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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Performance and Productivity of Rice and Corn Intercropping in Dry Land of Jambi Province

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Abstract. The aim of the study was to determine the performance and productivity of rice and corn intercropping on dry land. The assessment was carried out in Tambang Emas Village of South Pamenang Subdistrict, Merangin District, Jambi Province, from November 2018 to March 2019. The results that the growth of Inpago 10, Sukmaraga maize, can grow well on dry land. Pests that attack like white pests and stink bugs and birds. While the disease is neck blast with an intensity of attacks of 20 percent. The yield of rice obtained 3,69 t/ha GDH, and corn yields 8,0 t/ha dry shelled.

Keywords: Performance, Productivity, Rice and Corn Intercropping and Dryland

INTRODUCTION

Jambi Province, with an area of 5.1 million hectares, consists of 2.65 million ha of dry land and 352,410 ha of agricultural food crops. Based on the identification and characterization of AEZ, there is approximately 1,380,700 ha of dry land for agricultural land, which is suitable for the development of upland rice, maize, and secondary crops, while land suitable for 246,482 hectares of rice. Rice and secondary crops are important commodities in Jambi Province, so they are a priority in the agricultural program (Busyra et al. 2000). Food plants are important crops for the people of Indonesia. Meeting the food needs of the population, which continues to grow by 1.36 percent, needs to be done in an effort to increase food production in line with the increasing needs (IAARD, 2009).

Rice is a strategic food commodity and a priority in supporting agricultural programs. So far, rice farming in Indonesia is still the backbone of the rural economy (Budianto,2003). Cultivation of new superior rice varieties in sub-optimal land is a challenge as well as an opportunity, with adaptive technology innovation sub-optimal land can be a source of growth and production of rice (Jumakir, 2017). Corn is one of the food crops that is used as the second staple food after rice and an important source of protein for the community (Suarni and Yasin, 2011). The procurement of domestic rice production is very important in the context of the sustainability of national food security with the goal of achieving self-sufficiency in food (rice) (Suryatna, 2007). In an effort to increase agricultural production, the government has so far carried out through extensification, intensification, rehabilitation, and diversification programs (Yuwariah, 2011). One effort to increase agricultural production through intercropping cropping patterns. Intercropping is planting more than one crop at the same time or during the planting period in the same place

(Warsana, 2009). Some of the advantages of intercropping systems include the use of vacant land between staple crops, increased total production of broad unity because it is more effective in the use of light, water, and nutrients while reducing the risk of crop failure and suppressing weed growth. Furthermore, Beets (1982), the advantages of the intercropping system include facilitating maintenance, minimizing the risk of crop failure, saving in the use of production facilities, and being able to increase land-use efficiency.

Crop intercropping system using the legowo planting method can be applied to paddy or dry land with soil fertility and sufficient water resources. The Legowo planting system, in addition to increasing yields, is and efforts to increase cropping index (IP) intercropping patterns. Increased IP can increase yields, and land management will be more productive. One type of plant that can be used as an intercrop in corn is rice. Corn and rice that are intercropped will have competition in fighting over nutrients, water, and sunlight so that the planting system and fertilizer application are very important to reduce the competition. According to Odum (1983), intercropped plants are other plants of the family, and that meet the requirements that are different in nutrient requirements, pests and diseases, sensitivity to toxins, and the same controlling factors at different times.

The selection of composer plants in intercropping is based on morphological and physiological characters, including depth and distribution of root systems, canopy shape, photosynthetic trajectories, nutrient uptake patterns so that a synergistic growth, development and yield results are obtained (Gomez and Gomez, 1983. Palaniappan , 1985). Furthermore, Azizah et al. (2017) that the selection of rice as a companion crop of corn is expected to interact positively. Corn as a C4 plant requires full light intensity, while rice as a C3 plant requires the opposite, thus through active environmental modification taking into account the physiological aspects of the plant. The purpose of the study was to determine the performance and productivity of rice and corn intercropping on dry land.

METHODOLOGY

Rice and corn intercropping assessments were carried out in Tambang Emas Village, Pamenang Selatan District, Merangin sub-District, Jambi Province, from November 2018 to March 2019. Pasundan farmer group with 1 ha planting area and dryland agroecosystem. The upland rice variety used was Inpago 10, while the corn variety was Sukmaraga. This study applies cultivation technology with integrated crop management (ICM) approach. Components of rice and corn intercropping cultivation technology are shown in Table 1.

