

GSID

Discussion Paper No.216

**Combination of Coffee and Rice Cultivation
in the 1820s Priangan, West Java:
An analysis of the local Cultivation Calendars**

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March 2021

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**Combination of Coffee and Rice Cultivation in the 1820s Priangan, West Java:
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1. Introduction

The Priangan region is well known as the place where coffee was produced by local people's corvée labor in the 18th century, and the coffee production there has been a popular research topic. In 2010, the author published a monograph on this topic and argued that (1) the system resulted, even if only slightly, in improvements to the people's economic situation, however, (2) the system brought more harm than benefit to the people of the Priangan region, and the main detriment was neither coercion nor poverty, but the deprivation of the peoples' power to control their own time and energy (Ohashi 2010). The second argument is rather new compared to the previous arguments which question whether coercion or poverty truly existed (Breman 2010, 2015). This paper is a translation of Chapter 12 in the book.

This paper points out that the nature of irrigated rice fields enabled accommodation of competing demands for labor between coffee production and rice cultivation and that this nature was one of the reasons why the local people were willing to accept heavier labor for coffee cultivation and transportation than before. Up to this point, the mobilization of the local people for coffee cultivation and transportation has only been considered as a matter of political power. No attempt has been made to investigate cultivation calendars that would reveal the timing, type and, amount of labor required to local people's cultivation in the Priangan region at the beginning of the 19th century. Thus, the majority of this paper is devoted to reconstructing the cultivation calendars for coffee and rice, which was the region's staple crop. Section 2 reconstructs the cultivation calendar of coffee in the 1820s while Section 3 reconstructs the cultivation calendars of rice to examine the distribution of labor between coffee and rice production.

2. Reconstruction of the Coffee Cultivation Calendar in the Priangan Region in the 1820s

2-1. Sources

To reconstruct the workflow starting with land clearance for coffee plantations to coffee delivery to the Dutch colonial government this section relies on *De Preanger Regentschappen op Java Gelegen* by A. de Wilde [1830]¹⁾ as the basic source, with *The History of Java* by T.S. Raffles [1988] and other documents from the 1810s and 1820s being used as supplementary sources. In addition, to evaluate the reliability of cultivation calendars from this time period,

comparisons to the descriptions in *Handleiging voor de Gouvernements Koffiecultuur op Java* [Heijting 1887]²⁾ are provided in the endnotes.

2-2. Opening of new coffee plantations

In the 1820s, large tracts of land had to be newly cleared every year in the Priangan region to not only increase but also to simply maintain the amount of coffee delivery to the Dutch colonial government. The young coffee trees usually began to bear cherries in the third or fourth year after planting. However, harvests declined dramatically, in some cases as early as the sixth year and by the 30th year at latest.³⁾ In addition, large swaths of seedlings on newly opened plantations often fell down or withered due to poor land selection [Wilde 1830: 63-64; Algemeen Verslag 1828/29: 21-24].

According to Wilde, the process of opening new land was as follows:

Lands to be newly opened were normally selected in May. An area with suitable soil and of sufficient size for a large coffee plantation was chosen. Mountainside forests were most suitable for coffee plantations [Wilde 1830: 63]. Actual land clearance started in June or July. After a forested area was selected, the undergrowth was cleared, and large trees were felled. Branches and shrubs were collected into piles, left to dry, and burned. The land was then tilled with plows or hoes. These instruments were also used to dig up tree roots, which were also collected, left to dry, and burned. This was to prevent roots left in the ground from sprouting. The ash left after burning was worked into the soil to neutralize acidity. After that, the land was left for 15 to 20 days, sometimes even longer, before being weeded and retilled. If time allowed, the land was tilled a third time. The land was left fallow until planting. The large trees that were felled were either sold or laid in rows, where they were left to rot and eventually used as fertilizer [Wilde 1830: 64-66].

