

The Existence of Seed Resource Management Unit and Seed Grower to Support the Sustainable Certified Rice Seed in North Sumatera Province

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Abstract. The usage of qualified seed is one of practices in intensification strategy to minimize the rice yield gap. Unfortunately, its availability in North Sumatera Province is difficult to find. One of the measures to solve the scarcity is by maintaining the existence of the Seed Resources Management Unit (SRMU) and Seed Grower. This study has specific objectives, to inform the total potential production, the kind of varieties and the distribution of certified rice seed from SRMU and Seed Grower and to estimate the opportunity to enhance the certified rice seed sustainability. A descriptive method was used for this study by using observation and comparative analysis techniques. The results show that there are 4,693.5 ton of certified rice seed generated from SRMU and Seed Grower, which is *Inpari 32*, *Mekongga* and *Inpari 42* are the dominated varieties. This study also found that the majority of certified rice seeds were distributed to Deli Serdang, Serdang Bedagai and Labuhan Batu Regency. By comparing the necessity of certified rice seed which is resulting from the total raw rice land area with the existing production, the existence of SRMU and Seed Grower is significantly needed to support the sustainable certified rice seed in North Sumatera Province.

1 Introduction

As the strategic commodity in Indonesia, rice holds an important role in the socio-economic, cultural, and national conditions. Rice is also known as the staple food for Indonesian; thus, its production must be improved in line with the increasing total number of populations. There are two main strategies for anticipating food insecurity and famine issues in the future, extensification and intensification strategies [1]. Extensification is the

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effort to increase rice production by expanding the total rice land area. Unfortunately, this effort is difficult to realize nowadays because the available land will compete with other land uses, such as for urban development, expansion of estate crops, and supporting infrastructures, e.g., roads, factories, offices, etc. [2–4]. Meanwhile, the intensification strategy aims to increase the productivity of natural resources per unit area through the application of appropriate technologies, water and land management, fertilizers, pesticides, and certified seeds [5].

The usage of the certified rice seed gives some advantages, e.g., high yields, responsive to fertilization and resistant to major pests and diseases. Together with water and land management and some cultivation techniques implementation will increase productivity around 45% [6]. According to the Ministry of Agriculture, there are more than 100 high yielding rice seed has been generated by some research institutions in Indonesia and 85% of them are produced by the Agricultural Research and Development Agency of the Agricultural Ministry. Most of these rice seeds have been introduced at the provincial level through Seed Resource Management Unit (SRMU). The SRMU is one of the institutions that has responsibility to reproduce, certify and distribute these rice seeds to the seed growers and farmers at provincial level. All these certified rice seeds have their own characteristics, especially the ability to adapt in the specific agroecosystem. For instance, the varieties of *Inpari 32* and *Inpari 42* give good responses on the irrigated rice land area; the *Inpara 8* and *Inpara 9* are the example varieties which is tolerant in swampland; and the varieties of *Inpari 42* and *Ciherang* are the example varieties that can adapt well in the specific condition of the lowland [7].

The high yielding rice seeds has generated a lot by research institution, however the usage of these seed at the farmers level is still relatively low. According to Daradjat, more than 60 percent of the rice seeds which is used by the farmers came from the informal sector [8], such as their neighbor. Even, due to the limitation of accessibility on the rice seed, the farmers are commonly use the seed which is collected from their previous season's harvest. Some of factors behind of this issue, including the limitation of introducing strategy, the relatively low of farmers adoption on the certified rice seed, the performance of seed production and supervision institutions has not run optimally, and a few only found in the field regarding to the criteria to meet the sustainable certified rice seed (the right variety, the right quality, the right time, the right place, the right amount, and the right place) [9,10].

The opportunity to introduce and distribute the certified rice seeds at the farmers level is very open widely. Moreover, the government provided some strategies to maintain the availability of these rice seeds because it is related to the food self-sufficiency undoubtedly. In 2014, the Ministry of Agriculture has allocated a budget for the provision of seed logistics for several food commodities, including rice. The high opportunity of the rice seed needs is inseparable from the highly demand at the farmers level which is influenced by the cropping patterns and intensity, the total area of rice land, total usage of seed amount, the market situation, the seed prices, technology adoption rates, and many other factors [11].

