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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Analysis of Food Plants Intercropping on Acidic Dryland

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Abstract— Acidic dryland is a marginal land with a low level of productivity, so that the level of income of farmers is also low, especially farmers doing monoculture farming. One effort to increase farmers' income is through intercropping technology innovation. Research on rice-corn and soybean-corn intercropping farming has been carried out in Tambang Emas Village, Pamenang Selatan, Merangin District, Jambi Province, from 2018-2019. The results showed that the farmer's income from soybean-corn intercropping technology was Rp. 18,000,000 to Rp. 21,200,000 per planting season or higher compared to Rp 5,450,000 - Rp. 11,700,000 - per planting season on the monoculture of rice, corn, or soybean. The revenue-cost ratio (R/C) for the intercropping pattern is 1.72 - 2.04, while the monoculture pattern is 1.13-2.00.

Keywords: Analysis, farming, intercropping, paddy, acid soil

INTRODUCTION

Transfer of agricultural land functions of rice, maize, and soybean for other uses results in increasingly narrow and limited land for farming rice, corn, and soybeans (Balingtan, 2018). On the other hand, the increase in population will increase the demand for food, especially rice, corn, and soybeans.

Food is a basic need of the community to be provided at all times with the right quantity and quality (IAARD, 2012). The Government of the Republic of Indonesia is working hard to make rice, corn, and soybean supply sustainable and self-sufficient. One of the programs of the ministry of agriculture to increase rice, corn, and soybean production is to make special efforts (Kepmentan, 2018). Special efforts include; repair of irrigation, tools and agricultural machinery, expansion of planting areas, use of technology innovation.

Intercropping technology innovation between rice-corn, rice-soybean, and soybean-corn plants can optimize land limitations. The intercropping pattern that was designed with the Legowo row system was to overcome monoculture competition for land use for rice, corn, or soybean. Empty space in the legowo row can be planted with plants to be intercropped (Puslitbangtan, 2015, Economy, 2019)

Some advantages of cropping patterns with intercropping systems include; a) Optimizing land use, so that in one planting land can be planted with more than one type of plant, b) Increasing farmers' income, because not only one type of crop is

harvested, c) Reducing farming costs, saving labor and time, especially land processing work, d) Reducing the risk of crop failure and price fluctuations

The combination of corn-soybean intercropping can be applied to the 2: 1 legowo planting system where two rows of plants are closed together (spacing between rows) so that between every two rows of plants there is room for soybean planting (Puslitbangtan, 2015). The level of productivity of maize obtained in legowo plantations did not differ even tended to be higher (due to the influence of marginal plants) compared to single row cropping (regular planting).

Empty space in the legowo row can be planted with 2 rows of soybean plants (according to the distance of the corn plant) without decreasing the productivity of maize so that there is an increase in land use index and farmers' income. The results showed that soybeans grown among corn plants would be obtained 50% of the soybean grown in monocultures. Soybean planting as intercropping in maize can also improve soil fertility due to N fixation compared to corn monoculture systems.

RESEARCH METHODOLOGY

Case study research methods from the implementation of research on rice-corn intercropping demonstration during the rainy season of MH 2018 and soybean-corn intercropping in the dry season (MK 2019) conducted in Tambang Mas Village, Pamenang Selatan District, Merangin District, Jambi Province from 2018 (MH) until 2019 MK). While data from monoculture crops were obtained from interviews with farmers.

Maize varieties planted are Sukmaraga purple label varieties originating from Balitseralia Maros, South Sulawesi. Sukmaraga Variety was chosen because this variety was formed using AMATL (Asian Maize Tolerance Late) and SATP (Sitiung Aluminum Tolerance Population) population, the population came from KP. Sitiung, West Sumatra tolerant of acid land (Yasin, et al, 2014, Zubactirudin et all, 2012). While the rice variety used was Inpago 10, which came from the Sukamandi Rice Research and Development Center.

In 2019 (MK) planting of soybean-corn intercropping was carried out. Anjasmoro soybean varieties derived from Malang Balitkabi and Corn continue to use Sukmaraga Varieties.

DATA ANALYSIS :

The input-output data collected is tabulated, and then the feasibility of the farm is analyzed (Soekartawi, 1995). This analysis aims to see the level of farm income and profits as well as the ratio (ratio) of revenue and costs (R / C). Input-output data for analysis of monoculture plantations conducted by farmers is done by farmer interviews.

To calculate the total cost of agriculture, the formula is used:
TC = FC + VC

TC = total cost

FC = fixed cost
VC = variabel cost

To get the amount of farm receipts used the formula:
TR = Y.Py
TR = Total Revenue
Y = Output
Py = Output Price

Whereas to obtain the magnitude of farm income, the formula is used:
I = TR – TC
I = Income
TR = Total Revenue
TC = Total Cost

To find the ratio of revenue and cost, the formula is used:
RC ratio = TR/TC
TR = Total Revenue
TC = Total Cost

RESULTS AND DISCUSSION

Rice, corn, and soybean Intercropping Program in Jambi Province.

Lately, there has been a slowdown in crop expansion due to the shift in the function of the use of agricultural land for food crops, especially rice, corn, and soybeans to other uses such as use for industry, housing, or use for commodities other than food crops.

The allocation of paddy-corn and soybean intercropping activities in 2018 in Jambi Province covers an area of 500 ha, which is placed in 3 districts, namely, Bungo Regency, Muaro Jambi Regency, and Tebo Regency. For Bungo District, 100 ha of paddy-rice intercropping, for Muaro Jambi District for 100 ha of corn-rice intercropping and for Tebo District for 50-hectare rice and 250 ha for soybean corn. In 2019 the area of Pajale intercropping covers 9 districts with a total area of 7,500 (Table 1).