Table 1. The technology components of intercropping rice and corn with approached ICM in dry land of Merangin District

No	Technology Components	Rice	Corn
1.	Tillage	Perfect tillage	Perfect tillage

2.	Seed	Labeled/quality	Labeled/quality
	Total	50 kg/ha	25 kg/ha
	Agrimeth	500 gr/25 kg	-
3.	Planting system	Planting equipment	Planting equipment
4.	Spacing	(20 cm x 10 cm) x 100 cm	(40 cm x 12,5 cm) x 120 cm
5.	Varieties	Inpago 10	Sukmaraga
6.	Manure (kg/ha)	1.000	
7.	Inorganic fertilizer (kg/ha)		
	- Urea	200	
	- Phonska	300	
8.	Pest control	Integrated pest control	

The technology component with the ICM approach includes the use of superior varieties (rice and corn), planting with planting equipment, (20 cm x 10 cm) x 100 cm rice spacing and (40 cm x 12,5 cm) x 120 cm corn spacing. Agrimeth 500 gr/25 kg as a seed treatment. The dosage of fertilizer given is 200 kg Urea, Phoska 300 kg/ha, and 1000 kg/ha manure and IPM. Soil processing is done by perfect tillage using a hand tractor—Upland rice planting using planting tools and previously mixed with Agrimeth rice seeds (seed treatment). After planting rice is carried out, giving manure 1000 kg/ha to close the planting hole and, at the same time, as fertilizer. Furthermore, planting corn around 10-14 days after planting upland rice using planting tools.

Rice parameters observed were growth percentage, crop performance, the height of the plant before harvest, number of productive tillers, panicle length, number of filled grains, number of empty grains, and yield. Corn plant parameters observed were growth percentage, crop performance, plant height, cob length, cob weight, and yield as well as farmers ' perceptions/farmers' responses to technological innovation in rice and corn intercropping.

The data collection method for rice is as follows:

1. Plant height (cm). Retrieval of plant height data can be done if it has been cooked physiologically until the time of harvest. Plant height is measured from ground level to the longest panicle in the sample plant observed at harvest.
2. The number of productive tillers is calculated for each plant sample.
3. The panicle length is calculated from the panicle neck to the tip of the panicle.
4. The number of filled grains per panicle (seeds). Data on the amount of filled grains per panicle was obtained by counting all filled grain in the sample plants observed at harvest.
5. The number of empty grains per panicle (seeds). Grains that do not produce seeds perfectly classified into grain that is not pithy or hollow in the sample plants observed at harvest.
6. Results per plot are calculated by weighing all the results obtained from sample plots.

The data collection method for corn is as follows:

1. Plant height (cm). Plant height is measured from ground level until the longest leaf in the sample plant was observed.
2. The length of the cobs, calculated from the base of the cobs to the ends of the cobs.
3. Cob weight, calculated by weighing the weight of the cobs per sample
4. The diameter of the cobs, calculated by measuring the circle of cobs per sample.
5. Results per plot are calculated by weighing all the results obtained from sample plots.

RESULTS AND DISCUSSION

Location Characteristics

The assessment site has a wavy topography with a height of 65 m above sea level. In general, the farming system developed in the village is an annual crop-based farming system, namely oil palm and rubber. The characteristics of the land at the study site are black gray to dark brown, crumbly structured and sandy and clay texture, low nutrient content, and slightly acidic soil pH. The soil condition needs improvement to optimize plant growth and yield. The addition of organic material in the form of manure/compost can add nutrients, improve soil physical properties, and can bind micro-nutrients excess (Buckman and Brady, 1982). Furthermore, Sanchez (1976) said that the nutrients the plants most needed were nitrogen, phosphorus, and potassium. The rainfall pattern at the location is almost evenly distributed throughout the year, with the highest monthly rainfall generally occurring in December / January and the lowest rainfall in August. Usually, the rainy season starts in September / October and the dry season in April / May. In Pamenang Selatan sub-district, the rain continued to occur throughout the year, although with varying intensity and distribution between months. If the wet month is a month with rainfall> 200 mm, then there are at least 5-6 wet months and 6 dry months or according to Oldeman (1975) included in the classification of C3 agro-climate. In the C3 agro-climate zone, the appropriate cropping pattern is paddy/rice. 200 mm/month rainfall is the lowest rainfall limit for lowland rice, and 100 mm /month rainfall is the lowest limit for crops. Judging from the rainfall pattern, the choice of farmers to apply the cropping pattern of dry land -palawija-palawija is an option that is in accordance with the agro-climate zone.

