Eco. Env. & Cons. 27 (November Suppl. Issue) : 2021; pp. (S331-S338)
Copyright@ EM International
ISSN 0971–765X

Determinant of rice farmers welfare in wetlands of South Sumatra Province, Indonesia

Endang Lastinawati[1]*, Andy Mulyana[2], Imron Zahri[2] and Sriati[2]

[1]Department of Agribusiness, Agricultural Faculty, Baturaja University, Indonesia
[2]Department of Agribusiness, Agricultural Faculty, Sriwijaya University, Indonesia

(Received 12 June, 2021; Accepted 17 July, 2021)

ABSTRACT

Rice is the staple food in Indonesia, and high demand makes tidal and swamp lands a potential alternative to increase its production. But, efforts to increase the production are often not in line with the farmers welfare. Therefore, this study aims to compare the farmers welfare in tidal and swamp land areas and the influencing factors.A survey method was used and the selected locations were determined purposively to be two villages with tidal land type and another two with swamp land type in Banyuasin Regency, South Sumatra Province. From each village, 30 samples were selected randomly, therefore the total was 120 farmers. Welfare was measured by the rice subsistence exchange rate indicator and its determinants were analyzed using multiple linear regression. The study results found that farmers in swamp land were more prosperous than those in tidal land. The factors that have a significant effect on their welfare in both lands are food and non-food consumption, production costs, and yield. Meanwhile, the grain price only had a significant effect on swamp land.

***Key words**: Rice subsistence exchange rate, Tidal and swamp.*

Introduction

As a source of fiber, energy, minerals, vitamins, and other biomolecules, rice has become a very important and popular staple food (Sen *et al*., 2020). Efforts to increase its availability, accessibility, and affordability are continuously made through infrastructure provision, study and development as well as the establishment of various regulations, both on the production and price aspect (Pasaribu, 2010; Panuju *et al*., 2013).

Ironically, stagnation and decline in rice production have occurred in many agricultural areas. These raise the need for alternative land utilization to increase global rice production with about 1 billion Mg by 2050 (Nath and Lal, 2017). Wetlands are an alternative that are used for the rice farming development and they are an important natural resource due to being a provider of water and nutrients that serve as the rural economy's foundation (Schuyt, 2005; Biswas *et al*., 2010; Nabahungu and Visser, 2011). In Nigeria, these lands have great potential in fighting poverty, as more people depend on them for a living (Oladele and Wakatsuki., 2008). In the tropical regions, wetlands are unevenly distributed and they represent 3% of the world's total land area (Nath and Lal, 2017). One type of these is grouped into two zones based on tidal influences, namely tidal and non-tidal swamps (*lebak*). Tidal land is affected by the sea and/or rivers' tidal waters movement, either directly or indirectly. Meanwhile, swamp land are more influenced by local water (water logging) and water delivered from upstream areas (Wakhid and Syahbuddin, 2019).

***Corresponding author's email:** endang.lastinawati@gmail.com

South Sumatra has around 2.98 million ha of wetlands, including tidal and swamp lands, but only 10% of the total area is currently cultivated for agricultural production (BPS, 2015; Purba, 2020). In this province, Banyuasin regency topography is 80% flat area in the form of tidal and swamp lands (BPS Banyuasin, 2021). The community uses this geographical condition to develop rice farming.

Monoculture rice farming in wetlands has been traditionally cultivated for a long time but its productivity is still low, at 2-4 tons per ha (Lakitan *et al*., 2018). When productivity is high, welfare needs to be higher, although it is inseparable from the influence of other factors (Alfrida and Noor, 2018). In the Cyabayaga wetlands of Rwanda, rice is the largest contributor to households income with an average of $1045 per household per season (Nabahungu and Visser, 2011). According to Adriani and Wildayana (2015), increased production of commondities, including rice, promotes an increase in national income in the agricultural sector by 59.23% and investment in the agricultural product market by 26.93%. Unfortunately, efforts to increase production and productivity are often not accompanied by improvements in farmers welfare. Consequently, farmers exchange rate as a welfare indicator tends to decline (Darwanto, 2014; Rosada *et al*., 2021). The different types of cultivated land further widen the welfare gap. For technical irrigated land, farmers welfare is seemingly higher than suboptimal land, or vice versa.