As amongst the highest producer provinces of rice in Indonesia, North Sumatera Province also has a high opportunity to increase its production. One of the strategies to realize it by using the certified seed at the farmer's level. Unfortunately, due to the lack information about supporting factors related to the productivity, especially regarding to the data certified rice data, we conduct this study. By the descriptive methodology, this study tries to inform the total potential production of certified rice seed from SRMU and Seed Grower, to explain the kind of varieties and distribution of certified rice seeds at regencies level, and to estimate the opportunity to enhance the sustainability of certified rice seed in North Sumatera Province. All the outputs from this study can be used as references

especially for the local government to generate or empowering the policies to reach the sustainability of certified rice seed.

2 Methodology

2.1 Study area

North Sumatera Province was taken as a case study on this paper. It is located on the western part of Indonesia, which is geographically bordered by Aceh Province to the north, Riau and West Sumatera Provinces at the southern part, and Malacca Strait and Indian Ocean at the eastern and western part, respectively. As the province, North Sumatera is divided by 33 regencies/ cities which is lied on $98^0 - 100^0$ E and $1^0 - 4^0$ N astronomically [12] (Figure 1). In terms of the contribution of rice production at national level, North Sumatera Province exists at the top seven under East Java, Central Java, West Java, South Sulawesi, South Sumatera, and Lampung. Meanwhile, at the provincial level, the regencies of Deli Serdang, Serdang Bedagai and North Tapanuli share the highest contributors for rice production in 2021, by 327,607 ton, 268,604 ton and 130,116 ton, respectively [13]. This study also elects one of Seed Resource Management Units (SRMU), namely *IP2TP Pasar Miring*, as the information source of the certified rice seed for North Sumatera Province which is located in Deli Serdang Regency.



Fig. 1. Administrative map of study area.

2.2 Data preparation and method

The primary and secondary data were collected to observe the sustainable certified rice seed in North Sumatera Province, such as the total production and varieties name of certified rice seed from SRMU (government level) within five years and the total production of certified rice seed from Seed Grower (farmers level), the area distribution of certified rice seed, which is spread by SRMU, and the total rice land area in North Sumatera Province. All these data were gathered from the local government institution, including Assessment Institute for Agricultural Technology, Seed Control and Certification Institute, SRMU, and Food Crop and Horticulture Agency.

This study used the descriptive method for the methodology, by using observation and comparative analysis techniques. The observation technique was implemented to collect some primary and secondary data, while the comparative analysis technique was implemented to compare the total production of certified rice seed with the farmers necessity on the certified rice seed.

3 Result and Discussion

3.1 The production of certified rice seed at provincial level

Based on the information from the Seed Control and Certification Institute, there are two sources of the certified rice producer at provincial level, the SRMU and Seed Grower. The existence of SRMU is to reproduce the certified rice seed in the formed of Foundation Seed (FS) Class which is derived from the seed breeder (Breeder Seed (BS) Class). Meanwhile, the presence of Seed Grower has a function to multiply certified rice seed in the formed of Stock Seed (SS) Class which is derived from the SRMU. Then, the end user, the farmers, using the certified rice seed (SS Class) and produce Extension Seed (ES) Class.

As the local government institution that has responsibility to record the certified rice seed in North Sumatera Province, the Seed Control and Certification Institute reported that there are 4,693.5 ton of certified rice seed produced by SRMU and Seed Grower, by contributing 108.5 ton and 4,585 ton, respectively (Table 1). Although SRMU shares 2.5% from the total but it gives significantly impact for the local farmers who has capabilities to be the Seed Growers.

Table 1. Total production of certified rice seed at provincial level in 2021.

