and child. 3. Own rice fields as a result of inheritance. The main occupation of rice farmers and side laborers and selling. 4. Side jobs as farm laborers are carried out during the dry season.
Meeting 2 Partner 1's rice field (afternoon) and Partner 2 (afternoon)	Program offer and production	1. 1/2 technical irrigation system 2. Often lack of water 3. Stacks of straw are left until the following planting period arrives 4. Production between 5.3 tons / ha (partner 1) and 5.4 tons / ha (Partner 2) 5. Willing to take part in the program
Meeting 3 Home of one of the Partners 1 (morning) and Partner 2 (afternoon)	Prepare a plan of activities	1. Problems found 2. A plan for activities based on problems is arranged 3. Activity plans are described in Table II and Table III.

B. Counseling method

Counseling methods are used to increase knowledge and understanding of community groups, so that they have the ability to act and make decisions. Some of the counseling carried out are:

(1) the impact of composting rice straw on the development of lowland rice pests and diseases;

(2) the impact of using organic fertilizers on the physical properties of the soil.

2.3. Descriptive approach method

The descriptive approach method is used to describe the condition of the community before and after the implementation of the program and how the process is implemented, so that the benefits of the program can be known. The success of the program is measured based on the achievement of empowerment outcomes from each activity and expressed in a reasonable state and as it is (natural setting).

Table 2. Problems, activity plans, and Partner 1 contributions in Namorambe Village Namorambe District.

Problem	Activity Plan	The Contribution of Partner
Production		
The seeds that are used too much, about 40-50 kg / ha	"Rice Seed Selection with SRI Method" Training	Determine schedules, attend activities, provide training venues and participate in seed selection
The age of seedlings as long as the seed in the nursery is relatively old, namely 20-25 days.	Training and Demonstration Plot "Rice Seed Nursery"	Determine schedules, attend activities, provide land for nurseries and participate in seed nurseries
Soil processing is done twice; the first processing was carried out 30 days before planting and the second processing was carried out 3 days before planting.	Training and Demonstration Plot "Soil Processing in Rice Fields with the SRI Method"	Determine the schedule, provide 1,000 m² of paddy fields to be used as the SRI Rice Paddy Field Demonstration Plots, and conduct, supervise land processing
The spacing of the seedlings is too tight around 15x15 cm	Training and Demonstration Plots "Planting rice seedlings with a spacing of 30x30 cm in lowland rice with the SRI method"	Determine the schedule, attend the activities and participate in planting rice seedlings in the demonstration plot with a spacing of 30x30 cm
The number of seeds for planting holes includes a large number, namely 5-6 seeds.	Training and Demonstration Plots "Planting Rice Seeds, 2 Planting Stems / Pits"	Determine the schedule, attend the activities and participate in planting 2 rice seedlings / planting holes in the demonstration plot area.
Artificial fertilizers (made by factories) that are used too much at a dose of 400 kg urea / ha + 150 kg SP-36 / ha + 150 kg KCl / ha.	Training and Demonstration Plots "SRI Fertilizer Fertilization Method Area is 1,000 m² with a dose of 20 kg urea + 7.5 kg SP-36 / ha + 7.5 kg KCl	Determine schedules, attend activities and participate in fertilizing
Many use water where the water in the rice fields is 20-25 cm long during the planting period	Training and Demonstration Plot "SRI Method of Rice Paddy Water Supply" with 3 cm high water and dried once every 3 days	Determine the schedule, attend activities, participate in watering and control the water level 3 cm on the plot area and dry it every 3 days
Does not have a farm planning, implementation and evaluation schedule	Training "Making Implementation Planning, and Evaluating SRI Method"	Determining schedules, attending activities, providing training venues
Do not have bookkeeping to calculate profit and loss of farming	Training on "Bookkeeping of SRI Rice Production Facilities"	Determining schedules, attending activities, providing training venues

Table 3. Problems, plans for activities and contributions of the Partner 2 method in the Village of People's Love Namorambe District