Several studies have been conducted on the farmers welfare in relation to the differences in land agro-ecosystems. Zahri *et al*. (2018) compared the structure of households income and expenditure in technically irrigated land, tides, and freshwater swamps. They concluded that farmers' incomes are from highest to lowest in technically irrigated land, tidal, and freshwater swamps, but farmers income exchange rate was not compared with household and production expenditures. Sugiarto (2008) compared the rice farmers welfare in technically irrigated land based on the area. Asriani *et al*. (2020) compared the income of lowland and swamp rice farming. Simbolon *et al*. (2021) compared the production factors and income of lowland rice farming with different irrigation systems. Goswami *et al*. (2014) investigated agriculture types and their economic characteristics in a complex agroecosystem in India. Sharma *et al*. (2017) compared the performance of integrated agriculture on rainfed and irrigated land. However, this current study aims to compare the farmers welfare and analyze the influencing factors in tidal and swampagro-ecosystems due to the differences between both.

Materials and Methods

A survey method was used and the selected location was determined purposively to be two villages with a tidal agroecosystem, and another two with a swamp agroecosystem in Banyuasin Regency, South Sumatra Province. These villages were not the target of the government's production facilities assistance program. The farmers welfare is intended to be described in line with existing conditions. Samples were selected by simple random sampling of 30 farmers from each village to make a total of 120.

The rice farmers welfare was calculated using rice subsistence exchange rate (Pramonosidhi in Riyadh, 2015) with the following formula:

$$NTSp = \frac{Pp.Qp}{(Py_i.Qy_i) + (Py_j.Qy_j)}$$

Where:

NTSp = rice subsistence exchange rate
Pp = grain price
Qp = grain yield
Py_i = the price of the i-th consumption product
Qy_i = number of i-th consumption products
Py_j = the price of the jth production input of rice farming
Qy_j = the number of jth production inputs on rice farming

Exchange rate concept describes farmers purchasing power towards products that are bought for household consumption and production inputs. The higher the farmers exchange rate, the better the purchasing power and they also become more prosperous (Budhi and Yasa, 2018). Judging from the composition of expenditure, Syafruddin *et al*. (2018) stated that when the proportion of expenditure on basic needs is higher than the one on non-basic needs, then household welfare is still low.

Furthermore, the factors affecting rice farmers welfare in tidal and swamp areas were analyzed using multiple linear regression with OLS analysis as follows:

$$LnW = Ln\beta_0 + \beta_1 LnL + \beta_2 LnP + \beta_3 LnF + \beta_4 LnNF + \beta_5 LnC + \beta_6 LnY$$

Where:

W = farmer welfare

L = land area (ha)
P = price of harvested dry grain (GKP) (IDR/kg)
F = food consumption (IDR/MT)
NF = non-food consumption (IDR/MT)
C = production cost (IDR/MT)
Y = yield (kg/MT)

Results and Discussion

Characteristics of rice farmers

Table 1 shows the characteristics of rice farmers in tidal and swamp areas in South Sumatra Province. Rice farmers in tidal and swamp areas are at productive age and majority of the household size is 4-6 people. Their education level is generally low because only more than 50% receive basic education in both tidal and swamp areas. However, they are quite experienced in rice farming, especially in the swamp area, while the rice fields managed are owned personally and generally obtained by inheritance. The area of paddy fields is in the medium category, where more than 50% of farmers manage about 1 ha of land.

Characteristics of farming in tidal and swamp lands

Tidal land has physical constraints in its utilization, including acidic soil pH, the presence of toxic substances namely Fe and Al, low soil fertility, and biological constraints in form of pests and diseases. Farmers also face socio-economic problems such as limitations in mastering technology, capital, and labor (Adimiharja *et al*., 1998). Fertilizers containing N, P, and K elements as well as ameliorants are important components to overcome rice development problem in tidal land (Irwandi, 2015).

