Land conversion from coffee to citrus and changes of farmers livelihood strategies (case in Pal 7 village, Bermani Ulu Raya subdistrict, Rejang Lebong Regency, Bengkulu)

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Abstract. The development of agricultural commodity in rural areas has changes farmers' livelihood strategies. This study aims to analyse the process of coffee to citrus conversion in Pal 7 village and changes in the farmers' livelihood strategies that accompany it. The study was conducted in April to June 2019 through a survey of 116 citrus farmers. The data collected is emphasised on the process of developing citrus areas, conversion from coffee to citrus, and farmers' livelihood strategies. Interviews were also conducted with key informants to confirm and deepen the results of the survey. Data were analysed descriptively. The results showed that the development of the citrus area in Pal 7 occurred since 2014 which was driven by the existence of pioneering farmers as movers, the motivation of farmers to plant citrus, credit facilities from the bank, and seed assistance from the government. Farmers' high motivation caused them to convert coffee into citrus plantations through three patterns, namely insert, gradually, and direct cutting caused by economic considerations. The development of citrus areas causes changes in farmers' livelihood strategies. As many as 35.34% of farmers changed their main source of income, mainly from coffee farming and artisan/worker to citrus farming.

1. Introduction

Land conversion is defined as changes in land cover and function [1]. Conversion of agricultural land is a common phenomenon in rural areas caused by various agricultural factors and non-agricultural factors. Agricultural factors are, such as low productivity and land quality [2], agricultural development [3]. Meanwhile, non-agricultural factors are, such as land price and location [4] and infrastructure development [5]. Land conversion has a wide impact on rural communities [6], including a change in livelihood strategies [7].

Farmers' livelihood strategies in rural areas are generally diverse as an effort to survive and develop the welfare of their families [8]. Farmer livelihood strategies manifest in agricultural intensification, livelihood diversification, and migration, using five types of capital, namely natural capital (natural resources), physical capital (infrastructure/man-made things), financial capital, individual capital, and social capital [9].

The strategies vary depending on the intensity of land conversion. The more intensive the land conversion, the more uniform are the farmers' livelihood strategies [10]. Land conversion due to capital
expansion from outside farmer social system often creates a dilemma because it changes the sources of livelihood of the farmer from their agrarian resources to become dependent on capital resources that come from outside the community [11, 12, 13].

The conversion of smallholder coffee plantations to citrus plantations is one form of land-use change that occurred in Pal 7 village, Rejang Lebong Regency. The conversion is unique because it is carried out by farmers with various patterns, so it is interesting to be analysed. Therefore, the purpose of this study is to analyse: (1) the pattern of conversion of coffee to citrus in Pal 7 village; (2) changes of farmers’ livelihood strategies due to coffee to citrus conversion.

2. Materials and Methods
The study was conducted in Pal 7 village, Bermani Ulu Raya subdistrict, Rejang Lebong Regency, Bengkulu province (Figure 1) from April to June 2019. The village was chosen because it has the largest RGL citrus plantation area in Rejang Lebong Regency. In 2018, the area of RGL citrus plantations in the regency was around 300 hectares, mainly located in Pal 7 village, Bermani Ulu Raya subdistrict which is 198 hectares.

Figure 1. Research location map.

Primary data was collected through a survey involving 116 citrus farmers as respondents, 75 of whom converted coffee plants to citrus. Confirmation and deepening of data related to conversion patterns and changes in farmers’ livelihood strategies are done through interviews with key informants, namely pioneer farmer, farmer group leaders, village heads, and agricultural extension workers. Data collected included the development of the citrus area, the pattern of coffee to citrus conversion, and changes in farmers’ livelihood strategies due to the development of citrus plants in Pal 7 village. Data were analysed descriptively.

3. Results and Discussion
3.1. Citrus area development in Pal 7 village
Pal 7 village is located at an altitude of 878 meters above sea level with an area of 1070 hectares. The population is 1094 people with 256 households who generally earn their living by farming coffee. In addition, farmers are also cultivating rice, vegetables, and raising cattle. The people also make a living as traders, artisan, or farm and construction workers.