Problem	Plan Activity	The Contribution of Partner 2
Production		
Rice straw is stacked from harvest to the next planting season, not made as organic fertilizer	Training and demonstration plot "Making Organic Fertilizer"	Determine schedules, attend activities, provide demonstration plot locations in paddy fields, provide straw, conduct and control the process of making organic fertilizer
Rat pests and diseases caused by fungi are increasing because haystacks are a source of food	Counseling and Discussion "Composting of Straw Can Reduce Rat Pests and Diseases Caused by Fungi"	Determining schedules, attending activities, providing counseling venues
Micro decomposing organisms were destroyed because straw was burned. Useful micro organisms break down straw into organic fertilizer and provide nutrients in the soil that plants need.	Counseling and Discussion "Negative Impact of Straw Burning on Micro Development of Decomposing Organisms"	Determining schedules, attending activities, providing counseling venues
Soil is hard and dry so it is difficult to process, the roots of plants are difficult to penetrate and plants often lack water	Counseling and Discussion "Organic Fertilizer Spills Up Soil and Increases Groundwater Content"	Determining schedules, attending activities, providing counseling venues
Does not have a farm planning, implementation and evaluation schedule	Training "Making Planning, Implementation and Evaluation of Making Organic Fertilizers"	Determining schedules, attending activities, providing counseling venues
Do not have bookkeeping to calculate profit and loss of farming	Training on "Bookkeeping of Production Facilities for Making Organic Fertilizers"	Determining schedules, attending activities, providing counseling venues

3. Result and Discussion

3.1. Training of planning

The training of planning attended by 6 people, namely 3 people from Partners 1 and 3 people from Partners 2. The purpose of the training was so that the two partners had the ability to systematically arrange the stages of activities, to be the implementers of

activities that are responsible for the success of the activities, where activities take place and time implementation of activities. The training was carried out by inviting partners to think about, discuss and write down plans for the stages of activities based on the solutions offered to overcome the problem. The response given by partners is very good and able to make plans as well.

Based on the discussions conducted during the training, it was found that partners had never made a farming plan. So that partners do not realize that farming activities are a series of several activities that will be carried out in stages. This lack of knowledge is thought to cause partners to have difficulty dealing with problems that arise when conducting farming and if these problems are not immediately addressed will have an impact on the decline in production. On the other hand, it was revealed that Partner 1 and Partner 2 usually made plans for religious activities and customs.

3.2. Training of rice seed selection using the SRI method

The training was responded to well by attended by 3 members of the Partners 1. Training was intended to obtain high-quality rice seeds that have high growth power and if seeds were planted into the field they would produce healthy plants and provide maximum production. Partners were able to participate in and carry out the SRI method seed selection training, so that 1 kg of rice seeds were produced which would be used in the SRI rice demonstration plot. Based on the observation of partners there is a difference between SRI rice seeds and conventional rice seeds (ordinary). In Table 4, the difference between conventional rice seeds and SRI rice seed method is presented. In the training it was revealed that partners used labeled rice seeds directly without being selected. The results obtained in part of the seeds do not grow seeded, the growth of seedlings is not uniform and there are seeds attacked by disease pests. Based on the observation of partners that using the usual bbit if planted as many as 5-6 seedlings / planting holes produces 18-25 stems / clumps less than using SRI method seeds which are able to produce 35-70 stems / clumps with the number of seeds planted 2 seeds / holes planting.

3.3. Training and demonstration plot of rice seed nurseries

1) The training process was well implemented and was attended by 3 members of the Partner 1. Partners revealed some differences between ordinary nurseries and SRI method nurseries as presented in Table 5.

2) Participants respond well to nursery training because in some areas seed planting has been carried out directly without nurseries. This condition has an adverse effect on plant growth and development. The reason is there are those who have a tight spacing and wide plant spacing. In plants that have a distance of dense plants, there is competition for food acquisition, besides that between plant organs such as leaves, stems and roots touch each other. This situation can affect plant physiology processes and correlate with plant growth resulting in non-uniform plant growth. Farmers will also have difficulty doing plant maintenance such as insertion, fertilization, prevention of pest and harvesting. non-uniform plant growth and development and irregular spacing of rice. The difference in seedlings experienced by partners in this training is that the nursery area used is narrower, where the area of the nursery is adjusted to the number of seeds to be sown. If so far Mitra 1 uses 40-50 kg / ha seeds then the SRI rice method becomes 10 kg / ha or 1 kg / 1000 m2, so that the area of SRI paddy seed nursery becomes ¼ of the total nursery area that has been used. From the results of the training, Partner 1 has been able to save on the number of seeds, the size of the nursery, the time and effort.

