Fading local wisdoms of upland rice varieties in situ conservation in South Bengkulu Regency (case in Pino Raya subdistrict)

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Abstract. Upland rice is a useful source of germplasm and it is conserved by farmers through local wisdom. This paper aims to explain fading the local wisdom of upland rice in situ conservation in Pino Raya subdistrict, South Bengkulu regency. Data were collected from March to May 2020 through interviews and field observations. The interviews involved 11 key informants using snowball techniques consisting of a customary leader, village heads, agricultural extension, and farmers. Data were analyzed descriptively using the interactive model from Miles and Huberman. The results showed that the local wisdom of in-situ conservation of upland rice faded because shifting cultivation was no longer practiced by farmers due to oil palm expansion. Cultivation of upland rice is only on young oil palm plantations that are increasingly entering forest area. Intensification of wet rice cultivation allows farmers to cultivate modern varieties which early maturing rice and high productivity. Improvement in the community's economy due to oil palm expansion and the diminishing of the upland area for rice cultivation caused the young generation to no longer be interested in planting upland rice local varieties. As a result, the "Dundang Padi" ceremony as a form of local wisdom that is practiced by the Pino Raya community is fading.

1. Introduction
Rice is a staple food for the Indonesian people that has been cultivated thousands of years ago. Farmer relief plows the fields by using cows carved into the walls of the Borobudur temple which was built in the 9th century in Central Java [1] be a sign that rice cultivation had adhered to the Indonesian culture. Therefore, farmers have developed various local wisdom in rice cultivation, such as maintain the diversity of local rice varieties [2], setting planting schedules [3], water regulation [4], and harvesting [5]. Local wisdom is the noble values that apply in the order of community life to protect and manage the environment in a sustainable manner (Law number 32 of 2009 concerning Environmental Protection and Management).

The culture of rice farming in Indonesia is divided into settled rice farming and shifting cultivation. The shifting cultivation was implemented primarily outside the islands of Java and Bali and is fading mainly due to the expansion of plantation crops [6]. According to Ishak et al. [7], upland rice is no longer the main source of rice production in rural communities in Bengkulu due to the expansion of oil palm plantations and intensification of rice cultivation.
The decreased interest of farmers to cultivate upland rice due to more low productivity and harvesting periods more long compared with wet rice cultivation [8]. This causes in situ conservation of local rice varieties based on local wisdom increasingly difficult to apply. Bernsten et al. [9] estimate that before the green revolution there more than 8,000 local rice varieties in Indonesia. The use of modern varieties that replace local varieties is a characteristic of agricultural intensification in the era of the green revolution [10].

The intensification of agriculture has caused the fading of local wisdom such as the shifting cultivation system and various accompanying ceremonies [11]. The loss of local wisdom erodes the sustainability of cooperation as the social capital of traditional communities in rice cultivation [12]. Currently, the communities are no longer dependent on the production of upland rice because of wet rice intensification. This is indicated by the large contribution of wet-rice production in the 1969-2014 period which reached an average of 94.40% of the total national rice production in Indonesia [13].

Pino Raya Subdistrict in South Bengkulu Regency, Bengkulu Province is an area that has local wisdom that upland rice in situ conservation. This area has a ritual ceremony which is held regularly to prepare rice seeds called "dundang padi". However, the ceremony at present is only a ceremony because its function to conserve upland rice local varieties is no longer implement. This paper aims to explain the fading of the local wisdom of upland rice in situ conservation in the Pino Raya subdistrict.

2. Materials and Methods

The research was carried out in Pino Raya subdistrict (Figure 1) from March to May 2020. Data were collected through in-depth interviews with 11 key informants consisting of a customary leader, village heads, agricultural extension workers, and farmers using the snowball technique. Interviews were directed to explore information about the local wisdom of upland rice in situ conservation that was implemented by the local community. Field observations were carried out to identify the characteristics of the local varieties. Secondary data is used to describe the agricultural condition in Pino Raya subdistrict.

Data were analyzed qualitatively using an interactive model from Miles and Huberman [15]. In the interactive model analysis, data collection, reduction, presentation, drawing conclusion, and verification forming a cycle (Figure 2).
3. Results and Discussion

3.1. Oil palm expansion in Pino Raya and the disappearance of shifting cultivation culture

Pino Raya is one of 10 subdistricts in South Bengkulu Regency, Bengkulu Province. Its area is 223.5 km² or 18.84 percent of the regency area. Administratively, Pino Raya is bordered by South Sumatera Province in the north, the Indian Ocean in the south, Seluma Regency (Bengkulu Province) in the west, and Ulu Manna, Pino, and Kota Manna subdistricts (South Bengkulu Regency) in the east. Astronomically, it is located at 4°9" to 4°25" south latitude and 102°47" to 103°2" east longitude [14].

