Security in food, renewable resources, and natural medicines

SFRN 2019

PROCEEDING

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3rd INTERNATIONAL CONFERENCE ON SECURITY IN FOOD, RENEWABLE RESOURCES, AND NATURAL MEDICINES 2019 (SFRN 2019)

Convention Hall Politeknik Pertanian Negeri Payakumbuh
INDONESIA

QUANTUM-LEAP OF AGRI-FOOD SYSTEM 4.0 AND DELIVERY OF SUSTAINABLE DEVELOPMENTS GOALS (SDGS)

September 25-26, 2019

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Welcome Message
Executive Chairman of The 3rd International Conference on Security in Food, Renewable resources, and Natural Medicines (SFRN) 2019

Dear Honorable ladies and gentlemen,

Good Morning and Assalamu'alaikum wr.wb

On behalf of the SFRN 2019 organizing committee, I am really honoured and delighted to welcome all of you to the 3rd International Conference on Security in Food, Renewable resources, and Natural Medicines (SFRN) 2019 at the State Polytechnic of Agriculture Payakumbuh, West Sumatra Indonesia

Our technical program is rich and varied with 8 keynote speeches and 4 invited talks and more than 170 technical papers split between 8 parallel oral sessions and 1 poster sessions. The speakers and participants came from 8 different countries, consist of Academicians, Scientists, Researchers, Practitioners, Professionals, and Government Officialsin multidiscipline branch of knowledge, who gathered here today to share and discuss new findings and applications of innovations for promoting Food Security, Renewable Energy, Sustainable Resources and HealthCare Free for All, in particular for those who in needs. As the chairman of conference 2019 SFRN, I know that the success of the conference depends ultimately on the how many people who have worked in planning and organizing both the technical program and supporting social arrangements. This year, the conference is jointly organized by the Payakumbuh State Agricultural Polytechnic and Andalas University. We also thank to the steering committee fortheir wise and brilliant advice on organizing the technical program; and also to the the Program Committee, both from the Payakumbuh State Agricultural Polytechnic and Andalas University , for their thorough and timely reviewing of the papersand to the Directorof Payakumbuh State Agricultural Polytechnic and the rector of Andalas University, and the Head of the Institute forResearch and Community Service of Andalas University, and Payakumbuh State Agricultural Polytechnic. Our recognition should go to the Organizing Committee members who have all worked really hard for the details of the important aspects of the conferenceprograms and social activities, and then we extend our gratitude to our students who bore the arduous burden for preparing this event.

We hope this event is also a good step in gaining strengthenn cooperation between our universities as we know that the State Agricultural Polytechnicof Payakumbuh is part of the Andalas University previously, of course the psychological relationship between the State Agricultural Polytechnicand the Andalas University is really close.

Finally on behalf of the committee, we apologize profusely for all the shortcomings and everything that is not properly in organizing this event and hopefully AES-Network contributes significantly to the research and technology for the good of humanity.

Thank you

Fithra Herdian, S.TP, MP

Message from Afro-Eurasia Scientific (AES) Network
3rdInternational Conference on Security in Food, Renewable resources, and Natural Medicines (SFRN) 2019

Dear Honorable and Distinguished guests,
Ladies and gentlemen,

Assalamu'alaikum Warahmatullahi Wabarakatuh and Good Morning

On behalf of the AES Network, I am honored and delighted to welcome you to the 3rdInternational Conference on Security in Food, Renewable resources, and Natural Medicines (SFRN) 2019 at the Agricultural State Poly Technique of Payakumbuh, Indonesia. I believe we have chosen a venue that guarantees a successful technical conference amid the culture, delicacy and scenery of Payakumbuh, the city of "Rendang".

The AES-Network aims to Promote Livelihood Through Food Security, Promote Future Smart and Green Mobility by Using Renewable Energy, Promote Prosperity by Equally Managing and Distributing the Sustainable Resources and Promoting Enjoyable Long-Life by using Natural Medicines With Free Health Care For All. The AES-Network was established in 2018 and already have memberships from 12 countries. Our members consist of Academicians, Scientists, Researchers, practitioners, professionals, and government officials from multidiscipline branch of knowledge, who gathered and contributed their expertise to share and discuss new findings and applications of innovations for promoting Food Security, Renewable Energy, Sustainable Resources and Free Health Care for All.In particular, the network aims to alleviate the condition of those who in dire needs. In the future, we also expect to provide technical demonstrations, and numerous opportunities for informal networking for Promoting Food Security, Renewable Energy, Sustainable Resources and Free Health Care for All. In this opportunity, we invited you to become our members and join our efforts for a better life to all of mankind.

