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Planting and Consumption Patterns of Upland Rice Farmer in Indonesia

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Abstract. There are 2 types of farmers, namely commercial farmers and subsystems. This study analyzed farmers in dry land areas, whether included in the type of commercial or subsistence farmers. This study has some purposes, such as to analyze the pattern of cultivation, productivity, and the pattern of rice consumption of farmers in upland area in West Java Province. Southern West Java has a wide potential upland area. It reached 55.98 percent of the total upland in West Java. Sukabumi District has the largest upland area, which is 232,023 ha, followed by Tasikmalaya District 170,489 ha. Upland area has considerable potential to increase agricultural production in West Java. The utilization of upland area for commercial farming has not been cultivated maximally. The results showed that the planting pattern in both districts was variety, ie rice-rice-CGRT crops, rice- CGRT crops -rice, and rice- CGRT crops -not planted. This diverse planting pattern occurs because farmers have dependence on the rainy season. Meanwhile, for the consumption pattern, farmers set aside some of the production for daily consumption. This condition caused income of upland farmer is relatively low compared to wetland area.According to this consumption pattern, all farmers in this upland area are subsistence farmer.

Keywords**:** Put your keywords here, keywords are separated by semi colon

I. INTRODUCTION

Sector of agriculture in Indonesia is a very important sector and plays many roles in economic development. Food security will only be achieved if agricultural sector plays its role well, thus fulfillment of food requirement highly depends on the production of agricultural products. Fulfillment of food requirement in Indonesia is mainly from domestic production such as for rice and maize. Nowadays, domestic rice production in Indonesia is generated from rice farming with an irrigated wetland which is mostly located in Java Island. In the long run, Indonesia agriculture cannot only rely on irrigated rice field to sustain food production. Transformation of the economy occurs particularly in Java Island has threatened national food resilience since increasing demand for land for non-agricultural sector results in high rate of conversion of agricultural land to other uses. Moreover, development of rice production in farmers' own rice field is sometimes constrained by farmer decision, competition for water use and natural disaster. Therefore, one alternative for production improvement is able to be done by utilizing all lands available for production of the agricultural product, especially land that has not been maximally utilized, namely upland. The target of national food production will not be achieved by only relies on rice field since many constraints are faced, including climate change, land-use change and environment of production.

According to Dariah et al (2012), data of upland distribution showed that around 108 million hectares or 60 percent of land area in Indonesia is in the form of upland, and about 58 percent of that upland is suitable for the development of the agricultural product (Murtilaksono and Anwar, 2014). Farming business commonly performed in upland includes food crop, horticultural crop, and livestock. Since irrigation facility is not available, the water source for agriculture in upland is rainwater. Climate shock such as El Nino affect in decrease of some food production (Deffi, A.P.S., 2010). However, in regions with vast upland in Indonesia (East Java, Sulawesi, Bali, NTB, and NTT), rainfall occurs is not high. This reason leads to the condition that farmers are often not interested in upland farming and only small portion of farmers commercially perform this type of farming. Most farmers perform upland farming only to meet their household food

requirement thus sometimes there is no uniformity of planting pattern in upland farming. In fact, the dry land has a great potential to produce various food products, namely upland rice, maize, soybean, sorghum, and tubers.

The potential for the development of agricultural sector in West Java is relatively higher than that of other regions due to its strategic location and favorable climate. Based on the characteristic of the region, there are differences of condition between West Java in the northern and southern regions. Unlike the northern region that has fertile land, the condition of West Java in the southern region is dominated by dry land. In actual fact, upland in the southern region is the largest among the other two regions in West Java, namely in the northern and central regions.

Upland area in the southern region reaches 55.98 percent of total upland area in West Java. According to Table 1, Sukabumi District is a region that has the largest upland area in the southern region, namely 232,023 ha, followed by Tasikmalaya and Cianjur District. However, vast upland in the southern region of West Java is not supported by a good irrigation system. It is due to the reason that most agricultural land in the southern region is above the river flow thus irrigation canals are difficult to build. Therefore, water availability in this region highly depends on rainfall.