In swamp land, the main problem in rice cultivation is the unpredictable height of waterlogging, therefore the planting time is often uncertain. At any time, water soaks the rice crops causing harvest failure or low yields. Occasionally, the swamp also becomes dry. When this happens in the generative phase, the empty grain increases and the yield decreases. Therefore, farmers in swamp generally plant long-lived and relatively high local varieties of rice which prevents the crops from submerging even though the yield is low (Suhartatik and Makarim, 2009).

The above condition causes farmers in tidal and

Table 1. Characteristics of rice farmers in tidal and swamp lands, South Sumatra Province

Characteristics	Tidal		Swamp	
	Total	Proportion (%)	Total	Proportion (%)
Age (year)				
a. 22 – 39	31	51.67	4	6.67
b. 40 – 57	19	31.67	34	56.67
c. 58 – 75	10	16.67	22	36.67
Education				
a. Elementary School	32	53.33	37	61.67
b. Junior High School	19	31.67	13	21.67
c. Senior High School	8	13.33	10	16.67
d. Bachelor	1	1.67	0	0.00
Farming experience (year)				
a. 2 – 21	38	63.33	20	33.33
b. 22 – 41	22	36.67	28	46.67
c. 42 – 61	0	0.00	12	20.00
Household size (person)				
a. 1 – 3	23	38.33	19	31.67
b. 4 – 6	36	60.00	40	66.67
c. 7 – 9	1	1.67	1	1.67
Land area (ha)				
a. < 0.5	7	11.67	3	5.00
b. 0.5 – 1	38	63.33	37	61.67
c. > 1	15	25.00	20	33.33

Source: Primary data, 2018

swamp areas to generally plant rice only once a year, due to inadequate water management. For the rice planting season, there is a difference in planting time between tidal and swamp areas. Based on field observations results, the planting season (MT) is from November to March in tidal land. Meanwhile, in swamp land, it is from April – August or May – September, depending on water conditions.

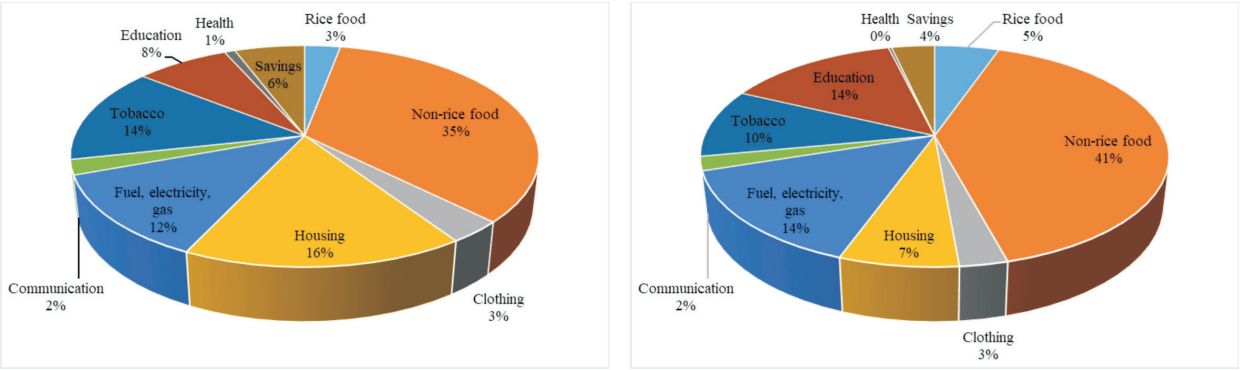
Differences in land types also cause differences in farming pattern and the cost structure of rice farming, one of which is in the nursery process. In tidal land, farmers do not prepare rice seedling, but the seeds are planted directly in the fields (*tabela*). In swamp land, they use the floating nursery method, which causes the rice seeding process to take a long time and cost higher. After the seedlings are ready for planting (approximately 25-30 days old), the rice seedlings are manually transferred to the fields. The rice planting machine is not used in the swamp field because the seeds are too high. Contrarily, in tidal areas, the *tabela* system is economical in planting costs but with difficult maintenance because planted rice grows irregularly. Land preparation is carried out by a manual and machine combination. Meanwhile, a combined harvest machine is later used on both land types, making it more efficient. Agricultural machines are really needed by farmers in tidal and swamp areas because of the limited number of workers.