As a team, we acknowledge the existence of mutual interest among university and college educators, researchers, activists, business sector, entrepreneurs, policy

makers, and all society members. We must promote the need to strengthen cooperation for establishing Security in Food, Renewable Resources, and Natural Medicines in Africa, Europe, and Asia.

The AES-Network believe, a firm foundation for mutual collaboration with the spirit of equality and partnership and thereby contribute towards sustainable development in these three regions.

Therefore, through networking, friendships, and joint efforts, the capacity of our network can be enhanced to address major challenges in securing the Food, Renewable Resources, and Natural Medicines in Africa, Europa, and Asia.Our Network goals areto increase the awareness of educators, researchers, scientific community, business sector, entrepreneurs, and policy makers in Africa, Europa, and Asia, that the future of a better world, lies within their responsibilities, and to improve the networking, mobility and mutual collaboration of scientific community, business sector, entrepreneurs, and policy makers in Africa, Europe, and Asia to energize the delivery of Sustainable Development Goals.

Finally, I hope that, by registering our network, you will be provideda common platform and support the exchange of knowledge, while at the same time, we offer constructive dialogue across and within the various interest and stakeholder groups, including the intended beneficiaries, and arrived at the best solutions to our terminal goal, Promoting Food Security, Renewable Energy, Sustainable Resources and Free Health Care based on scientific evidence in Africa, Europa, and Asianregion.

Thank You for Joining us!

President
Assoc. Prof. Dr. Eng. Muhammad Makky

Welcome Message
Head of Institute for Research and Community Service
Universitas Andalas

Dear Honorable and Distinguished guests,
Ladies and gentlemen,

Assalamu'alaikum Warahmatullahi Wabarakatuh and Good Morning

It is with great pleasure that I welcome the participants of the SFRN 2019 in Payakumbuh, the city of "Rendang", the prime of Indonesian delicacy.

In this esteem event, we share the knowledges, and imparted it to the people. The quest for knowledge has been from the beginning of time but knowledge only becomes valuable when it is disseminated and applied to benefit humankind. It is hoped that this conference will become a platform to gather and disseminate the latest knowledge which can be adopted for securing the food, resources, and health for mankind, in Asian, European and African region.

Academicians, Scientist, Researchers and practitioners from multidiscipline branch of knowledge who gathered here today will be able to share and discuss new findings and applications of innovations for ensuring food security, in particular for those who reside in developing countries. It is envisaged that the intellectual discourse will result in future collaborations between universities, research institutions and industry both locally and internationally. In particular it is expected that focus will be given to issues on environmental and sustainability. Therefore, we urge to all participants, to establish a scientific network that will voice the needs

Researchers in the multi sectoral aspects related to the benefit of mankind have been progressing worldwide. Food is a basic right, while energy drive the world. Human need a lot of resources so the civilization can be flourished. But human is not immune, and thus, ones need to take care of their health regularly. Modern Agri-food systems is the foundations of a decent life, a sound education and the achievement of

the Sustainable Development Goals. Over the past decade, we have witnessed a chain reaction that threatens the very foundations of life for millions of the world's people. Rising energy prices drove up the cost of food and ate away the savings that people otherwise would have spent on health care or education. Unsustainable plantation management induced forest fire and posed haze hazard to the whole Sumatra island and our neighboring countries.

The human cost of the food and energy crisis has been enormous. Millions of families have been pushed into poverty and hunger. Thousands more suffering from the collateral effects. Over the past year, food insecurity led to political unrest in some 30 countries. Yet because the underlying problems persist, we will continue to experience such crises, again and again -- unless we act now. That is why we are here today.

We must make significant changes to feed ourselves, and most especially, to safeguard the poorest and most vulnerable. We must ensure safety nets for those who cannot afford food, or energy, nor even a health service. We must transform agricultural development, markets and how resources is distributed. We must do so based on a thorough understanding of the issues. That is the only possible way we can meet the Goals of Sustainable Development.

Thank You,

Assoc. Prof. Dr.-Ing. Uyung Gatot S. Dinata,MT.

Opening Ceremony
Rector of Andalas University

Dear Honorable and Distinguished guests,
Ladies and gentlemen,

Assalamu'alaikum Warahmatullahi Wabarakatuh and Good Morning

I welcome the opportunity to address you at this important event.