Citrus that cultivated in Pal 7 is RGL citrus (Citrus reticulata), a tangerine variety. The citrus has several advantages, namely high vitamin C content, large fruit size, attractive orange colour, fresh sweet taste, high juice content, and can bear fruit throughout the year [14]. RGL citrus from Pal 7 is sold in a fresh form to the local market or other cities outside Bengkulu province such as Palembang, Riau, Jakarta, and Bogor.
Citrus planting in Pal 7 began in 2014. A civil servant who served as a food crop and horticultural seed supervisors is a pioneer farmer in RGL citrus at Pal 7. He advocated farmers to plant RGL citrus by converting coffee plants that have been traditionally hereditary but have not been able to improve the welfare of the farmers. Seeds are prepared jointly by farmers who want to plant citrus facilitated by the pioneer, while also introducing farmers to citrus cultivation technology.

In 2014, as many as 21 farmers began planting citrus on an area of 23 hectares. The farmers were interested in planting RGL citrus after seeing the success of farmers who converted coffee plants to citrus in Rimbo Pengadang Village, Lebong Regency, Bengkulu Province. Rimbo Pengadang is a village about 18 kilometres from Pal 7. In 2017 and 2018, the number of Pal 7 farmers who planted RGL citrus increased rapidly after seeing the success of other farmers who had planted citrus in this village previously. Figure 2 gives an illustration of the increase in the number of farmers and the development of citrus plantations in Pal 7.

![Figure 2](image.png)

**Figure 2.** Increasing number of farmers and the area of citrus plantations at Pal 7 in 2014-2018.

The number of farmers and the development of citrus planting area in the 2014-2018 period increased by about five times (Figure 2). The relatively high interest of farmers in growing RGL citrus is inseparable from the revenue they receive. Based on the survey results, it is known that the average number of RGL citrus plants per hectare in Pal 7 is 300 stems with a productivity of 44 kg/stem/year. Citrus are sold at an average price of IDR 10,000 per kilogram so that the gross income of citrus farmers is estimated around IDR 132,000,000 per hectare in a year. The revenue is assumed to be 9.4 times higher than the average gross income of coffee farmers, which only reaches IDR 14,000,000 per hectare per year. Conversion of coffee to citrus that profitable to farmers like this is also reported in Lebong regency in Bengkulu province [15] and Bangli regency in Bali province [16].

The conversion also occurs because of the support of farmers' financial availability. Farmers borrowed funds from bank BRI branch office in regency capital as much as 15-25 million rupiahs through the Food and Energy Security Credit Scheme (KKP-E) by pledging land certificates with a repayment period of 3 years, the interest rate of 5.5 percent, credit instalments once a year. Low-interest rates and relatively long-term payment methods make it easier for farmers to pay off loans. Pal 7 village head stated that there was no bad credit for citrus farmers in BRI. KKP-E has advantages because the loan requirements are simpler, the interest is low, and the instalment payment term does not burden the farmers [17].

High motivation of farmers for planting citrus in Pal 7 also was supported by the Rejang Lebong Regency Government by providing seed assistance of 17 thousand stems to 3 farmer groups in 2018. The amount of seeds is enough for 57 hectares of land. Assistance from the government is even more exciting for farmers who do not have citrus plantations to start cultivating citrus. The government's
development program has indeed become one of the factors that accelerates the development of citrus areas. In 2018, the Ministry of Agriculture had developed 1,895 hectares of citrus areas throughout Indonesia [18].

Based on the description above, the development of the citrus area in Pal 7 is influenced by internal and external factors that collaborate with each other. Internal factors are the high motivation of farmers to plant citrus. Meanwhile, external factors are the role of agricultural officers as pioneer farmers, access to capital from banks, and seed assistance from the government. Collaborative action between farmers supported by various stakeholders is needed in the development of the rural economy [19].

3.2. Land conversion from coffee to citrus
The development of citrus areas in Pal 7 in the 2014-2018 period was caused by land conversion, especially the conversion of coffee to citrus. As many as 75 farmers (64.66% of respondents) converted coffee to citrus with three patterns, namely insert, gradual and direct cutting (Table 1).

| Description                                           | Number of farmers (people) | Percentage (%) |
|-------------------------------------------------------|---------------------------|----------------|
| 1. Conversion of coffee to citrus (insert pattern)    | 48                        | 41.38          |
| 2. Conversion of coffee to citrus (gradual pattern)   | 5                         | 4.30           |
| 3. Conversion of coffee to citrus (direct cutting pattern) | 22                      | 18.97          |
| 4. Conversion of scrubland to citrus                  | 41                        | 35.34          |
| **Total**                                             | **116**                   | **100.00**     |