Farmerswelfare in tidal and swamp lands

The rice farmers welfare in tidal and swamp lands can be seen in Table 2. Based on NTSp value, farmers in swamp are more prosperous than those in tidal areas. Field observations results showed rice production in tidal land was higher than in swamp land. However, the price received by farmers in swamp is higher than in tidal land. This is due to differences in the growing and harvest seasons.

Expenditure for household consumption in tidal areas is higher than in swamp. Conversely, production costs in tidal areas are lower than in swamp. This is supported by Zahri *et al.* (2018) which stated household consumption expenditure of farmers in tidal land is higher than in swamp land. Figures 1 and 2 show the proportion of household consumption expenditure and production costs in both land types.

Household consumption expenditure in this study was on food (rice and non-rice), non-food



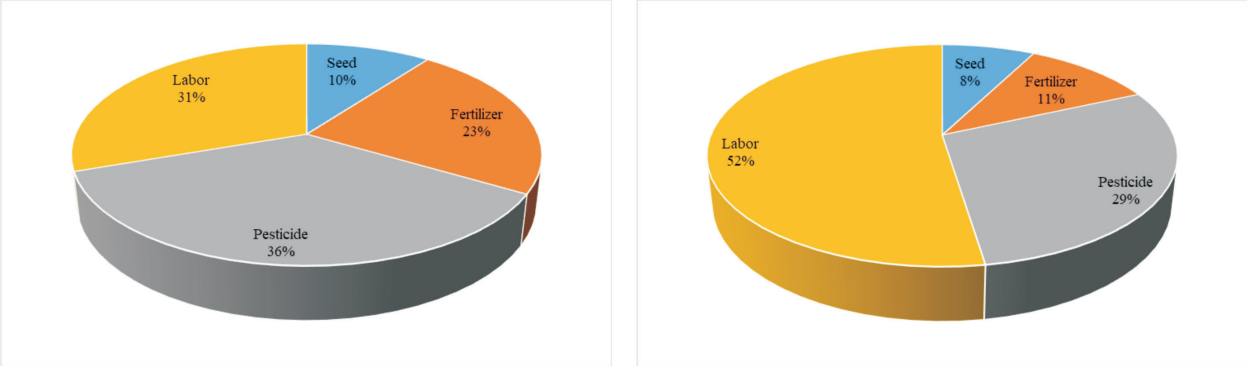
a. Tidal land b. Swamp land

Fig. 1. Proportion of household consumption expenditure

Table 2. Income, expenditure, and welfare of rice farmers in tidal and swamp lands

Variable	Land type	
	Tidal	Swamp
Yield (kg/ha/MT)	5,459	5,086
Grain price (IDR/kg)	4239.17	4470.00
Revenue (IDR/MT)	23,173,579	22,747,434
Household consumption expenditure (IDR/MT)	14,569,911	7,983,656
Production cost (IDR/MT)	5,810,443	6,158,279
NTSp	1.14	1.61

Source: Primary data, 2018



a. Tidal land b. Swamp land

Fig. 2. Proportion of rice farming production cost

(clothing, housing, fuel, electricity, gas, communication, and tobacco), and investment (education, health, and savings). The highest composition of household consumption expenditure is non-rice food, which is 35% in tidal and 41% in swamp areas. Meanwhile, the lowest was expenditure on health, with a proportion of 1% on tidal and 0.27% on swamp areas. When made into a large group of expenditure on food, non-food, and investment, the expenditure from highest to lowest in tidal areas is on non-food (48%), food (38%), and investment (14%). Meanwhile, in swamp areas, the highest to lowest expenditures were on food (46%), non-food (36%), and investment (18%). High food expenditure proportion in swamp land does not mean that the welfare is lower than in tidal areas, but it is influenced by the number of family members. In the swamp area, there are more farmers with family dependents exceeding 4 people compared to tidal lands, however, the share of investment in swamp is higher than in tidal land.