It gives me great pleasure in welcoming you to this 3rdConference on "Security in Food, Renewable resources, and Natural Medicines (SFRN)" 2019. I am delighted that so many have accepted our invitation. I am particularly happy that we have in this room, dedicated individuals from so many stakeholder groups — including our most respected and distinguished guest "The ministry of Agriculture of the Republic of Indonesia". We also welcome the mayor of Payakumbuh and the Regent of Lima Puluh Kota. We extend our welcome to the civil society, the private sector, international organizations; the science community; and others dedicated to help create an environment in which people can escape food insecurity. Imagine what we can do together if we make the security for all as an our top priority, and pull in the same direction. We can make a difference in the lives of millions.

Food is a basic right. Food security are the foundations of a decent life, a sound education and the achievement of the Sustainable Development Goals Access to medicines - a fundamental element of the right to health. Health is a fundamental human right, indispensable for the exercise of many other rights in particular the right to development, and necessary for living a life in dignity. Moreover, human rights principles and language are being used to support resource access claims as rights-based approaches empower individuals and groups to gain or maintain access to natural resources

Much progress has been made during the last decades but much more needs to be done. Millions of people are Insecure worldwide, meaning that they either starve or they do not know from where their next meal, health care or resources will come.

Much of the progress on security has occurred at the expense of our environment. With business as usual, we foresee that the production improvements during the next decade will be less than the last one, while the environmental degradation will continue, and health will deteriorate significantly. Without available resources to seek, mankind will become endanger species in a very short time.

Solutions to the security problems need to be designed and implemented within a new and rapidly changing environment. Globalization and sweeping technological changes offer new opportunities for solving these problems. A number driving forces or trends must be taken into account in developing appropriate action. Some of the action needed, such as appropriate technology for small farms, is not new but it must be cast in the new and changing global and national environment, taking into account new opportunities and risks. I hope that by providing a forum for knowledge exchange, this conference will help identify the action to be taken. Furthermore, this conference will help to provide constructive dialogue across and within the various interest and stakeholder groups, including the intended beneficiaries, and arrive at the best solutions.

In conclusion, even if those responsible give high priority to achieving sustainable security for all and back it up with action, the world may not achieve the goal by 2030. But we will be much closer than with business as usual. I urge all of us to provide the strongest support for this event, to enable securing the food for all in the closest time possible. It is my sincere optimism that through the accomplishment of the objectives of this event, we will come to an important step nearer to secure the food for all.

Finally, I would like to thank the organizing committee who have spent their utmost efforts to prepare and manage this event successfully. Let me conclude my remarks by wishing our guests happiness, good luck and great success in the conference.

May I announce now the opening of the "3rd International Conference on Security in Food, Renewable resources, and Natural Medicines (SFRN) 2019" in Payakumbuh.

Thank you.

Rector,
Prof. Tafdil Husni, SE, MBA, PhD

Welcome Message
Director of Politeknik Pertanian Negeri Payakumbuh

Dear Honorable ladies and gentlemen,

Good Morning and Assalamu'alaikumwr.wb

I congratulate to all participants on the invitation and participate at our beloved campus Payakumbuh StateAgricultural Polytechnic. I feel really honoured to welcome all of you at our event, the 3rd International Conference on Security in Food, Renewable Resources, and Natural Medicines (SFRN) 2019 at thePayakumbuh State Agricultural Polytechnic, Indonesia.

Food security is a very important aspect in a country's sovereignty. Food also determines the future direction of a nation. Many social and political fluctuation can also occur if food security is disrupted. Food availability that is smaller than its needs can create economic instability. This critical food condition can even endanger economic and national stability. In the current situation, there are many challenges in exteriorize food security, such as climate change, population, limited natural resources and other challenges both locally, regionally and globally.

Renewable resources are also our starting point to start sustainable development. Research on renewable resources is also very important as the solution in meeting the principles of sustainable development. As we know that Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Sustainability is the foundation for today’s leading global framework for international cooperation - the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs)

The discovery of treatment based on local culture also contributes greatly to the good of humanity. Unfortunately, there are still many treatments that have not been carried out by scientific research. So, through this conferencewe hope it can be a trigger to increase in traditional plant-based treatments that not go through complex

chemical processes, so that the effectiveness of the pillars can be further suppressed and also contribute to the community's economy.