Source of the Certified Rice Seed	Land Area (Ha)	Total Production (ton)
a. SRMU (Government Level)		
- <i>BBI Murni</i>	19	95
- <i>IP2TP Pasar Miring</i>	5	13.5
b. Seed Grower (Farmer Level)		
- Nias Regency	20	100
- South Tapanuli Regency	15	45
- Central Tapanuli Regency	40	200
- Asahan Regency	100	500
- Simalungun Regency	13	65
- Deli Serdang Regency	148	740
- Serdang Bedagai Regency	320	1,705
- Batubara Regency	225	1,125
- Pematang Siantar City	1	5
- Tebing Tinggi City	10	50
- Padang Sidempuan City	10	50
TOTAL	926	4,693.5

IP2TP Pasar Miring is one of SRMUs in North Sumatera Province which is organized by Ministry of Agriculture under Assessment Institute for Agricultural Technology. The existence of SRMU at provincial level gives significant advantages to fulfil the certified rice seed needs and to accelerate the spread of the certified rice seed for the farmers at regencies' level. The SRMU of *IP2TP Pasar Miring* produces the certified rice seed annually, and there are about 81.3 ton of certified rice seed has distributed in the recent five years (Fig.2). Among twenty-five varieties that has introduced to the farmers at regencies' level, the variety of *Inpari 32*, *Mekongga*, *Inpari 42*, *Inpari 33* and *Inpari 43* are the highest demand, by 35.5%, 9.3%, 7.2%, 6.7% and 6.6% from the total, respectively.

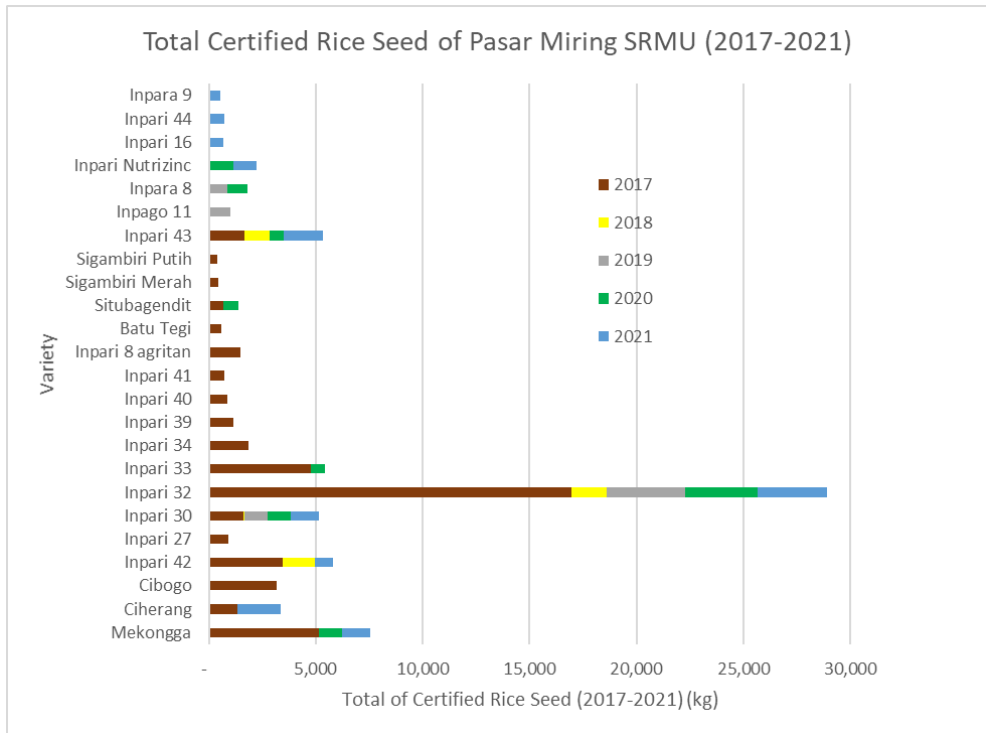


Fig. 2. Total of certified rice seed produced by SRMU of Pasar Miring within 5 years.

Undoubtedly, these five dominated-certified rice seeds have performed well which is mostly reach the average production based on their characterizations. There are some reasoning factors why the seed growers prefer to the particular varieties, such as high productivity, quality taste of rice, high environment adaptability, and high pest and disease resistance. The farmers much prefer to plant *Inpari 32* specifically because they noticed this variety better in productivity and quality, more resistant to the pest and disease and has high accessibility [14].