Table 1. Distribution of Upland Area in West Java based on Region

Region	Area (Ha)	%
Northern Region	146,205	9.52
Central Region	529,718	34.50
Southern Region	859,456	55.98
Cianjur District	173,218	11.28
Sukabumi City	429	0.03
Sukabumi District	232,023	15.11
Garut District	153,594	10.00
Tasikmalaya City	5,945	0.39
Tasikmalaya District	170,489	11.10
Banjar City	5,489	0.36
Ciamis District	118,269	7.70

Source: Rachmat (2013)

Upland has a quite high potential in an effort to increase agricultural production in West Java. However, utilization of upland in commercial farming to date has not yet done maximally, thus idle upland is frequently found. In general, there are no primary commodities which have high economic value produced from this agrosystem zone that highly depends on rainfall. Demographically, most farmers in this agrosystem zone have narrow land, low capital, and still follow subsistence agricultural system (Setiawan, 2008). Subsistence agricultural system implicates on planting pattern that is not simultaneous. Moreover, since agricultural system performed is more focused on fulfillment of household consumption, this activity is financially not able to provide high income for the farmer and shows that upland farming seems to be not profitable. This condition further makes farmer only spends the low income and causes many farmers to be below the poverty line. In fact, upland farming has potential to be seriously developed. Moreover, the development of farming in West Java which is geographically located closer to the center of the economy should be relatively easier than that in other regions.

2. Upland Rice

Rice is one of the world's most important staple food products, especially in Indonesia. Indonesian rice producer in Indonesia is dominated by the smallholder farmers. Smallholder farmers account for around 90 percent of Indonesia's rice production, each farmer holding an average land area of less than 0.5 hectares. According to Suwarno et al, 2002, Indonesia has about 1.5 million ha of upland rice. Generally upland rice is cultivated by poor farmers on problem soil. The main constraint of rice cultivation in the high altitude areas is low temperature stress (Hairmansis et al, 2014).

Upland rice is grown in Asia, Africa, and Latin America, about 14 million hectares of land is dedicated to upland rice, accounting 4% of global rice production. This rice environment can be found in low lying valley bottoms to undulating and steep sloping lands with high runoff and lateral water movement (Garivait 2011). The upland rice cultivation is mostly adopted in areas which receive an annual rainfall of 800-1000 mm and irrigation facilities are not available. In this system of cultivation, farmer has to depend upon rain water. Due to failure of monsoon, the farmer has to bear a heavy loss (Gangaiah, nd).

Farmers in upland area are still cultivate traditional rice varieties since improved varieties specifically released for the areas are not available yet. In the upland areas, most of the crops grown are food crops that are grown mostly for home consumption with limited market surplus. The attention given to horticultural crops is limited and at times non-food crops such as tobacco and other narcotic crops are also grown. Upland rice is increasingly becoming important and has been described in many ways in different parts of the world. In many countries, land where upland rice is grown is not described separately from land for other rice culture. Basically it is a subsistence crop planted by poor farmers who apply few purchased inputs (Ranawera 1993)

An interesting dichotomy that needs to be established is the difference between favourable and unfavourable uplands. Favourable upland areas have regular sources of water which can be used for irrigation of crops and this assures a crop during the year. In most of the countries, the upland areas which are

unfavourable are fast becoming the symbols and sites of poverty, hunger, hopelessness, discontent, greediness, and exploitation (Laquihon et al. 1992 in Ranaweera 1993).

3. Data Sources and Descriptions

The study was conducted in 2017. The survey was done in two locations that have the largest upland area in the southern region of West Java, namely in Sukabumi District and Tasikmalaya District.

Sampling used was non-probability sampling with the method of purposive sampling. Purposive sampling is a technic of nonprobability sampling by determining research sample based on specific characteristics that have linkage and represent all layers of the population. Those special characteristics were based on the status of farming, namely upland farming.