Finally, I would like to express my gratitude to all people who involved in organizing this event and to all ofstakeholders who have helped to make this event go on succesfully. Please accept my apologize for any shortage, Assalamu'alaikumwr.wb.

Thank you

Ir. Elvin Hasman, MP

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Prospects of Superior Variety Cane "POJ 2878 Agribun Kerinci" in Increasing Income Farmers in Kerinci District, Jambi Province

Endrizal, Araz Meilin, Julistia Bobihoe

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Abstracts. This study uses a survey method, which was carried out in the POJ 2878 Agribun Kerinci sugarcane planting in Kayu Aro Barat District. The survey was conducted in three villages (Sungai Asam, Kampung Baru, and Giri Mulyo). Data were analyzed descriptively. In the harvest arrangement, farmers divide 1 ha of land into 32 plates, 1 plate @ 312.5 m2. Yields in 1 plate obtained 338.5 cane stems weighing 859.4 kg, can produce 527 kg of sugarcane juice, and produce 105 kg of brown sugar with an average yield of 11.5%. Production of brown sugar in 1 ha = 13,440 kg. With a sugar price of Rp. 7,500 / kg, sugarcane farmers' income in one year reaches Rp. 100,800,000. The operational cost in one year is Rp. 30,440,000, so the net income of sugar cane farmers in one year is Rp. 70,360,000, with a monthly income of Rp. 5,863,333. This income is equivalent to the income of oil palm farmers who manage 3 hectares of land.

Keywords: Sugarcane Superior Variety, "POJ 2878 Kerinci Agribun" Brown Sugar, Farmer Income.

INTRODUCTION

Sugarcane plants with the scientific name Saccharum officinarum L belong to the family Poaceae or grass group. Morphologically, sugar cane plants can be divided into several parts, namely stems, leaves, roots, and flowers. Sugar cane has been cultivated for hundreds of years ago and encouraged the emergence of the commercial sugar plantation industry since the 19th century. Sugar cane is widely planted in the tropics for the manufacture of sugar (Adikusumo, 2001).

Sugarcane is an essential commodity to balance the increase in consumption and the availability of national sugar, so it is necessary to expand the planting area and increase productivity. One of the causes of the decline in sugarcane productivity is the problem in the use of seeds, such as sugarcane seeds used by farmers with inferior quality (Iskandar, 2005)

In the last few decades, the condition of the national struggle shows a downward trend in performance. It can be seen from several indicators, including

declining sugar production and tonnage of productivity per hectare and decreasing sugarcane quality and yield. This situation is exacerbated by the decrease in the area of sugarcane to 37%, causing the closure of some sugar factories due to lack of raw materials (Mulyono, D., 2004)

Sugar is one of the strategic commodities in supporting the Indonesian economy, part of the nine staples needed today (Mochamad, I., 2016). At present, the total area of national plantations is around 478,206 thousand hectares, with this area, Indonesia is only able to produce 2.7 million tons of white raw sugar per year. This amount is only able to meet household consumption. While the national sugar consumption, which reaches 4.5 million tons per year, has not been fulfilled (Directorate General of Plantations, 2010). History records that around 1935 - Indonesia has been known as a sugar exporting country, with its mastery of technology (plant technology and processing technology) that has made Indonesia the center of sugar-producing countries. The fact is that Indonesia, as a sugar-producing country, is experiencing a setback in the field of crop cultivation, as reflected in the low productivity of sugarcane (tons of sugar cane/ha) compared to the productivity achieved. The deterioration of the quality of sugarcane is reflected in the low sugar content in the sugar cane stem, which is seen from the level of sugar yield, the average yield of sugar in 1934 above 11% can only be achieved at an average rate of 7% or a decrease of around 37% (Research Agency and Agricultural Development, 2005).

To restore Indonesia as a sugar-producing country in realizing sugar self-sufficiency, an area of development or additional sugar cane area of about 350,000 ha must be sought, especially outside Java. Increasing the area for sugarcane is indeed not easy because of the narrowing of the agricultural area, especially in Java. While the development of sugarcane areas outside of Java is constrained by limited infrastructure and human resources availability (Kementan, 2014).

Sugarcane cultivation and sugarcane development areas in Indonesia are still focused on Java Island, namely in the Provinces East Java, Central Java, DI. Yogyakarta and West Java. Sugarcane cultivation is mainly cultivated on irrigated and rainfed lowland rice fields and on dry and dry fields with a ratio of 65% on drylands and 35% on wetlands. In an effort to increase sugar production, sugar cane farming on upland development is directed to outside Java, such as North Sumatra, South Sumatra, Lampung, South Sulawesi and Gorontalo (Ditjenbun, 2009).