Table 4. Differences in conventional rice seed method with SRI method.

No	Description	Conventional Rice Seeds	SRI Method
1	Seed treatment	Labeled seeds are directly used	From 1 kg of labeled seeds selected by the SRI method obtained ± 200g (20%) did not meet the SRI method selection or not used as seed
2	Hardness of seed if pressed between fingers using nails and weighed.	From 1 kg of labeled seeds obtained hard seeds ± 700g (70%) and less seeds ± 300g (30%).	Of the 1 kg of seeds selected, hard seeds of around ± 900g (90%) and less hard seeds ± 100g (10%) are obtained.
3	Seed size and shape (seen with eyes)	The seeds are not uniform because the seeds have various sizes such as long, short, large, small and flat.	The seeds are more uniform, where most seeds have a long and large size.
4	Seed color (seen with eyes)	The yellow seed is rather blurry, brown spots and the seed skin surface is rather dirty	The seeds are bright yellow and the surface of the seed skin is clean.
5	The volume of seeds weighing 1 kg.	More	Few
6	Seed requirements for 1 ha	40-50 kg/ha	1 kg/1.000 m² (demplot) or 10 kg/ha.

Table 5. The difference between conventional rice nursery and SRI method.

No	Description	Conventional Rice Nursery	SRI Method
1	The size of the nursery for 1 ha.	Area of 400 m²	¼ of conventional nursery area or 100 m²
2	Nursery	In the rice fields	In the rice fields or outside the rice fields
3	Water conditions	Inundated	Scrambled
4	Total manpower	6 HOK (working day)	2 HOK (working day)
5	Maintaining	More difficult to maintain because it is wider	Easy to maintain because it is narrower
6	Age of seedlings in the nursery	20-25 days	10 days

3.4. Training and demonstration plot for processing land in paddy fields with the SRI method

The training process went well and received a good response from 3 participants. The purpose of training is to cultivate soil to produce muddy soil (macak-macak) such as slurry which is suitable for the growth of wetland rice plants. Soil processing is only done once, in contrast to the habits previously carried out by partners, namely 2 times. To speed up the condition of the soil to mud, partners first provide as much as 2 tons / 1,000 m² of organic fertilizer or the size of a demplot which is equivalent to 20 tons / ha. Organic fertilizers are given 4-5 days before tillage while inundated. This treatment turns out to make the soil easier to mud. This is caused by the organic acids contained in organic fertilizers having the ability to break down the soil (aggregate). The results of this training add to the knowledge of partners, where the use of organic fertilizers is no longer considered limited only as a food enhancer (nutrient) for plants, but also can help accelerate the process of soil cultivation.

3.5. Training and demonstration plot for planting rice seedlings with a spacing of 30x30 cm in paddy fields with the SRI method

Training and demonstration plot of paddy seedlings with a spacing of 30x30 cm in wetland rice SRI method was followed by 3 members of the Partner 1. The spacing used was different from the spacing that had been used by partners, namely 15x15 cm, so initially the partners gave less which is good because it is argued that the wide spacing will result in not optimal land use and the number of rice stalks planted becomes less, so that production becomes low. This opinion can be justified if the planted rice yields a low number of tillers so the number of stems per clump is also low. Conversely, if the rice seedlings planted can produce many tillers, the number of plants per clump will also be large, so that it requires a wide spacing so that plant growth is not disturbed. At

a tight spacing of 15x15 cm, plant roots, leaves and stems touch each other and can interfere with physiological processes. On the other hand the use of seeds selected by the SRI method allows more number of stems per clump to be produced. When compared to the results obtained from the empowerment of the SRI method rice the number of stems per clump of 35-70 stems, is higher than the conventional method obtained by partners 18-20 stems.

3.6. Training and demonstration plot for planting rice seeds, 2 stem / planting holes

Training and planting plots of paddy seedlings planting 2 stems / planting holes with 10 days of seedling age can be implemented even though the participants initially did not respond well. This is due to the habit of partners using bibt aged 20-25 days and the number of seedlings per hole planting 5-6 stems. Some of the reasons stated are that the seeds used are too young so that it is difficult to plant and care for plants in the field is difficult because it is feared that they can be easily attacked by pests and not resistant to the environment. To reduce the risk, seed selection is planted with characteristics that have erect growing stems (not broken or tilted), large and high stem diameter, large number of leaves, leaves not broken, leaves not withered, not affected by pests / diseases and having roots many. The purpose of seedling selection is to ensure that the seedlings after planting can easily develop, grow healthy, produce many tillers (clumps), are not susceptible to pests and diseases and are resistant to drought conditions.