Sampling is required to identify the potential, problem, planting pattern, input use, the production process of farming and consumption pattern of the farmer in upland in Sukabumi District and Tasikmalaya District.

3.1 Descriptive Statistic Analysis

Method of descriptive statistic data analysis was aimed to determine the description of farmer condition in upland in the southern region of West Java. The condition included: planting pattern, input use, production, and farmer consumption pattern farmer in upland farming.

3.2 Production Cost

Farming science is the study of how farmers manage inputs or factors of production (land, labor, capital, technology, fertilizers and pesticides) effectively, efficiently and continuously to get a high production, thus increasing the farmer's income. According Soekartawi (1995), the science of farming is the study of how people allocate existing resources effectively and efficiently to obtain high profit at a given time. Detail of production can be seen at Table 2.

Table 2.Production Cost

A. Cash Revenue	Price x Production (Sold) (Kg)
B. Tangible Revenue	Price x Production (Consumption) (Kg)
C. Total Revenue	A + B
D. Cash Cost	Seed, Fertilizer, Worker, Land Rent, Menure, Tax
E. Intangible Cost	Family Worker (Intangible), Depreciation of capital
F. Total kos	D + E
G. Margin from Cash Cost	C – D
H. Margin from Total Cost	C – F
I. Cash Margin	A – D
J. RCR	C/D
I. BCR	I/D

Source: Soekartiwi (1995)

4. Empirical Analysis

Identification of Planting Pattern and Food Production in Upland

a) Sukabumi District

Three sub-districts in Sukabumi District that were selected as the object of research were: Surade, Ciemas and Sagaranten sub-districts. The potential of upland area in the form of rice field in each sub-district in 2016 was 4,375 ha and 1,964 ha, respectively. Moreover, upland agriculture area of the non-rice field was 8,496 ha and 9,878 ha of each (BPS Kab.Sukabumi, 2017). Upland that has chosen as the study object was rainfed rice field, dry rice field, mixed garden, and yard of 40.79 ha; 5.04 ha; 5.54 ha; and 0.3 ha, respectively. According to the result of this study, more rice crop in upland was grown in the rainfed rice field in which the irrigation source was the rainwater. Therefore, rice crop is grown highly depended on the rainy season. The total area of rainfed rice field selected as the object of study in Sukabumi District was 51,731 ha. In those two sub-districts, rice crop was able to be harvested 1-2 times a year. In the dry season, other crop grown was secondary crop (CGRT) with various planting pattern applied, such as rice-rice-CGRT, rice-CGRT-rice, and rice-CGRT-unplanted. CGRT crops mostly grown were soybean, chili pepper, cucumber, sweet potato, and maize. In Planting Season 1 (MT 1), that was around September-December, farmers planted rice by relying on the rainy season. However, it sometimes became a constraint when rainwater was still lack while the land was completely worked, thus rice planting was postponed.

Average rice productivity produced in MT 1 in research site was 4.76 ton/ha. The high productivity was able to be obtained since MT 1 performed in the rainy season so that irrigation in rice field was enough. Selling price of Dry Grain Harvest (GKP) in MT 1 was around Rp 4,000-Rp 5,000 per kg.

Table 3 Benefit Cost Analysis of Upland Paddy in Tasikmalaya District

No.	Component	Unit	Volume	Price	Total	%
A.	**Revenue**					
	Paddy (GKG)	Kg	4,726	4,500	21,265,044	
B.	**Costs**					
1.	Planting					
	Seed	Kg	34	12,000	402,106	4.78%
	Urea	Kg	167	2,000	334,913	3.98%
	TSP	Kg	118	2,300	270,346	3.22%
	Phonska	Kg	129	2,700	347,022	4.13%
	NPK	Kg	94	3,600	337,357	4.01%
	Liquid Pesticide				506,087	6.02%
	Sub Total 1				**2,197,831**	
2.	External Worker	HOK	81	40,000	3,234,767	38.47%
3.	Tax				50,745	0.60%
	Sub Total 2				**5,483,343**	
4.	Internal Worker	HOK	54	40,000	2,170,799	25.82%
5.	Depreciation				754,479	8.97%
	Total Cost				**8,408,620**	
C	**Cash Income**				**15,781,701**	
D	**Total Income**				**12,856,424**	
E	**R/C (Cash Income)**				**3.9**	
F	**R/C (Total Cost)**				**2.5**	