Table 1. Intercropping allocation in Jambi Province years 2018 dan 2019

No	District	Intercropping Activity 2018 (ha)			Intercropping Activity 2019 (ha)		
		Rice-Corn	Rice-Soybean	Corn-Soybean	Rice-Corn	Rice-Soybean	Corn-Soybean
1.	Batang Harii	-	-	-	200	-	100
2.	Bungo	-	100	-	400	500	300
3.	Kerinci	-	-	-	200	500	-
4.	Merangin	-	-	-	300	500	400

5.	Muaro Jambi	100	-	-	800	-	-
6.	Sarolangun	-	-	-	200	-	-
7.	Tanjab Barat	-	-	-	-	-	450
8.	Tanjab Timur	-	-	-	-	250	500
9.	Tebo	-	50	250	400	750	750
10.	Kota jambi	-	-	-	-	-	-
11.	Kota Sei.Penuh	-	-	-	-	-	-
	Total	100	150	250	2.500	2,500	2.500

Source : Dirjentan (2018)

FINANCIAL ANALYSIS

Monoculture Planting Patterns

Monoculture cropping patterns or cropping patterns applied by farmers by commercializing one type of food crop on land per unit area owned. The cultivated food crops include; upland rice, corn, soybeans. In general, farmers do farming once a year in the rainy season.

Of the three types of plants that are often sought by farmers, corn farming provides higher revenues and benefits compared to upland rice or soybeans. The acceptance of corn farming is Rp. 15,750,000 / ha/planting season with a profit level of Rp. 10,030,000 / ha/planting season, while upland rice farming gives an income of Rp. 10,000,000 / ha/planting season with a profit rate of Rp 4,617. 500, - / ha / growing season. Toha research results (2007) found that the average farm income by implementing Integrated Crop Management for upland rice for three years in a row was Rp 5,226,000 / ha with a range between Rp 4,807,000 - Rp 5,957,100 / ha.

The Soybean farming provides an income of IDR 6,300,000 / ha/planting season with a profit rate of IDR 750,000 / ha/planting season. The low acceptance from soybean farming due to low productivity levels due to attacks of armyworms and other pests and R / C 1.13. Meanwhile, Minsyah research results (2015) found R / C of soybean farming on dry land between oil palm that has not produced reached 3.4

Indicator of the ratio of revenue (revenue) to cost (cost), then the R / C of rice is higher than the R / C of corn and soybeans and the R / C of corn is higher than the soybean R / C. The results of R / C analysis of rice, corn and soybean are as follows; 2.0, 1.75, and 1.13. The results of Bahua's research (2008) found that R / C monoculture of hybrid varieties was 2.11, and the composite was 1.52.

Cultivation of Intercropping Patterns

The rice-corn intercropping system is more profitable compared to the soybean-corn intercropping pattern. The rice-corn intercropping pattern gives a profit of Rp 12,131,500 / ha/planting season with R / C of 2.04, while the soybean-corn

intercropping pattern only gives a profit of Rp 8,791,500 with an R / C of 1.79. The low profit on the soybean-corn pattern is due to the low level of soybean productivity in the dry season.

Table 2. Input-Output Analysis (Rp/ha/MT)

Uraian	Intercropping		Farmer Monoculture Pattern		
	Rice-Corn	Soybean-Corn	Rice	Corn	Soybean
Materials	4.356.000	4.356.000	1.012,500	1.750.000	1.180.000
Farming wages	7.250.000	6.690.000	4.370.000	3.970.000	4.370.000
Total of expense	11.606.000	11.046.000	5.382.500	5.720.000	5.550.000
Revenue	23.737.500	19.837.500	10.000.000	15.750.000	6.300.000
Profit	12.131.500	8.791.500	4.617.500	10.030.000	750.000
R/C	2,04	1,79	2,0	1,75	1,13

Data primer 2018-2019

Revenue from corn-soybean intercropping farming is Rp. 19,837,500 / ha / MT. These results are similar to the corn-soybean intercropping research conducted by Astuti et all (2019), amounting to Rp 19,480,000. Further said by Astuti et al. (2019) that although there are additional production costs, higher revenues of Rp 5,480,000 / ha/planting season compared to monoculture farming.

Balance of Production Costs

Production costs for farming both intercropping and monoculture crops are more significant than the costs for purchasing production input. In the rice-corn intercropping pattern, the cost for wages is 62.47%, and the cost for purchasing production input is 37.53. Expenditures for intercropping wages in the soybean corn pattern are 60.56 and for the procurement of input material 39.44. In monoculture crops, there is a wide difference in the high costs incurred for wage purchases compared to production inputs, except for corn commodities. The high cost of purchasing inputs in corn farming compared to rice and soybean farming is because the price of hybrid corn seeds is quite high.

Labor that is used for farming is labor in the family, except for land management work. Land management uses external family power, namely using a tractor.

Table 3. Imbangan Biaya Produksi (%)

Uraian	Tumpangsari		Monokultur pola petani		
	Padi-jagung	Kedelai-jagung	Padi	Jagung	Kedelai
Pembelian bahan saprodi	37,53	60,56	18,81	30,59	21,26
Upah usahatani	62,47	39,44	81,19	69,41	78,74

Data primer 2018-2019

CONCLUSION

- Cultivation of intercropping systems of rice-corn and soybean corn is more direct than monoculture planting
- Corn-rice intercropping farming is more profitable than soybean-corn intercropping farming
- Monoculture corn farming is more profitable than upland rice and monoculture soybean farming
- The highest R / C ratio is 2.04 in rice-corn intercropping and 1.13 in the soybean monoculture crop
- Wage costs are higher than the cost of purchasing inputs
- Intercropping technology innovation can improve land-use efficiency and farmers' incomes

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