The area of Pino Raya subdistrict is a lowland with a wet climate in the tropics which according to Lim et al [16] is very suitable as an environment for oil palm cultivation. According to a customary leader in Selali village, the development of oil palm plantations in Pino Raya has occurred since 1982 by Nusantara Plantation VII Ltd. (PTPN VII), a state-owned enterprise, with a Nucleus Estate System (NES). According to agricultural extension workers in Pino Raya, the collaboration between PTPN VII with farmers from 8 villages took place from 1986 to 2001 covering about 3000 hectares of smallholder plantation. The community started to plant oil palm independently starting in 2002 after seeing the economic success of farmers who had planted oil palm through the NES program. In 2018, the planted area of oil palm in Pino Raya had reached 5,572 ha [14].

The farmers in Pino Raya explained that the cultivation of upland rice before the expansion of oil palm plantations was carried out by the Pino Raya community using shifting cultivation techniques to fulfill the family's food consumption needs. Forest or shrubs were slash and burn to become agricultural land. The land is planted with upland rice for 2 years before the farmers move to open new land and abandon the old land to be reforested to restore the declining fertility of the land. About four years later, the farmers opened the old land again.

After oil palm expansion, land for upland rice cultivation has become increasingly limited. Upland rice is only planted among immature oil palm plantations. The location of upland rice cultivation is increasingly entering the forest area following the location of young oil palm plantations. As a result, farmers who initially relied on shifting cultivation for family subsistence changed their source of income to rely on oil palm plantations. The development of smallholder plantations has resulted in the community having a source of income from harvesting oil palm twice a month to fulfill family needs. Of the 22 villages in Pino Raya in recent time, 19 villages rely on oil palm plantations as a source of community income, while the other 3 villages rely on food crops. The three villages are located on the edge of a forest area that is still not cleared for oil palm plantations (Table 1).

The process of disappearing shifting cultivation in Pino Raya has occurred dramatically in the past 20 years. The expansion of plantation crops in Indonesia, which is carried out by converting mixed gardens or shifting cultivations to monoculture plantations such as oil palm, is indeed driven by efforts to improve the community's economy which changes local wisdom [6, 17].
Table 1. Source of community income in Pino Raya subdistrict.

| Village         | Village location            | Main source of community income |
|-----------------|-----------------------------|---------------------------------|
| 1. Tanggo Raso* |                             |                                 |
| 2. Padang Beriang* |                            |                                 |
| 3. Tungkal I*   |                             |                                 |
| 4. Tungkal II*  |                             |                                 |
| 5. Talang Padang* |                            |                                 |
| 6. Pasar Pino*  |                             |                                 |
| 7. Selali*      |                             |                                 |
| 8. Nanjungan*   | Outside the forest area     |                                 |
| 9. Bandung Ayu  |                             |                                 |
| 10. Air Kemang  | Oil palm plantation        |                                 |
| 11. Napal Melintang |                        |                                 |
| 12. Serang Bulan |                             |                                 |
| 13. Kemang Manis |                             |                                 |
| 14. Suka Bandung |                             |                                 |
| 15. Padang Serasan |                         |                                 |
| 16. UPT Tanjung Aur II |                  |                                 |
| 17. Pagar Gading |                             |                                 |
| 18. Karang Cayo II |                       |                                 |
| 19. Tanjung Aur II | Edge the forest area     |                                 |
| 20. Cinto Mandi |                             |                                 |
| 21. Kembang Seri | Food crop                  |                                 |
| 22. Telaga Dalam |                             |                                 |

Note: * ex-NES location (information from customary leader in Selali village)

3.2. Disappearance of upland rice local varieties

In 2018, the harvested area for upland rice only 85 ha or 3.8% of the harvested area for wet rice in Pino Raya subdistrict [14]. Based on the results of interviews with various informants, farmers are still cultivating five local varieties of upland rice of the 9 local rice varieties that have been ever known by the community (Table 2). The upland rice cultivation was found in two villages, namely Telaga Dalam and Cinto Mandi where located on the edge of the forest area.