Next, the land was measured. The plantation area was surrounded with a bamboo fence. At the beginning of the rainy season, shrubs were planted around this perimeter fence. A ditch measuring three to four *voet* (96 to 126 cm) in width and two to three *voet* in depth (62 to 94 cm) was dug at a distance of three to four *voet* outside the fence.⁴⁾ The ditch was meant to prevent rhinoceroses, water buffalo, or cattle from entering the plantation and was especially common in plantations on flatland. Gates measuring eight to ten *voet* (251 to 314 cm) in width were placed at two ends of the perimeter fence. The enclosed area was bisected by a main road measuring one *roede* (377 cm) in width⁵⁾ that ran through the middle of the plantation from gate to gate. Smaller paths that were eight to ten *voet* in width branched off to the left and right of this central main road. Usually, 25 to 30 coffee seedlings were planted in the area between these smaller paths. These small paths also connected to a path running just inside the bamboo fence. The areas between these small paths were measured. Wooden sticks were stuck in the ground at regular intervals to mark where the seedlings were to be planted. Locations where shade trees (*dadap*) were to be planted were similarly marked. Seedlings were spaced eight *voet* (251 cm) apart in all directions in good soil, seven *voet* (220 cm) apart in moderate soil, six *voet* (188

cm) apart in poor soil.⁶⁾ The soil preparation and measurement described above was carried out by early November, before the beginning of the rainy season [Wilde 1830: 66-68].

Upon arrival of heavier rains, cuttings (twigs) were obtained from the shade trees in an old plantation and planted in the new plantation. After that, holes for planting coffee seedlings were dug. If the land became overgrown with weeds before the shade tree cuttings could be planted, the area was weeded first. For the most part, coffee seedlings were obtained by taking seedlings grown in old coffee plantations. Two- or three-year-old seedlings were preferred. These were usually uprooted from old plantations and left for two or three days in a narrow, shaded waterway. This was done to identify seedlings that would thrive and those that would not. However, if available, seedlings grown from seed in seed-plots were preferred. Manure was not used at transplanting. Transplanting should be completed before New Year's day [Wilde 1830: 68-72].

The preparation of soil and transplanting of seedlings described above was carried out using rotating groups of Javanese⁷⁾ peasants and took about half a year to complete [Wilde 1830: 73].

Raffles' *The History of Java* also describes coffee cultivation in the Priangan and other regions [Raffles 1988: vol. 1 126-127]. Although less detailed than Wilde's description, the main points are very similar.⁸⁾ Raffles starts by describing the selection of land, felling and burning of trees, use of ash, and the disposal of large trees. He goes on to describe three or four repeated tillings, the laying out of plots, planting of hedges, and digging of ditches, followed by the planting of shade trees, digging of shallow holes for seedlings, procuring of seedlings from old plantations, and the transplanting of seedlings. The differences with Wilde's description are as follows: Raffles indicates that the hedge was planted at a distance of 12 *voet* from the outermost row of coffee seedlings, that the depth of the holes for the seedlings was 1.5 to two *voet*, and that the seedlings taken from old plantations were 14 inches tall. In addition, Raffles clearly states that the number of seedlings taken from old plantations was insufficient to meet demand and that seed-plots were also established.⁹⁾

The timing of each task was as follows. Raffles describes that land clearance began in August or September and that soil preparation was completed by the time the heavy rains arrived. The start of work according to Raffles was later than that described by Wilde, perhaps because Wilde describes the optimal timing.¹⁰⁾ Both Wilde and Raffles indicates that the planting of shade trees and transplanting of seedlings began in the rainy season after the arrival of heavy rains.¹¹⁾ Whereas Wilde indicates that the transplanting of seedlings was ideally completed by the end of the year, Raffles does not mention the timing. However, Raffles' description of poorly-growing coffee seedlings and shade trees being replaced at the end of the rainy season implies that transplanting work was completed around February or March.¹²⁾

Although Wilde's and Raffles' descriptions of new plantations opening were not completely desk plans, it might be better to consider them best practices. In particular, Wilde's intention was to describe ideal coffee cultivation for readers interested in agricultural development in Java. The actual work performed may have been simpler, and the timing may have been more flexible.