In sugarcane cultivation, seedlings are one of the factors that determine the success of both the number of stems and growth to productivity to milled sugar cane along with the potential yield of sugar. Therefore the use of high-quality seeds is an absolute factor of production that must be met. So the government feels it is necessary to regulate the supervision of seed distribution through certification, which is a process of granting seed certificates after going through inspections, testing, and supervision for requirements that can be distributed and circulated. With the release of superior local varieties of Kerinci into Sugar Cane Superior Varieties through Ministry of Agriculture Decree No. 110 / Kpts / KB.010 / 2/2017 on 14 February

2017 under the name "POJ 2878 Kerinci Agribun" is a very profitable and prospective opportunity for the development of sugarcane in Jambi Province.

One of the obstacles in developing sugarcane is obtaining quality sugarcane seeds. To get quality sugar cane seeds, in addition to superior varieties, it is necessary to apply serious cultivation and handling techniques. Until now, sugar cane plants are propagated by using cuttings. The most straightforward propagation of sugarcane is by cuttings, but produces a limited number of plants and requires many parent trees. (Sukmajaya, 2011)

In general, the problems faced by the sugar industry occur in on-farm and off-farm activities. On the farm side, a significant problem is the low level of sugar productivity, which currently only reaches around 6 tons/ha. Thus, the mission carried by the Government, according to strategy and policy, is to increase productivity and efficiency. The realization in the field is to increase the yield of sugar through a proper processing system in sugarcane cultivation activities, namely planting, seeding, and maintenance (Regulation of the Minister of Industry, Number: 11 / MIND / PER / 1/2010).

The success of a type of plant depends on the quality of the plant, the environment in which it grows, where cultivation is carried out, and management is carried out by farmers (Syafruddin, 2016). The local sugar cane in the Kerinci Regency precisely in the Kayu Aro Barat District is a sugar cane plantations that have existed since the Dutch era. More than 90% of the population in Sungai Asam Village, West Kayu Aro District, depend their lives on sugar cane plants, which are processed into brown sugar. Cultivation is carried out by farmers with modest technology, including brown sugar processing. For this reason, technology assistance for sugar cane cultivation and processing of brown sugar is needed in order to increase the income and welfare of sugarcane farmers. (Endrizal, 2016)

The target to be achieved from this activity is the development of sugarcane farmer farming using superior local varieties of POJ 2878 Agribun Kerinci with high yields and yields. Besides that, it is expected to increase competitiveness through increased production and business productivity supported by other service businesses, as well as developing efforts to develop processed products from brown sugar (product development). The development of superior local varieties of sugar cane POJ 2878 Agribun Kerinci with the application of cultivation technology that is correct and, in accordance with recommendations, is expected to increase the income and welfare of the community.

Sugar cane of superior varieties will give higher yields by applying cultivation techniques in accordance with recommendations. The superiority of a variety only lasts for a certain period of time. This is caused by changes in the growing environment and the development of strains of disease that attack plants so that varieties that are initially resistant then become vulnerable. Therefore the use of a variety must have a dynamic pattern, and there is no need for fanaticism towards a variety (Mirzawan, 1999).

METHODOLOGY

The research method used was a field survey carried out in the planting of POJ 2878 Agribun Kerinci sugarcane in Kayu Aro Barat District. The survey was conducted in three villages (Sungai Asam, Kampung Baru, and Giri Mulyo). Agronomic observations were made in three villages. Data were analyzed descriptively.

RESULTS AND DISCUSSION

Kerinci Regency is located in the Western part of the Province of Jambi, with coordinates: 01 ° 41'LS - 02 ° 26 'latitude and 101 ° 08' east longitude - 101 ° 50 'east longitude. The topography of hilly land and mountain slopes, altitude between 500 - 3,805 masl, high rainfall, and prone to erosion. The tropics with an average temperature range of 18 ° C - 26 ° C. Kerinci Regency Area: 380,850 Ha consisting of the Kerinci Seblat National Park Area covering an area of 50.4% or 191,822.3 Ha, and cultivation land 49.6% or 189,027.7 Ha. Kerinci Regency consists of 16 districts.