For rice farming production cost, the highest expenditure in tidal land is for pesticides purchase, and in swamp it is labor cost. Pesticides cost is highest in tidal land because of the large number of pests that attacked the growing season when this study was conducted. Under normal conditions, labor costs generally have the largest share in tidal and swamp areas, because the amount is limited, therefore wages are expensive. For fertilizer costs, the proportion in swamp is less due to being relatively more fertile than tidal land. The lowest production cost incurred by farmers in both tidal and swamp areas is for seeds.

Determinants of the rice farmers welfare in tidal and swamp lands

Based on the OLS analysis, the factors affecting the rice farmers welfare can be seen in Tables 3 and 4. The results showed expenditure on food and non-food consumption had a negative and significant effect, while yield had a positive and significant effect on the rice farmers welfare in the tidal and swamp lands ($p < 0.01$). This is slightly different from the study by Fajri *et al*. (2016) that stated non-food expenditure of farmer households has a negative and significant effect, but food expenditure is not significant. Bantilan (2018) stated that spending

Table 3. OLS analysis results of farmers welfare in tidal land

Variable	β	Std. error	t-stat	*p*
Intercept	6.247	7.061	0.885	0.380
Land area (L)	0.014	0.033	0.432	0.668
GKP Price (P)	19.292	58.666	0.329	0.744
Food consumption (F)	-0.378	0.056	-6.726*	0.000
Non-food consumption (NF)	-0.241	0.031	-7.694*	0.000
Production cost (C)	-0.392	0.150	-2.605**	0.012
Yield (Y)	0.913	0.065	14.158*	0.000

Note: F-stat = 87.068; R square = 0.908; *significant at $p< 0.01$; and **significant at $p< 0.05$.

Table 4. OLS analysis results of farmer welfare in swamp land

Variable	β	Std. error	t-stat	*p*
Intercept	0.576	2.678	0.215	0.831
Land area (L)	-0.017	0.040	-0.434	0.666
GKP Price (P)	0.560	0.194	2.888**	0.006
Food consumption (F)	-0.337	0.049	-6.874*	0.000
Non-food consumption (NF)	-0.191	0.022	-8.716*	0.000
Production cost (C)	-0.307	0.138	-2.232**	0.030
Yield (Y)	0.985	0.048	20.408*	0.000

Note: F-stat = 167.806; R square = 0.950; *significant at $p< 0.01$; and **significant at $p< 0.05$.

on food and non-food consumption increases farmers' welfare. For yield variables, Nirmala *et al*. (2016), Bantilan (2018), Wahed (2018) in Jember, Kadiri and Eze (2015) in Nigeria, also discovered rice yield has a positive and significant effect on farmers' welfare.

Production costs also had a negative and significant effect on the farmers welfare in both land types ($p < 0.05$). This is confirmed by the Nirmala *et al*. (2016) that the price of fertilizers and pesticides as a production costs component, has a negative and significant effect on the farmers welfare. This means that when production costs increase, the farmers welfare decreases.

The dry grain harvested price has a positive and significant effect only in swamp land ($p < 0.05$). This slightly contradicts Budhi and Yasa (2018) that stated price variable has a negative and significant effect. Prices do not directly affect the farmers welfare, but the problem is thought to be in the supply chain. Conversely, Nirmala *et al*. (2016); Rasyid and Budyanra (2018); and Wahed (2018) stated the grain price has a positive and significant effect on the farmers welfare and these conditions are different in each region. In the current study, in tidal land, the grain price has no significant effect because the harvest season in tidal land coincides with that of irrigated and rainfed land in other areas. Consequently, rice production is abundant and farmers' grain prices are falling, but an opposite situation occurs in swamp areas. Different planting seasons in swamp areas cause farmers to harvest during the lean season, therefore grain price is higher than in tidal areas. This means grain price has a positive and significant effect on the farmers welfare in the swamp land, but not significantly in the tidal land.