Table 2. Identification of upland rice local varieties in Pino Raya.

| Local rice name       | Competitive advantage          | Planting location                      |
|-----------------------|--------------------------------|----------------------------------------|
| 1. Tambun             | Not identified                | Telaga Dalam and Cinto Mandi villages  |
| 2. Siung kancil       | Aromatic                      |                                        |
| 3. Abang pintal       | Relatively high productivity  |                                        |
| 4. Putih pintal       | Relatively high productivity  |                                        |
| 5. Abang mumbang      | Not identified                |                                        |
| 6. Saleah             |                                |                                        |
| 7. Saleah keciak      | Not identified                | Not found                              |
| 8. Serasai            |                                |                                        |
| 9. Kemang             |                                |                                        |

"Siung kancil", "abang pintal", and "putih pintal" are local variety names of upland rice that are still more cultivated by farmers in Pino Raya. The farmers stated that “siung kancil” rice has the advantage of being aromatic so that it is liked by farmers. Meanwhile, the “abang pintal” and “putih pintal” have relatively high productivity. The form of grain upland local varieties are shown in Figure 3.
Figure 3. Grain of upland rice varieties.

The farmers explained that planting upland rice at the beginning of the rainy season in August and harvesting after the plants had 5-6 months old. After that, the land is interspersed with vegetable crops before farmers return to planting upland rice in the rainy season of the following year. The cultivation technology that applied was still traditional. The land was cleared (slash and burn), made planting holes for planted several local varieties of upland rice. Farmers prepared rice seeds independently or obtained from other farmers around them as a form of local wisdom on rice seed conservation. Fertilization was not done and harvest using ani-ani (traditional harvesting tool) was done in stages over 1 month. The productivity of upland rice is relatively low, around 0.7-2.21 tons/hectare (Table 3). The rice harvest is used for family consumption need. Some of the grain is selected to be used as seeds.

Table 3. Description of upland rice local varieties in Pino Raya.

| Description                  | Tambun   | Siung Kancil | Abang Pintal | Putih Pintal | Abang Mumbang |
|------------------------------|----------|--------------|--------------|--------------|---------------|
| Plant age (day)              |          |              | 150-180      |              |               |
| Plant height (cm)            | 174      | 173          | 186          | 188          | 177           |
| Grain shape                  | Long slim| Long slim    | Medium       | Medium       | Medium        |
| Panicle length (cm)          | 24,58    | 27,88        | 25,54        | 30,91        | 24,90         |
| Weight of 1000 grains (g)    | 21,61    | 18,12        | 21,193       | 24,79        | 21,193        |
| Productivity (ton/ha)        | 0,79     | 1,30         | 2,18         | 2,21         | 0,77          |
| Rice texture                 |          |              | Fluffier     |              |               |
3.3. **Fading the function of "Dundang Padi" ritual ceremony**

The disappearance of local varieties of upland rice in Pino Raya because of decreasing interest of the farmers in using the local seeds. This condition causes the function of Dundang Padi tradition is fading. The customary leader stated that “dundang padi” (which means an invitation for the community to take rice seeds) was once known by the community done in Selali village every three years. The ceremony aims to select local rice seeds and determine the right planting time. Farmers from Pino Raya and the surrounding area were invited by customary leaders from each region. The costs needed to build a tent, purchase a buffalo to be slaughtered, and the cost of consuming the ceremony was prepared by the community that coordinated by customary leaders.

Local rice varieties from various regions in Pino Raya are collected and "cleaned" by the customary leaders in “dundang padi” ceremony before distributed to the community. Then, farmers will mix the rice seeds that are distributed during the ceremony with the seeds that have been previously prepared for rice cultivation. The community believes that following “dundang padi” ceremony, will have a good effect on crop yields. According to Hasyim and Muda [18], various traditional ceremonies in rice cultivation are local wisdom which farmers still believe will increase crop yields.

"At present, the “dundang padi” is rarely performed", said the customary leader in Selali. Even if it is carried out, the participating communities are only limited to Selali village, while the other villages around Selali no longer participate in the ceremony. This is because the community, especially the young generation, no longer needs upland rice seeds to be widely cultivated in Pino Raya. The last “dundang padi” ceremony was carried out in 2018 which was initiated by the Regional Government only as an effort to preserve culture. Table 4 describes the fading of the “dundang padi” ceremony.

| Description          | Past time                                      | Present time          |
|----------------------|------------------------------------------------|-----------------------|
| Area coverage        | Pino Raya subdistrict                         | Selali village        |
| Time of ceremony     | Every 3 years                                 | Not sure              |
| Function             | Prepare the seeds and determine planting season | Just a ceremony       |
| Community needs      | High                                           | Low                   |

4. **Conclusions**

The expansion of oil palm plantations in Pino Raya subdistrict since the 1980s has been in the disappearance of a shifting cultivation system. The loss of the shifting cultivation culture was then accompanied by the fading of the meaning “dundang padi” ceremony. Both shifting cultivation and “dundang padi” ceremony are local wisdom of in situ conservation of upland rice local varieties. Fading of the local wisdom causes diminishing the diversity of local varieties. Therefore, ex-situ efforts are needed so that the upland rice local varieties do not become extinct.

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