However, even if the work performed was minimal, tasks such as tree felling, burning, soil preparation, and the transplanting of seedlings could not have been omitted. Moreover, it is clear that tasks needing massive labor such as tree felling, burning, and soil preparation would have to have been completed before the beginning of the rainy season or, at least, before the arrival of heavy rains. Similarly, the procuring and transplanting of seedlings would have to have been completed before the next dry season. Thus, the tasks required for opening of new plantations was seasonally constrained and was concentrated in the period after the late dry season up to the middle of the rainy season. In addition, this work had to be performed by able-bodied men.¹³⁾

2-3. Maintenance of plantations and harvest, drying, and transportation of coffee beans

Wilde indicates that the coffee plantations, once established, did not require massive labor for maintenance. He proposes only that the local people used to open a new plantation should have been permitted to cultivate crops such as rice and beans between coffee seedlings in the first and second year after opening and that cultivation of these crops ceased in the third year, at which point the plantations were weeded [Wilde 1830: 75-78]. Similarly, Raffles only mentions weeding being carried out three to four times a year [Raffles 1988: vol. 1 127]. From these descriptions, it appears that maintenance required very little labor compared to the opening of new plantations. For example, in 1803, the regent of Sumedang proposed selecting one couple and their children in each village from among the local villagers who participated in opening of a new plantation to remain on the plantation to perform maintenance and having the other villagers provide the family with food [Haan 1910-1912: vol. 3 613].¹⁴⁾

In contrast, the tasks that did require labor, and what the European officials kept an eye out for, were harvest and transportation. Each year in January, the government posted the next season's delivery quotas. Upon receiving this quota, the inspector in the Priangan region conducted inspections in March and April, and the results were reported to the government [Register January 4, 1821; March 13, 1821; April 5/9, 1820].

Compared to his description of new plantation opening, Wilde's description of the coffee harvest was brief. Just after the rainy season in May, the coffee trees bore large numbers of cherries and those were picked. Picking was carried out all at once for the entire plantation and required a large number of people. Ideally, each coffee cherry was picked individually. If branches and leaves were removed at the same time, there was a risk that immature cherries would also be removed and the harvest in the following year would be adversely affected [Wilde 1830: 78-79]. Raffles describes the harvest as follows: In the Priangan region, picking began in June or July. The coffee trees bore large amounts of cherries three times each season. The second time was the most prolific. Each cherry had to be picked individually to protect immature cherries that were still in the flowering stage. Picking was carried out by women and children. Men performed heavier work during this period [Raffles 1988: vol. 1 127-128].

The coffee trees in the Priangan region did not bear cherries at a specific point in time, but bore them continuously throughout the year. According to Raffles, generally three major bearing periods were observed during the dry season.

The second period yielded the most cherries. However, in the case of high-elevation plantations, there was one major bearing period with multiple smaller bearing periods before and after [Heijting 1887: 101; Olivier 1827: 83]. Thus, the harvest period varied. Picking was carried out to coincide with the most prolific bearing periods. According to reports by European officials at the beginning of the 19th century, picking was carried out from May to June in lowlands and later in the colder, mountainous districts [Haan 1910-1912: vol. 3 598-599]. From the above, it appears that, although the main picking season lasted until approximately the middle of the dry season, there was no clear end to the picking season. Several documents corroborate that the picking was carried out primarily by women and children. However, there were many cases in which men also participated. For example, in 1796, it was reported that couples and their children moved to the plantations to pick cherries [Haan 1910-1912: vol. 3 599, 609, 614].¹⁵⁾

After the coffee cherries were picked, they needed to be dried. Wilde described the drying process as follows: The harvested coffee cherries were taken to a drying shack. The floor was made of woven bamboo and raised three to four *voet* (94 to 126 cm) off the ground. The shack roof was designed to be opened. During the day, the cherries were dried by sunlight and, at night, by a smoldering fire under the floor. When the cherries were almost completely dried, they were transported to the coffee cultivators' houses, where the cherries were placed on the ceiling above the sunken hearth and dried further [Wilde 1830: 79]. Raffles' description is essentially the same, the only difference he mentions is that the coffee cherries were stirred in the drying shack [Raffles 1988: vol. 1 128].¹⁶⁾

The next step after drying was pulp removal. Wilde describes two methods: using a mortar and a wooden pestle and using a hole in the ground. As for the latter method, the hole was fairly deep, between 14 and 15 *duim* (36 to 39 cm),¹⁷⁾ and was covered with a sack or a repeatedly folded mat of water buffalo hide. The coffee cherries were placed on this water buffalo hide and beaten with a wooden mallet. Pulp removal was performed by men with strong arms [Wilde 1830: 79-80]. Raffles also describes that pulp removal was accomplished either by placing the cherries in a sack made of water buffalo hide and beating or by using a mortar and pestle. According to Raffles, the former was better for avoiding breakage of the coffee beans [Raffles 1988: vol. 1 128]. Although the timing of drying and pulp removal work is not stated, it appears that the appropriate time for this work was the dry season.¹⁸⁾