3.2 The spread of certified rice seed

One of the strategies to enhance the sustainable rice production is by introducing and accelerating the distribution of certified rice seed to the farmers who has lack information and access. Indonesian Center for Rice Research (ICRR) is one of government institutions that has responsibility to generate the new rice variety. Abdullah et al (2008) informed that there are hundreds of rice varieties has produced by ICRR through their professional breeders, which is can adapt in different agroecosystems, such as on lowland, middle land, highland, swampland, saline land, etc. [15]. Unfortunately, a few kinds of varieties known by farmers in North Sumatera Province.

According to the Seed Control and Certification Institute of North Sumatera and SRMU of *IP2TP Pasar Miring*, among 33 of regencies/cities, Deli Serdang, Serdang Bedagai, Labuhan Batu, Batubara and Medan were the top five regencies/cities using certified rice seed in the recent five years by 24.1 ton, 5.9 ton, 5.3 ton, 4.1 ton and 2.4 ton, respectively. It can be observed that the distance of these regencies/cities from the certified source (SRMUs) is one of the reasons behind why they absorbed the certified rice seeds in large

portion (Fig. 3). Closer to the SRMUs and Seed Growers, the larger portion of certified rice seed will be implemented.

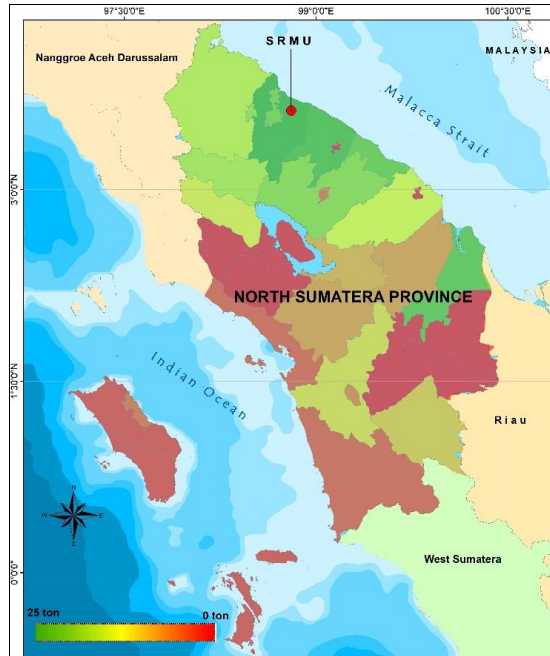


Fig. 3. The spread of certified rice seed at regencies' level in North Sumatera Province

Some researchers found that accessibility is one of the important parameters to reach the sustainability of certified rice seed [11,16]. Definition of seed accessibility is the ability to gain the rice seed through a cash purchase, barter, loan, exchange and or through a social relationship. All these strategies are commonly occurred practically in the field, especially in exchange for cash. The seed is not a problem when farmers still can take the certified rice seed from their neighbor. The situation would indicate seed insecurity when there are issues on the lack of seed physical availability at farmers household and from social and economic access.

3.3 The opportunity to enhance the certified rice seed sustainability

There are six criteria to meet the sustainable certified rice seed according to [9,10], namely the right variety, the right quality, the right time, the right price, the right amount, and the right place. The right variety means the farmers must knowing well about the variety characteristic that being planted, such as the potential productivity, the appearance, taste and flavor, the potential market, the pest, and disease resistance, etc. The seed quality is related to the seed health [17], the moisture content, the physical purity, etc. In terms of the right time, it is related to the timeline of the rice seed will be used by farmers. Then, it is very important as well to arrange the fix planting calendar for anticipating unavailability of rice seed. Then, for the SRMU and Seed Growers is important also to schedule the planting time to produce and stock the certified rice seed which is waiting by farmers. The seed sustainability is also connected to the rice seed price, which is related to the capability of famers to purchase. The government intervention is needed to maintain the price stability of the certified rice seed to help the poor farmers. According to Indonesia's Central Statistics Agency that there were 25.4 million of farm household in Indonesia and estimated 13.7 million is categorized by poor farmer because has only 0.3 ha of the land ownership [18].