Source: Primary data processed (2017)

Productivity of upland rice in this area is 4,726 kg/ha. This productivity is lower than wet land production in other area in Indonesia, such as Karawang. In Karawang, rice productivity is 5,273 kg/ton (Falatehan, 2015).

According to Table 3, income of farmers is 21,265,044. Total cost from RC ratio of benefit cost analysis of upland paddy is Rp8,408,620, so farmer's income is Rp15,781,701. In generally, RCR from cash income in Sukabumi District is 3.9.

b) Tasikmalaya District

There are three sub-districts in Tasikmalaya District that were selected as the object of research were Cigalontang, Cipatujah and Panca Tengah sub-districts. The potential of upland area in the form of rice field in each sub-district in 2016 was 2,762 ha and 839 ha, while non-rice field upland area was 231 ha and 1.620 ha of each (BPS Kab.Tasikmalaya, 2017). Upland chosen as research object was in the form of rainfed rice field, up rice field, mixed garden, and yard amounted to 22.25 ha; 25.05 ha; 19.88 ha; and 0.36 ha, respectively. Based on the research finding, rice crop in upland area was mostly grown in the dry rice field and rainfed rice field. Hence, rice crop planted highly depended on the rainy season.

Table 4 Benefit Cost Analysis of Upland Paddy in Tasikmalaya District

No.	Component	Unit	Volume	Price	Total	%
A.	**Income**					
	Paddy (GKG)	Kg	3,013	4,500	13,560,139	
B.	Cost					
1.	Planting					
	Seed	Kg	48	12,000	573,273	6.48%
	UREA	Kg	195	2,000	389,986	4.41%
	TSP	Kg	169	2,300	388,994	4.40%
	Phonska	Kg	161	2,700	435,005	4.92%
	Liquid Pesticides	ml	1,060	150	159,026	1.80%
	Sub Total 1				1,946,285	
2.	External Worker	HOK	93	40,000	3,737,184	42.27%
4.	Tax				56,701	0.64%
	Sub Total 2				5,740,170	
5.	Internal Worker	HOK	54	40,000	2,167,616	24.52%
6.	Depreciation				932,562	10.55%
	Total Cost				8,840,349	
C	**Cash Income**				7,819,969	
D	**Total Income**				4,719,791	
E	**R/C (Cash Income)**				2.36	
F	**R/C (Total Cost)**				1.53	

Source: Primary data processed (2017)

The total area of dry rice field and rainfed rice field selected as the research object in Tasikmalaya District was 67.53 ha. In those sub-districts, rice crop was able to be harvested 1-2 times a year. In the dry season, other crop planted was CGRT or secondary crop. Varied planting patterns were applied, included: rice-rice-CGRT, rice-CGRT-rice, and rice-CGRT- unplanted. CGRT crops mostly grown were chili pepper and maize. In Planting Season 1 (MT 1), that was from October-December, farmers planted rice by depending on the rainy season. This condition often became a constraint when rainwater was still lack while the land was completely worked, thus rice planting was postponed.

The average rice productivity obtained during MT 1 in research site was 3.01 ton/ha. Selling price of dried milled grain (GKG) in MT 1 was about Rp 4,000- Rp. 5,000 per kg.