The land area variable has no significant effect on the farmers welfare in tidal and swamplands. This is in line with Budhi and Yasa (2018) that stated rice fields area has a positive but not significant effect. Contrarily, Wahed's (2018) study in Jember discovered land area has a positive and significant effect on the rice farmers welfare. Meanwhile, Nirmala *et al*. (2016) showed land area has a negative and significant effect. In the tidal and swamp lands, the area is not significantly affected because more than 50% of farmers only own less than 1 ha. The tidal and swamp lands have been fragmented, causing difficulty for farmers to manage their farming (Purba *et al*. 2020). Rice fields narrowness causes investment not to produce an adequate surplus return, therefore worsening the farmers welfare in Indonesia (Syafruddin *et al*., 2018; Putri and Noor, 2018). Farmer households that experienced a decreased agricultural land area caused a decrease in their per capita expenditure by IDR 36,833 in 2000 and IDR 68,683 in 2007 (Moeis *et al*., 2020). Therefore, support from the Government is required in sustainable land management (Issahaku and Abdulai, 2020). Maintaining agricultural land ownership needs to be a major concern in agricultural development to better the farmers welfare.

Conclusion

Farmers in swamp land are more prosperous than in tidal land. The factors affecting their welfare are food and non-food consumption expenditure, production costs, and yield, meanwhile, the grain price only affects swamp land. The policy implications needed to improve the farmers welfare in both areas include increasing the land area and guaranteeing prices that are profitable for farmers as well as affordable for consumers. Investments are also needed in human resources and technological modernization, due to farmers low education level and the limited number of workers in both agroecosystems. Business diversification is also needed, therefore

farmers that have narrow lands in swamps and swamp tends to enhance their income and welfare. The policy scenarios simulation conducted by Jogo and Hassan (2010) showed diversification of livelihoods outside agriculture improves farmers welfare and wetland conservation concurrently.

References

Adimihardja, A., Sudarman, K. and Suriadikarta, D.A. 1998. Pengembanganlahan pasang surut: keberhasilan and kegagalanditinjaudariaspe kfisikakimialahan pasang surut. *Proceeding. Seminar Nasional Hasil Penelitian Menunjang Akselerasi Pengembangan Lahan Pasang Surut.* Balitbangtan, Puslitbangtan, Balittra. Banjarbaru.

Adriani, D. and Wildayana, E. 2015. Integrasi pertumbuhanekonomi and penciptaankesempatan kerjasektorpertanian di Indonesia. *Sosiohumaniora.* 18(3) : 203-211.

Alfrida, A. and Noor, T.I. 2018. Analisispendapatan dan tingkatkesejahteraanrumahtanggapetanipadi sawah berdasarkanluaslahan. *Jurnal Ilmiah Mahasiswa Agroinfo Galuh*. 4(3): 803-810.

Asriani, W., Noor, T.I. and Isyanto, A.Y. 2020. Analisisperbedaanpendapatan pada usahatanipadi sawah and padirawa. *Jurnal Ilmiah Mahasiswa Agroinfo Galuh*. 7(1) : 160-165.

Bantilan, N.K., Wahyuningsih, M.A. and Rauf, R.A. 2018. Improved exchange rate farmers through rice falied crop intensification in Tolitoli, Indonesia. *Sustainable Agriculture Research*. 7(1): 1-6.

Biswas, M., Samal, N.R., Roy, P.K. and Mazumdar, A. 2010. Human wetland dependency and socio-economic evaluation of wetland functions through participatory approach in rural India. *Water Science and Engineering*. 3(4) : 467-479.