Rice Growth and Yield

The percentage of growth of rice plants in rice and corn intercropping reached 90 percent, the high percentage of growth is due to the quality of quality seeds, the availability of nutrients in the soil with the addition of organic fertilizer. The growth of rice plants showed excellent performance in the vegetative and generative phases. The phenotypic appearance of plants is a reflection of genetic and environmental

influences during plant development so that it can change the stability of the characteristics of a rice variety. From the results of Satoto and Suprihatno's research (1998), that the diversity of rice plant characteristics is determined by the diversity of the environment and the diversity of genotypes as well as their interactions. Furthermore, Vegara (1982) said that the ability of plant adaptation to the environment is influenced by metabolic activities, which vary depending on the variety. The pests that appear on rice plantations are stinky bugs, and birds, while the disease is neck blast. The intensity of the attack of neck blast disease is around 20 percent. The control of pest control by spraying insecticides and controlling the disease is carried out by spraying fungicides while controlling bird pests by being guarded by farmers. According to Sudir et al. (2002) that in addition to environmental factors, the emergence of attacks of blast disease in rice plants is also influenced by genotype factors of these varieties. Inpago 10 rice varieties have characteristics that are somewhat resistant to resistance to blast disease (Jamil et al., 2016). Efforts to develop superior varieties are not only adaptive, high yield potential, early maturity, but also resistant and somewhat resistant to blast disease (Jumakir and Endrizal, 2017).

Table 2. Growth and yield of rice in intercropped rice and corn in the dry land of Tambang Emas Village, Pamenang Selatan sub District Merangin District

No	Rice	Intercropping Rice and Corn
1	Plant height (cm)	124,93
2	Number of tillers	12,00
3	Panicle length	23,53
4	Number of filled grains/panicles	103,27
5	Number of empty grains/panicles	27,33
6	Weight 1000 grains (gr)	23,50
7	Yield (tons/ha)	3,69

The observations showed that the plant height was 124.93 cm, and the number of productive tillers was 12.00. Growth of rice plant height seems to continue to increase from the age of about 30 DAP to age 60 DAP, upland intercropping of rice with maize gives the effect of plant height at around 60 DAP, due to the influence of the amount of light received by rice. The growth of corn plants is relatively faster than rice plants resulting in reduced light penetration into the rice canopy. The results of the research of Dewi et al. (2014) that the height of rice plants at the age of 60 DAP and 75 DAP was higher than monoculture plants, due to the morphological adjustment of upland rice plants to the shade of corn plants so that the height of rice plants increased. According to Sasaki et al. (2010) that plant height and number of productive tillers are influenced by plant varieties or genetic factors of a plant (De Datta, 1981).

Furthermore, according to Simanihuruk (2010) that the number of tillers was influenced by crop competition in one clump so that the less competitive plants would die, apart from that due to the intake of photosynthates that were used could not meet the needs of plants for the overall growth of tillers. The number of productive tillers is related to the yield, and the number of productive tillers will reduce the yield (Hatta, 2011). The panicle length was 23.53 cm, the number of filled grain per panicle was 103.27, while the number of empty grains per panicle was 27.33. According to Vegara (1982), that the activity of plants during filling of grain greatly determines the weight of the grain. Furthermore, according to Suhartini (2010) that the weight of 1000 grains and panicle length of rice plants is also influenced by genetic factors. Furthermore, Wahyuni et al. (2006), seeds with a high density and 1000 grain weight, showed more complete seed filling rates. Optimum light intensity and sufficient water availability produce sufficient assimilate for filling seeds and ultimately contribute to density, 1000 grain weight, and high yield.

Rice yield obtained 3.69 t/ha GDH. According to Sharma et al. (2013) that there are three quantitative characters that influence yield, namely the number of panicles, the number of seeds per panicle, and the weight of seeds. From table 1 it can be seen that the yield component of rice shows that the level of corn shade can still be tolerated, and environmental conditions such as water availability, nutrients and microclimate are still optimum for both the growth of rice plants and corn plants (Sasmita, 2006). The results of the research of Dewi et al. (2014), showed that the intercropping of upland rice with sweet corn tended to capture lower light compared to the monoculture of upland rice plants, the closer the distance of sweet corn planting on intercropping treatment, the lower the light captured by upland rice. Plants with high density cause the intensity of the received light is getting lower.