Conversion with an insert pattern is the most widely applied by farmers (41.38%). Coffee plants that are still productive are pruned to be inserted with citrus seeds. The citrus spacing is 6 x 6 m. The advantage of the insert pattern is farmers can still harvest coffee for three years before being cut down when the citrus trees start to produce. Coffee plants are routinely pruned to provide space for immature citrus. The lack of light intensity causes etiolation symptoms [20], and the citrus plant will grow taller. Those plants will more difficult in care and harvest when the plants have produced.

The gradual pattern is only applied by farmers as much as 4.30 percent. This pattern is carried out by farmers in the hope that citrus plants can grow well without sacrificing all the coffee plants that can still produce. The disadvantage of applying this pattern is to have the remaining coffee plants, so that citrus production is not optimal.

Conversion with the direct cutting pattern is applied by farmers who have enough capital. Coffee plantations are converted because farmers still have other sources of income or have coffee plantations in other locations. Conversion done at once like this is a disadvantage to farmers when starting conversion due to loss of income from coffee plants, but more profitable after citrus produce because plant growth is more optimal than the insert pattern. Three patterns of coffee to citrus conversion are shown in Figure 3.

Farmers are more likely to apply insert patterns because of economic considerations. The conversion does not eliminate farmers' income from coffee plants before citrus plants produce. The proceeds from the sale of coffee can be used for various purposes of farmers, including funds for citrus cultivation. In addition, the insert pattern does not require relatively large labour costs to dismantle the coffee plant in a short time so that it is more easily applied by farmers who have limited funds.
3.3. Changes of farmers' livelihood strategies due to land conversion

The development of the citrus area in Pal 7 followed by the land conversion of coffee to citrus has caused changes in farmers' livelihood strategies quickly. The development of Pal 7 as a citrus area in addition to changing farmers' livelihood strategies, also attracts people who rely on income sources from artisans/labourers to enter the citrus agribusiness system.

The survey results show that in the period 2014-2018, as many as 35.34% or more than 1/3 of the Pal 7 community changed their livelihood strategies to become citrus farmers, especially those who initially relied on the main source of income from coffee farming, artisans or labourers (Figure 4).

Various capital is used by farmers to change their livelihood strategies to become citrus farmers. Pal 7 village where has a highland agroecosystem is suitable for the development of a well-adapted RGL citrus. In the Decree of the Minister of Agriculture Number 2280/Kpts/SR.120/6/2012 concerning Provision of Horticultural Crop Varieties, stated that RGL citrus could grow optimally at 900-1,200 meters above sea level. This natural capital is supported by physical capital, which is the availability of agricultural land, both scrubland and coffee plantations that can be converted into citrus plantations. Some informants estimated that the potential for RGL citrus development in Pal 7 could reach 500 hectares from 1070 hectares of the village area.

Financial capital support is essential in the cultivation of RGL citrus. The price of citrus seeds in Pal 7 is IDR 25,000 per stem, so it needed costs IDR 7,500,000 to prepare seeds in the one-hectare plantation. Easy access to capital from banks allows farmers to open plantation. Seedling assistance from the government and the role of pioneer farmers is social capital that supports farmers to cultivate citrus. The role of this pioneer farmer is very important to increase the knowledge of citrus farmers in Pal 7, which is individual capital. The utilisation of financial capital and social capital is able to
overcome the main problems of farmers in cultivating RGL citrus, namely limited knowledge and capital in farming.

4. Conclusions
RGL citrus development in Pal 7 village, Bermani Ulu Raya subdistrict, Rejang Lebong regency which occurred in the 2014-2018 period was relatively fast. In 5 years, there was 198 ha of community citrus plantations which were built through the conversion of coffee plantations and shrubs. The conversion is caused by internal factor (high motivation of farmers to plant citrus) and external factors (role of a pioneer farmer, credit facilitation from the bank, and seed assistance from the government). The conversion made by farmers is divided into three patterns, namely: the insert, gradual, and direct cutting pattern. The most pattern applied by farmers was insert pattern (41.38%) caused by economic considerations. Land conversion caused 35.34% of the Pal 7 community changed his livelihood strategy to become a citrus farmer.

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