3.7. Training and demonstration plot for fertilizing the rice fields using the SRI method

Training and fertilization demonstration plots were responded well by participants even though there was a difference between the dosage of treatment and the type of fertilizer used. The use of organic fertilizer before tillage with a dose of 2 tons / 1,000 m² or the size of a demonstration plot which is equivalent to 20 tons / ha, SP-36 fertilizer dose 75 kg / ha or 7.5 kg / 1,000 m2 equivalent to 75 kg / ha and KCl dosage 75 kg / ha or 7.5 kg / 1,000 m2 equivalent to 75 kg / has 200 kg / ha of urea fertilizer or 20 kg / 1,000 m2 suspected to have been able to supply plant nutrients. The treatment of organic fertilizers, SP-36 and KCl fertilizers is given before planting because the release of nutrients from fertilizers is difficult to occur so it takes longer than urea fertilizer. On the other hand the age of rice plants to produce 105 days immediately requires the availability of nutrients. The treatment of urea fertilizer is given 3 times with a dose of 1/3 part of the total dose of urea or 7.3 kg per administration every 2 weeks. The

treatment of organic fertilizer is expected to change the mindset of partners using straw as the main source of organic fertilizer. If the partner's rice production is now 5.3 tons / ha, the rice straw produced by 7.632 tons / ha will save production costs.

3.8. Training and demonstration plot for the provision of rice fields watering using the SRI method

Training activities and water supply demonstration plots can be carried out and the participants responded well. The problem of water shortages is often faced by partners every crop season due to 2 things: (1) the ½ technical irrigation system results in the loss of water in the water channel due to leaking waterways before the water reaches the paddy fields and (2) the lack of awareness of farmers using excessive water especially farmers who are close to irrigation waterways. This training is a solution that can be used to overcome water shortages, where water is high in 3 cm rice paddy fields and then is dried once every 3 days for 1 day. When compared with the habits of partners who use 20-25 cm of water or adult knee height throughout the growing season, the SRI method is very efficient in water use. During the implementation of the demonstration plot of lowland rice, there was no shortage of water and the plant growth was very good. Participants gave a positive response and understood how to save water.

3.9. Counseling and discussion of straw composting to reduce rat pests and lowland rice disease

Counseling and discussion of composting straw can reduce rat pests and paddy rice, both participants responded. Rat pest has long been a problem and various actions have been taken by farmers and government assistance. Partners are less aware of one strategy that can be done to reduce food sources. Straw still has un-shed rice residues which are thought to be the main source of food for rat pests. Through this counseling, partners' knowledge increases so that straw is composted immediately after harvest. On the other hand composting changes the condition of the microenvironment in wetland rice to the development of diseases caused by micro-organisms such as fungi. Composting changes the environmental conditions of the appropriate ones to be inappropriate, so that disease progression can be reduced.

3.10. Counseling and discussion of the negative impact of burning rice straw on the development of decomposing micro-organisms

Counseling and discussion of the negative impact of burning rice straw on the development of decomposing micro-organisms was followed by 3 partners and could be implemented. The habit of partners to freeze straw after harvest by reason of being able

to use charcoal or burnt residual ash is not justified because at the time of combustion there will be changes in the environment (1) air contains CO2 which can cause respiratory diseases, (2) soil increases temperature in the soil destroyed and (3) the micro-decomposing organisms found in straw are destroyed. Micro decomposers are needed to accelerate weathering of organic matter so that the nutrients contained in it can be immediately available to plants. Eliminating decomposer organisms means eliminating nutrients needed by plants from the soil. Penyluhan made the partner aware of the mistakes that had been caused by the lack of information obtained.