Corn Growth and Yield

Table 3. Growth and yields of maize on rice and corn intercrops in the dry land of Tambang Emas Village, Pamenang Selatan sub District Merangin District

No	Corn	Intercropping Rice and Corn
1	Plant height (cm)	235,2
2	Cob length	19,33
3	Cob diameter	7,13
4	Cob weight	326,07
5	Weight 100 seeds (gr)	265
6	Yield (tons/ha)	8,0

Data on average plant height, ear length, ear diameter, ear weight, and corn yield are shown in Table 2. Field observations indicate that the growth and yield of corn plants are quite good. Corn plants are planted 14 days after planting rice, it is seen that the growth of corn plant height is faster than rice plants so that the acceptance of sunlight on corn plants is quite a lot. The high level of photosynthesis

due to the optimum light intensity and the availability of sufficient water in the crop will produce enough assimilates for filling the seeds and ultimately contribute density, 1000 grain weight, and high yields (Wahyuni et al., 2006).

The response of farmers to intercropping rice and corn is quite good, especially Inpago 10 and Sukmaraga seen in the field showing high growth and yields on dry land. With the response of farmers/PPL high enough to intercropping rice and corn, then the next planting season tries planting intercropping. However, there are suggestions from some PPL and farmers that the distance of rice planting is rather extensive, and the number of rows has been added, and the time for planting corn is 3 weeks after planting rice. According to Taryoto (1996) that technology adoption is a mental process and behavior change in the form of farmers' knowledge, attitudes, and skills since they know until they decide to implement it. Also, environmental factors that encourage the use of innovation include counseling. Farmers' participation in extension has a real influence on the possibility of adopting new technologies. Counseling material related to intercropping rice and corn can increase land and crop productivity and income so that it is attractive to farmers. Higher educated farmers have more significant opportunities to adopt the technology. Agricultural counseling enables farmers to gain new knowledge or skills related to agriculture. The agricultural extension can be a means for extension workers to introduce an agricultural innovation. Thus, farmers who are always present in counseling have a more significant opportunity to adopt an innovation because they have higher knowledge and skills related to innovation than farmers who have never attended agricultural extension (Ouma et al., 2006; Satoto et al., 2010).

CONCLUSION

The cropping pattern of intercropping rice, Inpago 10, and corn varieties of Sukmaraga, their growth is quite good on dry land, meaning that these varieties can adapt to the agroecosystem. Constraints on rice plants are white pests and stinky bugs and birds. While the disease is neck blast with an attacking intensity of 20 percent, Rice yields are 3.69 t/ ha Dry Grain Harvest (DGH), and corn yields 8.00 t/ha dry shelled.

The response of farmers to intercropping rice and corn is quite good, Inpago 10 and Sukmaraga varieties seen in the field show high growth and yields on dry land. However, there are suggestions from some PPL and farmers that the distance of rice planting is rather extensive, and the number of rows is added, and the time to plant corn is 3 weeks after planting rice.

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REFERENCES

Azizah E, Setyawan A, Kadapi M, Yuswariah Y dan Ruswandi D. 2017. Identifikasi morfologi dan agronomi jagung hibrida Unpad pada tumpangsari dengan padi hitam di dataran tinggi Arjasari Jawa Barat. Jurnal Kultivasi 16(1) : 260-264

Beets WC. 1982. Multiple croping and tropical farming system. England : Westview Press.

Buckman Harry O dan Nyle C Brady. 1982. Ilmu tanah. Bharata Karya Aksara. Jakarta

Budianto D. 2003. Kebijaksanaan penelitian dan pengembangan teknologi

peningkatan produktivitas padi terpadu di Indonesia. Prosiding Lokakarya pelaksanaan program peningkatan Produktivitas Padi Terpadu (P3T) Tahun 2003. Puslitbangtan. Bogor

Busyra BS, N Izhar, Mugiyanto, Lindawati dan Suharyon 2000. Karakterisasi zona agro ekologi (AEZ): Pedoman Pengembangan Pertanian di Provinsi Jambi. Instansi Penelitian dan Pengkajian Teknologi Pertanian Jambi. Badan Litbang Pertanian. Deptan.

De Datta SK. 1981. Principles and practices of rice production. John Willey and Sons. New York.

Dewi SS, dan Soelistyono R. 2014. Kajian pola tanam tumpangsari padi gogo (*Oryza sativa* L.) dengan jagun manis (*Zea mays saccharata sturt* L.). Jurnal Produksi tanaman 2(2) : 137-144

Gomez AA dan AK Gomez. 1983. Multiple croping in the humid tropic of Asia. Inter national Development Research Centre. Ottawa.

Jamil A, Satoto, Sasmita P, Baliadi Y, Guswara A dan Suharna. 2016. Deskripsi varietas unggul baru padi. Badan Penelitian dan Pengembangan Pertanian. Kementerian Pertanian. Balai Besar Penelitian. Tanaman Padi. Sukamandi.

Jumakir. 2017. Budidaya padi varietas unggul lahan rawa. IAARD Press. Jakarta. 136 hal.