After completion of the above preparatory work, the coffee beans were placed in sacks or baskets and transported to the three largest storehouses in Buitenzorg, Tjikao, and Karangsamboeng. The transportation was carried out mainly by local people. As land routes were used, the dry season when the roads were in good condition was the appropriate time for this work. The timing and labor required for coffee bean transportation to the three largest storehouses was as follows: Payments for coffee were sent from the colonial government in Batavia to the three largest storehouses in July and August [Register August 11/22, 1820; July 27, 1821]. It can reasonably be assumed that the delivery of coffee beans to the storehouses began around this time. In some cases, transportation from remote areas to the largest storehouses could take more than one month. Thus, actual delivery tended to be later than the end-of-year, which was the government's ideal delivery timing. Transportation from Bandoeng and Sumedang, which were located far from the

storehouses, required heavy labor and tended to be delayed. Orders to speed up transportation were issued by the resident, sometimes as early as June, but most often in August and later [Register June 10 & 27, 1821; 1821 · 8/9 passim]. The transportation system was in a state of disorder during the Raffles government (1812 to 1816), and coffee delivery seems to have not been completed by April [Raffles 1988: vol. 1 128]. Thus, it can be guessed that transportation work peaked from June and July to the early part of the following year. At the time, coffee beans were primarily carried on the backs of water buffalo and other transportation animals. However, in areas with gently sloping roads, carts pulled by water buffalo were used. Such transportation by able-bodied men using water buffalo, with round trips lasting from one week to one month, was carried out several times in the period described above [Sections 4 and 5 in Chapter 9; Section 2, Paragraph 2 in Chapter 10].¹⁹⁾

Thus, of the work performed after new plantation opening, plantation maintenance required relatively little labor and, although picking required large numbers of people, this could be carried out by women and children. The work that most required able-bodied men was coffee bean transportation, which occurred from the middle of the dry season to the middle of the rainy season. This timing overlapped with the timing of new plantation opening. From this, it can be concluded that the need for labor by able-bodied men was concentrated in the period from mid-dry season to mid-rainy season.

2-4. Origins of coffee cultivation calendars

As described in Section 2-3, coffee cultivation and transportation requiring the labor of able-bodied men were concentrated in the period from mid-dry season to mid-rainy season. Of these two tasks, the concentration of transportation work was not due to the biology of the coffee trees but was the result of prioritizing convenience of shipping to Europe. As was previously discussed, although the bulk of the cherry picking was performed from the beginning to the middle of the dry season, this period did not necessarily coincide with cherry baring. Meanwhile, vessels from the Netherlands carrying money to pay for various goods, arrived from the end of the rainy season up to the beginning of the following rainy season. These vessels left port for their homeward bound journey from around the New Year season to February [Boxer 1988: I 90]. The reason that the colonial government pushed for the bulk of coffee cherries picking to be carried out in the first half of the dry season and pressured the local people to deliver the coffee beans by year's end was to ensure that the coffee beans would arrive at Batavia in time to be loaded onto these homeward bound vessels.

However, this picking and transportation schedule was not created entirely by the Dutch government but was a forward adjustment of the existing transportation schedule of the pepper cultivation and transportation calendars, which had long been established in Java. In the late 17th and early 18th century, just after the VOC colonized the Priangan region but still had not gained control over the native chiefs, export crops (mainly pepper) produced in the Priangan region arrived at Batavia and Cirebon from July to February of the following year [Haan 1910-1912: vol. 3 643]. It was