Sugar cane plants in Kerinci Regency can grow well and produce brown sugar products. Sugarcane planting has been existed since the Dutch era, from generation to generation until now, especially in Kayu Aro District. The development of the People's Sugar Cane Plant in Kerinci Regency has the potential for hilly topography on the mountain slopes. The direction and target of the sugar cane planting area are to use abandoned and critical land.

Most of the sugarcane plants in Kerinci Regency (66.85%) grow and develop in Sungai Asam Village, Kayu Aro District (1,200 Ha). The rest grew and developed in the same sub-district in the villages of Kampung Baru, Giri Mulyo, Lindung Jaya, and Sungai Dalam Village. Two other subdistricts that also grow and develop sugarcane are Siulak and Gunung Kerinci Districts (Table 1).

Table 1. Condition of the Sugar Cane Area in Kerinci Regency

No.	Districts/Village	Areal (Ha)
1.	Kayu Aro Districts :	
	Sei.Asam Villaage	1.200
	Kampung Baru Village	120
	Giri Mulyo Village	36
	Lindung Jaya Village	80
	Sungai Dalam Village	9
2.	Siulak District :	
	- Siulak Kecil Hilir Village, Hamparan Sungai Bermas	310
3.	Gunung Kerinci Districts	40
	Amount	1.795

Existing Kerinci Cane Cultivation

Local varieties of sugar cane are traditionally planted, seeds are planted using sugar cane seeds improvised and not certified, and in general, the plants have not been cared for properly. In some places, sugar cane is often left just like a sugarcane forest, so productivity is not optimal.

Figure 1. Sugarcane POJ 2878 Agribun Kerinci

Cultivation activities are carried out by sugar cane farmers without planting new ones and only maintaining tillers from existing plantations. Existing sugar cane plants are the legacy of their parents (aged> 60 years). On average, each farmer has sugarcane land between 1-2 ha per family. New planting is only done in areas of development or expansion. In general, only cultivating modest land and using sugarcane that already exists from previous crops. Fertilization and weeding cane is rarely done, or if there is only using cow dung that is not through composting. Weeding or cleaning the garden is only done at harvest time as well as cleaning old leaves (picking up leaves). Pest and disease control was not carried out although several sugar cane borer attacks were also found, because they were still below the economic threshold. All farmers harvest the sugarcane by selective logging, and the growing tillers are maintained, so no special rejuvenation is needed. Sugarcane cultivation activities are carried out by farmers in Kerinci Regency (Table 2).

Table 2. Sugarcane cultivation activities carried out by farmers in Kerinci Regency

No.	Kegiatan Budidaya	Yes (%)	No (%)
1	Land management	±5	95
2	Fertilizer	±5	95
3	Weeding	±5	95
4	Control of pests and diseases	±5	95
5	Harvest by selective cutting	100	0

The process of making brown sugar is done traditionally and still needs improvement. Most farmers squeeze sugarcane stalks (refineries) using animal power (cows), in one day can produce about 30 kg of brown sugar, whereas if squeezing using a machine can produce about 300 kg of brown sugar. The number of farmer groups is 36 farmer groups, 12 farmer groups have received a press machine and 24 farmer groups in the proposal process.

Brown sugar in Kab. Kerinci has a very important role in meeting the needs of the community in addition to being very helpful in terms of the community's

economy, and brown sugar is also very needed in everyday life both in household and industrial needs.

Figure 2. Brown sugar produced by Agribun Kerinci POJ 2878

Brown sugar has become an important source of income for some farmers in the Kerinci Regency. Sugar cane farming is able to create employment and a source of income for around 4,487 farming families (assuming average land ownership of 0.4 ha/farmer). If one farmer has 5 family members, it means that sugarcane plants in the two sub-districts support 22,437 lives, and that does not include labor in the garden, processing of brown sugar, and marketing.

ANALYSIS OF FARMING CANE OF KERINCI

One of the differences in the cultivation of sugar cane farming of brown sugar from white sugar farming is the harvest system. Harvesting on sugar cane farming is done selectively once a week, whereas, for white sugar, the harvest is done at once. The products produced from sugar cane cultivation in Kerinci Regency are brown sugar plot products for household needs, and soy sauce industry.

Brown sugar production from smallholder sugar cane farming in Kayu Aro, Kerinci, reaches 6,700 kg/ha/yr. The average price of brown sugar at the farm level is Rp 7,500 / kg, so that a farmer's gross income is Rp 50,250,000 per year.