BPS. 2015. *Statistik Pertanian Sumatera Selatan 2015*. http://sumsel.bps.go.id/index.php/linkTabelStatis/49. Accessed April 5, 2021.

BPS Banyuasin. 2021. *Kabupaten Banyuasindalamangka 2021*. https://banyuasinkab.bps.go.id/publication.html. Accessed April 5, 2021.

Budhi, M.K.S. and Yasa, I.N.M. 2018. The impact of rice field size and rice price on farmers welfare in Indonesia. *International Journal of Science and Research*. 8(10) : 1793-1798.

Darwanto, D.H. 2014. Tinjauankebijakanperberasan and esejahteraanpetani di Indonesia, p. 15-39. In: Krisnamurthi, B. *Ekonomi Perberasan Indonesia*; PERHEPI, Bogor.

Fajri, M.R., Marwanti, S. and Rahayu, W. 2016. Analisisfaktor-faktor yang mempengaruhinilaitu karpetanisebagaiind ikatorkesejahteraanpetanipadi di Kabupaten Sragen. *Agrista*. 4(2): 85-94.

Goswami, R., Chatterjee, S. and Prasad, B. 2014. Farm types and their economic characterization in complex agro-ecosystems for informed extension intervention: study from coastal West Bengal, India. *Agricultural and Food Economics*. 2(5): 1-24.

Irwandi, D. 2015. Strategi peningkatanpeman faatanlahanrawa pasang surutdalammen dukungpening katanproduksiberas di Kalimantan Tengah. *Agriekonomika*. 4(1): 97-106.

Issahaku, G. and Abdulai, A. 2020. Household welfare implications of sustainable land management practices among smallholder farmers in Ghana. *Land Use Policy*. 94 : 1-14.

Jogo, W. and Hassan, R. 2010. Balancing the use of wetlands for economic well-being and ecological security: The case of the Limpopo wetland in southern Africa. *Ecological Economics*. 69(7): 1569-1579.

Kadiri, F. and Eze, C. 2015. Effects of paddy rice production on the welfare of farmers and the determinants of the achievements of paddy rice farmers in Niger Delta Region of Nigeria. *Journal of Economics and Sustainable Development*. 6(4): 202-209.

Lakitan, B., Hadi, B., Herlinda, S., Siaga, E., Widuri, L.I., Kartika, K., Lindiana, L., Yunindyawati, Y. and Meihana, M. 2018. Recognizing farmers' practices and constrains for intensifying rice production at Riparian Wetlands in Indonesia. *NJAS – Wageningen Journal of Life Sciences*. 85: 10-20.

Moeis, F.R., Dartanto, T., Moeis, J.P., Ikhsan, M. 2020. A longitudinal study of agriculture households in Indonesia: The effect of land and labor mobility on welfare and poverty dynamics. *World Development Perspectives*. 20: 1-17.

Nabahungu, N.L. and Visser, S.M. 2011. Contribution of wetland agriculture to farmers' livelihood in Rwanda. *Ecological Economics*. 71: 4-12.

Nath, A.J. and Lal, R. 2017. Managing tropical wetlands for advancing global rice production: Implications for land-use management. *Land Use Policy*. 68: 681-685.

Nirmala, A.R., Hanani, N. and Muhaimin, A.W. 2016. Analisisfaktor-faktor yang mempengaruhinilaitu karpetanitanamanpangan di KabupatenJombang. *Jurnal Habitat*. 27(2): 66-71.

Oladele, O.I. and Wakatsuki, T. 2008. Social factors affecting wetlands utilization for agriculture in Nigeria: A case study of sawah rice production. *Rice Science*. 15(2): 150-152.

Panuju, D.R., Mizuno, K. and Trisasongko, B.H. 2013. The dynamics of rice production in Indonesia 1961-2009. *Journal of the Saudi Society of Agricultural Sciences*. 12(1): 27-37.

Pasaribu, S.M. 2010. Developing rice farm insurance in Indonesia. *Agriculture and Agricultural Science Procedia*. 1: 33-41.