also reported that, in the middle of the 17th century, pepper produced in remote regions of Banteng arrived in the city in February. Pepper was transported via rivers that swelled during the rainy season [Blusse 1986: 43]. It can be assumed that the calendars for pepper cultivation and transportation on Java in the 13th century continued into the middle of the 17th century. In *Zhu Fan Zhi*, it was reported that pepper plants flowered around the Chinese New Year and bore corns in the fourth month. The corns were harvested in the fifth month and dried under the sun before being stored. The pepper was taken out of the storehouse after the next New Year and transported to markets by oxcart.²⁰⁾ The transportation season began around February because it was around this month that junks arrived from China, which was the primary destination for peppercorn exports at the time. Pepper was produced near the sea ports or transported in advance to storehouses near the ports. In contrast, in the Priangan region around the 1820s, coffee beans had to be transported from the slopes of volcanoes that, in some cases, were located more than 100 km from the sea ports, in time to be loaded onto vessels bound for the Netherlands that left port around New Year. Because transportation via overland routes was difficult during the rainy season, it was necessary to transport the coffee beans to inland ports by the end of the dry season. Transportation from production areas to inland ports could take as long one month. It is for this reason that the transportation period had to cut much earlier into the dry season.

The seasonal concentration of labor demand described above had not been perceived as problematic in the Priangan region when the coffee was produced in areas where it could relatively easily be transported to sea ports and the amount was small. However, in the 1780s, the VOC began to expand coffee cultivation. Following this policy, from the early 19th century the Dutch colonial government began to open large plantations on the slopes of volcanoes that were inconvenient for transportation. This required the massive mobilization of local people and competing demands for labor between coffee cultivation and subsistence agriculture became a problematic issue.

3. Rice Cultivation Calendars

3-1. Sources

Expansion of rice cultivation started in the mid-18th century, around the same time as the expansion of coffee cultivation, with much reliance on irrigated fields. Accordingly, this section examines rice cultivation calendars focusing on differences between that for irrigated rice fields and those for other types of fields. In addition, this section clarifies how the characteristics of irrigated rice fields helped solve the problem described at the end of the previous section and how this led to intensification of the people's corvée labor. Descriptions by Wilde are relied on as the basic source and compared with descriptions by Raffles and other sources from the 1810s and 1820s. That said, as descriptions of subsistence agriculture in these sources are generally scarcer compared to descriptions of coffee and other export crops, the section also refers to H.C.H. Bie's paper, *De Landbouw der inlandsche bevolking op Java*²¹⁾ published in the early

20th century. Furthermore, descriptions from these sources are compared to research by Tadataka Igarashi [1984] on rice cultivation calendars in the Priangan region in the 1970s in the endnotes.²²⁾

The section begins with an examination of irrigated wet rice cultivation, to which Europeans paid attention most and for which relatively detailed descriptions exist.

3-2. Reconstruction of workflow with irrigated rice fields

For irrigated rice fields with a sufficient water supply, work could be started at any time. All European records of wet rice cultivation noted this fact as a major characteristic of irrigated cultivation. J. Jz. Olivier,²³⁾ who was an official of the Dutch colonial government in the first half of the 1820s, writes:

This method [irrigated rice cultivation] keeps people from wasting time and frees them from the changing of monsoon...it is possible to easily have two harvests in one year with this method, and six harvests in five and a half years are not rare cases [Olivier 1827: 63-64].²⁴⁾

Wilde's book also contains the following passage:

In places where sufficient water can be supplied, [irrigated rice cultivation] is not always carried out during a limited period of a year; it can be observed that the stage of rice growth in one place is very different from those in other places [Wilde 1830: 89].

The Europeans seems to have been aware of this advantage when irrigated cultivation began to spread. As early as 1777, the rice riping in November (beginning of the rainy season) near the Regent's toen in Tjandjoer was noted in the log of a European official [Anonymous 1856: 172]. In a survey on crops in the Priangan region in the 1790s, the limitation of the cultivation period to the rainy season was emphasized only for dry fields and swidden fields, implying the non-seasonality of irrigated fields [Nederburgh 1855: 124].²⁵⁾ It is perhaps for this reason that descriptions in Dutch and English-language documents for irrigated fields did not mention the season. This section, which focuses on irrigated rice fields, examines the number of days and amount of labor required for each stage of work.