Base on Table 4, total production of paddy in Tasikmalaya is 3,013 kg/ha. Farmers get their income is 13,560,139. This income is lower than farmer's income in Sukabumi. Total cost from RC ratio of benefit cost analysis of upland paddy in Sukabumi is Rp8,840,349, near the same with expenditure of farmers in Sukabumi. Farmer's income is Rp 7,819,969. This value is almost half than farmer's income in Sukabumi. Meanwhile, RCR from cash income in Tasikmalaya District is 2.36.

Identification of Food Consumption Pattern

a) Sukabumi District

Food consumption pattern in Sukabumi District was differentiated into two patterns based on sub-district, namely Sagaranten Sub-district and Surade Sub-district. Average food consumption in each sub-district is presented in Table 5.

Table5. Average rice consumption in Sukabumi District in 2016

No	Sub-district	Average (kg)		% from production
		production	rice consumption	
1	Sagaranten	1836.42	572	31.15%
2	Surade	1847.45	874	47.31%
3	Ciemas	2008.15	1119	55.72%

Source: Primary data processed (2017)

In planting season 1, crop to be planted was rice with product type produced in the form of dried

milled grain (GKG). The harvested production was not completely sold by the farmer, yet there was the portion to be used for self-consumption despite the low amount. Based on the result of field survey obtained, farmers kept at least half of the production for household consumption.

According to Table 5, farmers keep their production for their needs. It is mean that these farmers are subsystance. The most consumption from their production is in Ciemas, their consumption around 1119 kg or 55.72 % from their production. Some farmers in wet land area in Indonesia, such as in Subang and Karawang, farmers in these area are commercial, they sold all of their rice production (Falatehan 2015)

b) Tasikmalaya District

Average rice consumption in Tasikmalaya District was divided into two sub-districts, namely Cigalontang Sub-district and Cipatujah Sub-district. Average rice consumption in Tasikmalaya District was lower than that in Sukabumi District. In two sub-districts in Tasikmalaya, the average rice consumption only ranged from 400 to 1114 kg. This finding was caused by the fact that the amount consumed did not reach half of the production. Most rice production was sold, not for consumption. Rice produced was in the form of dried milled grain (GKG), despite small portion of farmers produced dry grain harvest (GKP).

Table 6 shown that farmers in Panca Tengah is the most consumption, around 67.94%. Meanwhile for Cigalontang 64.08% and Cipatujuh 52.05% from their production. According to this result, these farmers are subsistence.

Table 6. Average rice consumption in TasikmalayaDistrict in 2016

No	Sub-district	Average (kg)		% from production
		production	rice consumption	
1	Cipatujah	785.75	408.71	52.02%
2	Cigalontang	663.65	425.25	64.08%
3	Panca Tengah	1639.75	1114.23	67.94%

Source: Primary data processed (2017)

5. Conclusions

Upland planted with rice in Sukabumi District was mostly in the form of rainfed rice field, with rice planting pattern of 1-2 times a year. Other crops planted other than rice was secondary crop (CGRT)like soybean, chili pepper, sweet potato, and maize. In Tasikmalaya District, upland planted with rice was mostly in the form of upland rice andrainfed rice, with rice planting pattern of 1-2 times a year. In third season, most of farmers is unplanted their land.

Consumption pattern in the two regencies was relatively different as shown by the average rice consumption in Sukabumi District which reached 500 to 1199 kg, around 31 to 55 % from their production, while rice consumption in Tasikmalaya District only ranged from 400to 110 kg, 52 to 67 % from their production. According to this consumption, all farmers in this upland area are subsistence farmer.

Productivity of paddy land in Sukabumi is higher than in Tasikmalaya, this impacted to productivity of paddy. Productivity paddy in Tasikmalaya is only 3,013 kg meanwhile in Sukabumi is 4,726 kg. It can be seen in the field, inTasikmalaya, it is not easy for farmers to get water, farmers highly depended on the rainy season. Meanwhile in Sukabumi, more rice crop in upland was grown in the rainfed rice field in which the irrigation source was the rainwater. This productivity is lower than productivity in wetland area.

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