3.11. Counseling and discussion of organic fertilizers to loosen soil and increase soil water content

Counseling and discussion of organic fertilizers to soil and increase soil water content is good. Organic fertilizer is a fertilizer that can improve soil physical properties, soil chemical properties and soil biological properties. Hardened soil describes the physical properties of the soil and is not favored by plants because the plant roots cannot penetrate deeper into the soil to find the nutrients needed. In hard soil air and water cannot enter easily due to lack of available pore space as a place for air and water. If plants grow on it can be imagined that plants will lack air, water and nutrients that are needed in physiological processes. Mixing organic matter into the soil is a simple technology and is the easiest to solve problems. Soil that is given organic fertilizer can loosen the soil, so that air, water and plant roots easily penetrate into the soil. Thus the needs of plants are fulfilled and plants can grow well. This counseling motivates partners to use organic fertilizer to loosen the soil which often occurs in the dry season, so the planting system can last throughout the year.

3.12. Harvest of paddy using the SRI method

SRI paddy field demonstration plots were harvested after 105 days of planting. Some characteristics of harvested plants are leaves and stems that are yellow, the rice fruit in the panicle has been bent down completely, the fruit has dried and some have begun to fall out. To facilitate the harvesting process, land drying is done 1 day before. Rice stems are cut using a sickle of about 30-40 cm from the ground and stacked in one place close to the rice threshing machine to facilitate fruit threshing. Then the rice fruit is shed and put in burlap to be weighed. The weighing of SRI demplot rice with an area of 1,000 m2 obtained 875 kg which is equivalent to 8.75 tons / ha. This production has increased from production before the conventional method (ordinary) of 5.3 tons / ha to 8.75 tons / ha after applying the SRI method or experiencing an increase in production

of around 3.45 tons / ha and if made in the form of percent, the production increase is equivalent to 65 , 09%.

4. Conclusion

Based on the results of the program implementation to Partner 1 and Partner 2, a number of things that can be concluded are as follows:

1. Partner 1 can increase conventional lowland rice production from 5.3 tons / ha to 8.75 tons / ha or increase by 65.09% through the application of SRI rice.
2. Partner 1 was able to implement the SRI rice cultivation techniques such as seed selection, seed nursery, tillage, planting seedlings with a spacing of 30x30 cm, planting seedlings aged 10 days with the number of 2 stems / planting holes, organic fertilization and artificial fertilizers and saving water supply.

Partner 2 increasingly knows and understands that rice straw can be used as a source of organic fertilizer, the use of straw can break the food source of rat pests, burning straw destroys micro-organisms decomposing organic matter and reduces pest and disease attacks and the use of organic fertilizers further aggravates soil.

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References

[1] Badan Pusat Statistik Kabupaten Deli Serdang, *Deli Serdang Regency in Figures 2015*. Lubuk Pakam: Badan Pusat Statistik Kabupaten Deli Serdang, 2016.

[2] Badan Pusat Statistik Kabupaten Deli Serdang, *Namorambe District in Figures 2015*. Lubuk Pakam: Badan Pusat Statistik Kabupaten Deli Serdang, 2016.

[3] A. De Jager, D. Onduru, M. S. Van Wijk, J. Vlaming, and G. N. Gachini, "Assessing sustainability of low-external-input farm management systems with the nutrient monitoring approach: A case study in Kenya," *Agric. Syst.*, vol. 69, no. 1–2, pp. 99–118, 2001.

[4] Mardikanto. T, *Building Modern Agriculture*. Surakarta: Sebelas Maret University Press, 2009.

[5] I. S. Anugrah, Sumedi, and I. P. Wardana, "Ideas and Implementation of System of Rice Intensification (SRI) in Ecological Rice Cultivation (BPE) Activities," *Analisis Kebijakan Pertanian*, vol. 6, no. 1, pp. 75–99, 2008.

[6] Departemen Pertanian, *Technical Guidelines for the Development of System of Rice Intensification (SRI)*. Jakarta: Direktorat Jenderal Pengelolaan Lahan dan Air (PLA), 2009.

[7] B. Purwantana, "Study of energy input on rice cultivation system of rice intensification method," *Jurnal Agritech*, vol. 31, no. 1, pp. 1–8, 2012.

[8] T. J. Sugarda, A. Charina, L. Setiagustina, and I. Setiawan, "Study of development of organic rice SRI (System of Rice Intensification) insight with agribusiness insight in supporting sustainable food security program," *Agrikultura*, vol. 19, no. 1. 2008.