Wilde describes the preparation of seedbeds and regular rice fields, starting with clearing of new land, as follows: First, all trees and underbrush were removed from the land for rice fields. The size of the area cleared was an area that a single man could cultivate with two water buffalo (*Loewoek Sa-rakkiet*), usually 900 to 1,000 square *roede* (1.2 to 1.4 ha). The area was divided into numerous rectangular plots and arranged to enable water to flow from plot to plot. After constructing one *voet* tall ridges, the roots of weeds and trees were removed, and the land was tilled. Then, water was drawn for the first time, and the land was repeatedly tilled until the soil was rendered soft and fine enough for planting.

At that time, the water was controlled to achieve the same depth in all plots [Wilde 1830: 83-84]. One or two plots were prepared and seeded in the manner described above. Next, the remaining plots were prepared as regular rice fields while the rice seedlings were developing. The seedlings grew to a sufficient height for transplanting at 40 to 45 days after seeding. After the preparation of regular rice fields was completed, all rice fields were surrounded with a bamboo fence to protect them from wild boars and other animals [Wilde 1830: 84-85].

While Wilde's description starts from the clearing of land, he does not mention work related to irrigation facilities. In contrast, as the use of existing wet rice fields was common, Bie's description begins repair and maintenance of irrigation facilities.²⁶⁾ Preparation of irrigation facilities began three to four weeks before plowing. Plowing was not carried out until 10 to 14 days after flooding, when the soil had become soft enough [Bie 1991: 54, 57-62]. At the beginning of the 20th century, when the considerable lands had already cleared, the work of enclosing rice fields with bamboo fences was not mentioned. However, the other works in Bie's description except for the bamboo fences are highly similar to the works in Wilde's description. Regarding the period needed after preparation of seedbed and regular rice fields, Bie notes that, the starting point was the time of seeding in seedbeds, that, in locations at high elevation, rice seedlings were transplanted 40 to 50 days after seeding, and that preparation of regular rice fields was completed during this time. Bie also mentions that seedbed preparation took a week to ten days [Bie 1991: 47, 67]. If existing wet rice fields were used, it can be assumed that the period from the start of work to transplanting would have been between two and three months.²⁷⁾

Wilde describes transplanting and subsequent control as follows: The seedlings were pulled out of the seedbeds and bundled, and the leaf tips were cut so that the all plants were six to seven *duim* (15 to 18 cm) tall. Seedling bundles were then prepared for each plot. As transplanting required an extremely large number of hands, relatives and villagers helped each other. This work was usually carried out by women and children. Two or three seedlings were planted at once in the same spot. Although no tools were used, the seedlings were planted in fairly orderly rows. After transplanting, the fields were usually flooded for three days. The fields were then drained and left to dry for three days. If necessary, the fields were flooded again. Because this watering and drying affected harvest, special care was needed. After that, fields were weeded as necessary [Wilde 1830: 85-86].

Although Bie provides a detailed description of seedling preparation and transplanting, his outline of the work and the labor required was almost the same as Wilde's [Bie 1991: 67-70].²⁸⁾ However, Wilde appears to confuse rice field control after transplanting with that of the seedbed.²⁹⁾ The only work mentioned by Bie and Igarashi after transplanting was the gradually increasing of water level in rice fields over several days after transplanting, weeding and replanting of poor growing seedlings several days thereafter, and weeding a month and a half to two months after transplanting [Bie 1991: 72; Igarashi 1984a: 37-38]. It can be concluded that manure was not applied in most instances. Wilde does not mention manure, and Raffles states explicitly that the rice fields were not manured [Raffles 1988 I: 118]. Bie explains that manure was applied only by industrious peasants [1991: 109].

Wilde provides a detailed description of work at the riping stage, which can be summarized as follows: When the rice ears became mature, a bamboo guard hut with a palm leaf roof was built in the center or to side of the rice fields. The hut had a floor raised several *voet* off the ground and was equipped with a device for driving off birds similar to a clapper in premodern Japan. Bamboo poles were planted at many points on the fields. Various objects that moved or made noise were tied to ropes that were strung from the poles to the hut. These ropes were shaken by hand and foot from the hut to scare off birds. In addition, a device similar to a deer scarer in premodern Japan [*shishi-odoshi*] was made to ward off wild boars. This device consisted of a bamboo tube positioned under a water source that made noise as it tilted back and forth [Wilde 1830: 87]. The description of the guard hut in Bie's book was almost the same as Wilde's [Bie 1991: 89-91]. Neither Wilde nor Bie mention the labor needed for guarding the fields; however, according to a report in the 1790s, the head of the household stayed overnight and even cooked meals in the hut. From time to time, the man's wife and children visited and also stayed overnight in the hut [Nederburgh 1855: 123-124]. In contrast, Raffles notes that, on Java island, the work in the hut was generally carried out by children [Raffles 1988 I: 120-121].³⁰⁾