For the right amount, it is related to the availability of rice seed physically. The SRMU and the Seed Growers, as the local producers of certified rice seed, have to serve the farmers by providing the certified rice seed in their region. Lastly, the right place is related to the suitability level of certified rice seed planted on the particular area. The rice will give a maximum production when it can adapt and grow well on the specific environment.

Rice production decreased by 1.63% from 2010 to 2011, and it was due to harvested area and productivity declining by 0.22% and 1.42%, respectively [9]. The increase of rice production is the main priority of all local government at provincial level, including North Sumatera Province, as the consequence of the increasing total number of population and diminishing rice land area. One of solutions is by planting the certified rice seed at farmers level which is still has high opportunity to distribute to all regencies in North Sumatera Province. By observing the total raw of rice land area in 2020 (Table 2), the necessity of certified rice seed for North Sumatera Province is about 6,173 ton by assuming 20 kg of certified rice seed/ha.

Table 2. Total necessity of certified rice seed at regencies' level in North Sumatera Province

Regency	Total Raw Rice Land Area (Ha)	Necessity of Certified Rice Seed (kg)
Nias	5,904	118,076
Mandailing Natal	11,581	231,621
South Tapanuli	12,377	247,545
Central Tapanuli	8,533	170,668
North Tapanuli	20,535	410,706
Toba Samosir	17,084	341,673
Labuhan Batu	16,244	324,884
Asahan	6,539	130,776
Simalungun	25,343	506,854
Dairi	5,694	113,883
Karo	14,518	290,369
Deli Serdang	33,992	679,841
Langkat	19,443	388,852
South Nias	8,603	172,064
Humbang Hasundutan	11,837	236,745
Pakpak Bharat	1,121	22,426
Samosir	7,289	145,783
Serdang Bedagai	28,017	560,339
Batubara	12,060	241,193
North Padang Lawas	6,854	137,080
Padang Lawas	5,732	114,640
South Labuhan Batu	175	3,491
North Labuhan Batu	11,993	239,852
North Nias	7,173	143,457
West Nias	1,813	36,256
Sibolga	0	0
Tanjung Balai	73	1,455
Pematang Siantar	1,520	30,395
Tebing Tinggi	256	5,113
Medan	928	18,551
Binjai	1,208	24,167
Padang Sidempuan	3,066	61,324
Gunung Sitoli	1,164	23,271
TOTAL	308,668	6,173,351

4 Conclusion and suggestion

One of the intensification strategies to increase rice production is by applying certified rice seed in the cultivation management. As one of the provinces in Indonesia that giving high contribution to the rice production, the farmers in North Sumatera has been using certified rice seed through SRMUs and Seed Growers guidance. *Inpari 32*, *Mekongga*, *Inpari 42*, *Inpari 33* and *Inpari 43* are the dominant varieties at the provincial level, by 35.5%, 9.3%, 7.2%, 6.7% and 6.6% from the total, respectively. In addition, the certified rice varieties already distributed to 23 out of 33 regencies in North Sumatera Province by diverse proportion.

The sustainability of certified rice seed in North Sumatera Province is still possible to enhance. Collaboration from the SRMUs and Seed Growers has to be improved to produce a larger portion of total certified rice seed production. Some strategies that can be implemented to reach the sustainable of certified rice production are:

- a. By improving the facilities and infrastructures at SRMUs (government level) and at Seed Growers (farmer level)
- b. By introducing new rice varieties that can adapt in the specific environment
- c. By conducting training to increase farmers capabilities and encouraging them to be the new seed growers
- d. By ensuring the certified rice seed with the criteria of the right variety, the right quality, the right time, the right price, the right amount, and the right place
- e. By increasing the collaboration between the local government, SRMU, Seed Grower and Farmer, specifically at the remote area

The continuing research is urgently needed to assess the seed security assessment in North Sumatera Province. The opportunity, problems and the causal factors of the unsustainable certified rice seed specifically will be defined. The output of this research will give further significant contribution for the local government to generate the precise policies related to the certified rice seed sustainability.

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