Purba, K.F., Yazid, M., Hasmeda, M., Adriani, D. and Tafarini, M.F. 2020. Technical efficiency and factors

affecting rice production in tidal lowlands of South Sumatra Province Indonesia. *Potravinarstvo Slovak Journal of Food Sciences*. 14 : 101-111.

Putri, C.K. and Noor, T.I. 2018. Analisispendapatan dan tingkatkesejahteraanrumahtanggapetanipadi sawah berdasarkanluaslahan di Desa Sindangsari, KecamatanBanjarsari, Kabupaten Ciamis, Provinsi Jawa Barat. *JurnalIlmiah Mahasiswa Agroinfo Galuh*. 4(3): 927-935.

Rasyid, A.A. and Budyanra, 2018. Determinan kesejahteraan petanitanamanpangan di Provinsi Aceh tahun 2012 – 2017. *Jurnal Perspektif Ekonomi Darussalam*. 4(2) : 178-198.

Riyadh, M.I. 2015. Analisisnilaitukar petanikomo ditastanamanpangan di Sumatera Utara. *Jurnal Ekonomi and Kebijakan Publik*. 6(1): 17-32.

Rosada, I., Nurliani, Gobel, F.A., Amran, F.D. and Aminah, 2021. Strategy development to improve food security at the household level of rice farmers in South Sulawesi, Indonesia. *Ecology, Environment and Conservation*. 27(1) : 29-39.

Schuyt, K.D. 2005. Economic consequences of wetland degradation for local populations in Africa. *Ecological Economics*. 53(2) : 177-190.

Sen, S., Chakraborty, R. and Kalita, P. 2020. Rice – not just a staple food: A comprehensive review on its phytochemicals and therapeutic potential. *Trends in Food Science & Technology*. 97 : 265-285.

Sharma, R.L., Abraham, S., Bhagat, R. and Prakash, O. 2017. Comparative performance of integrated farming system models in Gariyaband region under rainfed and irrigated conditions. *Indian Journal of Agricultural Research*. 51(1) : 64-68.

Simbolon, M., Setiawan, B.M. and Prasetyo, E. 2021. Analisiskomparasifaktor-faktorproduksi dan pendapatan pada usahatanipadilahan sawah dengansistemirigasi yang berbeda di Kecamatan Banyubiru. *Jurnal Ekonomi Pertanian and Agribisnis*. 5(2): 575-583.

Sugiarto. 2008. Analisispendapatan, polakonsumsi dan kesejahteraanpetanipadi pada basis agroekosistemlahan sawah irigasi di perdesaan. *Proceeding Seminar Nasional Dinamika Pembangunan Pertanian and Perdesaan: Tantangan dan Peluangbagi Peningkatan Kesejahteraan Petani*, Bogor, 19 Nopember 2008.

Suhartatik, E. and Makarim, A.K. 2009. Kebutuhan hara padi di lahanrawalebak. *Penelitian Pertanian Tanaman Pangan*. 28 (2) : 101-108.

Syafruddin, Utama, I.M.S., Yasa, I.G.W.M. and Marhaeni, A.A.I.N. 2018. Effect of socio-economic and demographic factors against social capital, farming performance and farmers welfare in Sumbawa, Indonesia. *IOSR Journal of Economics and Finance*. 9(1): 1-8.

Wahed, M. 2018. Pengaruhluaslahan, produksi and hargagabahterhadapkesejahteraanpetanipadi di daerahsentralproduksipadi Kabupaten Jember. *Journal of Economics Development Issues*. 1(1): 33-40.

Wakhid, N. and Syahbuddin, H. 2019. Dinamikawaktutanampadi di lahanrawalebak Pulau Kalimantan. *Agrin*. 23 (2) : 144-154.

Zahri, I., Adriani, D., Wildayana, E., Sabaruddin and Harun, M.U. 2018. Comparing rice farming appearance of different agroecosystem in South Sumatra, Indonesia. *Bulgarian Journal of Agricultural Science*. 24(2): 189-198.