Jumakir dan Endrizal. 2017. Keragaan dan produktivitas beberapa varietas unggul baru inpara di lahan rawa pasang surut tipologi lahan sulfat masam di Provinsi Jambi. Jurnal Pangan 26(1) : 107-116

Hatta M, 2011. Pengaruh tipe jarak tanam terhadap anakan, komponen hasil dan hasil dua varietas padi pada Metode SRI. Floratek 6(1) : 104-113

Odum EP. 1983. Basic ekology. CBS College. Publishing. Japan

Ouma, J. O., H. D. Groote, dan G. Owuor. 2006. *Determinants of Improved Mayze Seed and Fertilizer Use in Kenya: Policy Implications.* Contributed paper prepared for presentation at the International Association of Agricultural Economists Conference, Gold Coast, Australia, August 12-18, 2006

Palaniappan. 1985. Cropping system in the tropics: principles and managemnet. Wiley Easten Limited and Tamil Nadu Agricultural University. Coimbataro.

Sanchez, P.A. 1976. Properties and management of soil in the tropic. John Wiley and Sons,Inc. New York

Satoto dan B Suprihatno. 1998. Heterosis dan stabilitas hasil hibrida-hibrida padi turunan galur mandul jantan IR62829A dan IR58025A. Jurnal Penelitian Tanaman Pangan. Vol 17. No 1. 1998. Puslitbangtan. Badan Litbangtan. Bogor

Satoto, Y. Widyastuti, I. A. Rumanti dan Sudibyo. 2010. Stabilitas Hasil Padi Hibrida Varietas Hipa 7 dan Hipa 8 dan Ketahanannya terhadap Hawar Daun Bakteri dan Tungro. Penelitian Pertanian Tanaman Pangan. PP29/03 : 129-135.

Sasmita P, Bambang S, Sujiprihati, Hanarida dan MA Choizon. 2006. Evaluasi pertumbuhan dan produksi padi gogo haploid ganda toleran naungan dalam sistem tumpangsari. Buletin Agronomi 34(2): 79-86

Suarni dan Yasin M. 2011. Jagung sebagai sumber pangan fungsional. Iptek Tanaman Pangan 6(1): 41-56

Suryana A. 2007. Menelisik ketahanan pangan, kebijakan pangan dan swasembada beras. Orasi Pengukuhan Profesor Riset Bidang Sosial Ekonomi Pertanian. Badan Litbang pertanian. Bogor

Sasaki K, S Ikeda, S Eda, H Mitsui, E Hanzawa, C Kisara, Y Kazama, A Kushida, T Shinano, K Minamisawa dan T Sato. 2010. Impact of plant genotype and nitrogen level on rice growth response B510 under paddy field conditions. Soil Sci and Plant Nut 56: 636-644.

Sharma D, Sanghera GS, Sahu P, Parikh M, Sharma B, Bhandarkar S, Chaudhari PR and Jena BK. 2013. Tailoring rice plant for sustainable yield trough ideotype breeding and physiologycal intervations. Afr. J. Agric.Res. 8(40) : 5004-5019

Simanihuruk BW. 2010. Pola pertumbuhan dan hasil padi gogo yang disubtitusi bahan organik dengan manipulasi jarak tanam. Jurnal Argoekologi 26(2): 334-340

Sudir, Suprihatno, Agus Guswara dan Husin M Toha. 2003. Pengaruh genotipe, pupuk dan fungisida terhadap penyakit blas leher pada padi gogo. Jurnal Penelitian Tanaman Pangan. Vol 21. No 1. 2003. Puslitbangtan. Badan Litbangtan. Bogor

Suhartini, T. 2010. Keragaman karakter morfologis plasma nutfah spesies padi liar (*Oryza sativa* sp). Buletin Plasma Nutfah Vol 16 No 1. Hal : 17-28

Taryoto, AH. 1996. Telaah, Teoritik dan Empirik Difusi Inovasi Pertanian. Forum Penelitian Agro Ekonomi. Pusat Penelitian dan Pengembangan Sosial Ekonomi Pertanian. Bogor

Vegara BS. 1982. Low temperature problems in growing rice. Lecture Notes gev Training at IRRI. Los Banos, Philippines.

Yuswariah Y. 2011. Dasar-dasar sistem tanaman ganda. Jurusan Budidaya Pertanian. Fakultas Pertanian UNPAD Bandung.

Wahyuni S, Trint S, Kadir dan Udin S Nugraha. 2006. Benih padi gogo pada lingkugan tumbuh berbeda. Jurnal Ilmu Pertanian Indonesia 25(1) ; 30- 37