Farming costs for labor costs and the purchase of materials such as fertilizers and herbicides are Rp. 8,940,000 and net income or farm profits are Rp. 41,310,000 per year. There are several things that affect the income of smallholder sugar cane farming in Kayu Aro, among others; sugarcane production per hectare, yield, price of the input, processing costs from sugar cane to brown sugar, and labor costs for harvesting, transporting, and maintaining the garden.

Table 3. Analysis of Kerinci Sugar Cane per ha / year w / selective cutting system with potluck cultivation in Kayu Aro Barat District

No	Description of activities	Cost (Rp)
1.	Spraying herbicides	450.000,,--
2.	Fertilizer	600.000,-
3.	Cut down transport	3.600.000,-
4.	Processing sugar cane into sugar	2.880.000,-
5.	Maintenance	600.000,-

6.	Inorganic fertilizer	570.000,-
7.	Herbiscides	240.000,-
8.	Total input	8.940.000,-
No.	**Production and acceptance of farming**	
1.	Sugar production (kg)	6.700,-
2	Sugar Price (Rp)	7.500,-
3.	Income (Rp)	50.250.000,-
4.	The advantage (Rp)	41.310.000,-
5.	R/C	5,6
6.	B/C	4,6

Sugar cane farming in Kayu Aro, Kerinci Regency is economically feasible and profitable, this can be seen from the R / C and BCR> 1. The comparison of revenue with production costs is intended to see the relative profit (R / C) of smallholder sugarcane farming, which is Rp 5.6 (> 1). Sugar cane farming provides benefits for farmers with a BCR value of 4.6 (BCR> 1), meaning that if the farm production costs Rp. 1, - will give a profit of Rp. 4.6, -

Marketing of processed brown sugar from farmers does not experience significant problems, market share can still be increased. The marketing system through intermediary traders who come to the village so that the bargaining position of the price of brown sugar products by farmers is still low. Efforts are needed so that farmers can increase the production of brown sugar through the application of technological innovations and activating farming institutions and supporting institutional farming through institutional engineering.

Table 4. Analysis of sugarcane farming using technology input in Siulak District

A	**PERSIAPAN LAHAN**	**Unit**	**Satuan**	**Harga satuan**	**Total**
1	Land opening	1	Ha		1.600.000
2	Land clearing	1	Ha		500.000
3	Land management	1	Ha		3.200.000
4	Planting	1	Ha		1.500.000
5	Maintenance	1	Ha		
6	Seeds	10.000	stek	300	3.000.000
7	Fertilizer	500	kg	8.000	4.000.000
	Amount A				**13.800.000**
B	Cost harvest:				
1	Milles wages				6.400.000
2	Machine Operating Costs, Firewood costs, Cane Transport.				10.240.000
	Amount B				16.640.000
	TOTAL A + B				30.440.000
C	Sugar Production : 1 Plate = 4 times milled				

	1 Ha = 32 piring 1 milled = 105 kg Gula				
	- Sugar production 1 Ha =	105 kg	4 kali	32 piring	13.440 kg
	- Prices/Kg = Rp. 7.500,-				
	- Value of sugar production 1 Ha (Rp)	13.440	kg	7.500	100.800.000
D	Clean Production Value				
	- Sugar production value (Rp)				100.800.000
	- Total cost (Rp)				30.440.000
	- Clean value/ Ha/year				70.360.000
	- Clean value/ Ha/month				5.863.333

Sales of brown sugar are carried out at local and outside Jambi markets (West Sumatra and South Sumatra). The current consumption of brown sugar tends to increase, especially those consumed by households and also from industries such as the soy sauce industry, large restaurants, and others. Demand for brown sugar in the local and outside Jambi Province is always increasing so that the local Kerinci sugar cane plant, which has been released into superior local varieties with the name POJ 2878 Kerinci Agribun is very prospective and profitable to develop.

CONCLUSION

1. Community sugar cane farming with selective cutting system, in Kayu Aro Barat District, Kerinci Regency is economically feasible and profitable, this can be seen from the R / C and BCR values> 1.
2. Sugar cane superior variety "POJ 2878 Kerinci Agribun" has opportunities and prospects to be developed in an effort to increase the production of brown sugar and improve the welfare of sugarcane farmers.
3. The Income of sugar cane farmers POJ 2878 Agribun Kerinci Rp 5,863,333, - / month., Equivalent to the income of oil palm farmers who manage 3 ha of oil palm plantations.

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