Wilde's description of rice harvest was very short. All available hands were gathered to cut rice ears with hand-held sickles (*aniani*). The ears were cut, leaving a one-*voet* (31 cm) or slightly longer stem. The ears were then tied in a bundle and transported to the rice granary [Wilde 1830: 88].

Regarding the labor for the harvest, the report in the 1790s mentioned that harvest was also the work of women and children. The harvest was carried out with mutual aid and those who participated received one fifth of the ears they harvested as reward [Nederburgh 1855: 124]. Olivier notes that the elderly also participated in the harvest along with women and children [Olivier 1827: 64]. This can be interpreted as meaning that the harvest relied on the hands other than able-bodied men.³¹⁾ According to Bie, the rice ears were dried for one week to ten days [Bie 1991: 137].

Regarding the cultivation period for irrigated fields, Wilde explains that a good harvest could be obtained within two or three months after planting, if the rice was not damaged by field mice or insects [Wilde 1830: 86]. And, as examined above, the period from the start of work up to transplanting was approximately two to three months. According to Oki who investigated a VOC document in 1694, the dominant rice variety grown in the lowlands of West Java was an early-maturing variety that matured in five months [Oki 2006: 40-42]. Raffles notes that, although two harvests could be obtained over a 12- to 14-month period if continuous cultivation was practiced, the local people did not do so for fear of exhausting soil fertility [Raffles 1988: vol. 1 119]. It is reasonable to conclude that the period from the start of work up to harvest was half a year or a little over a half year.³²⁾

To summarize, the tasks requiring massive labor were the plowing and preparation of new land by able-bodied men and the transplanting and harvesting of ears by women, children, and the elderly. In some cases, the guarding of the rice after earing was carried out by men. However, labor demand for these tasks could be dispersed over a year by staggering the timing of work in different rice fields. Olivier described this arrangement as follows:

While one rice field is plowed and prepared, seeds are sown in the second field, and seedlings are transplanted in the third field. The fourth field is covered by green growth, while ears are riping in the fifth field; in the sixth field, ears are harvested by women, children, and the elderly [Olivier 1827: 64].

3-3. Rice cultivation calendars for non-irrigated fields

In the Priangan region at the time, rice fields were classified as irrigated fields, swidden fields (*hoema*), dry fields (*tipar*), and rain-fed wet fields. Compared to the cultivation of irrigated fields, which was seen by the Europeans as the most effective cultivation method for agricultural development, descriptions of the cultivation for the three other types of fields are scarce. This sub-section outlines these three cultivation methods focusing on seasonal work constraints. The sources of these descriptions are the same as those used throughout this paper. As it was either evident or implied that the work associated with the three other types of fields was the same as that of irrigated fields from the earing period onward, this work was not examined here.

Swidden fields: According to Wilde, swidden fields were opened on mountain slopes at higher elevations. The undergrowth and underbrush were cut, piled up, and burned. The soil was prepared, and seed rice was sown at the beginning of the rainy season [Wilde 1830: 90]. If rainfall began in November or earlier, the undergrowth and underbrush could not be burned [Wilde 1830: 91]. Olivier's description is slightly more detailed. The forest was cut, and the trees, undergrowth, and cogon grass (*alang-alang*) were burned. Then, the roots of these plants were dug up using a machete (*parang*). The ash was transformed into manure by the rain in the rainy season and by the night dew in the dry season. Seed rice was sown between tree stumps. This sowing was usually carried out by the beginning of the rainy season so that rice could be harvested in the next dry season [Olivier 1827: 61].

Bie's description is more or less the same as those of Wilde and Olivier up to sowing. After the trees were felled, the underbrush and other vegetation were dried for one to two weeks and then burned by the beginning of the rainy season. The land was not plowed. After seeding, it took four to six months for harvest, and weeding was carried out twice. Earing began at the end of the second month after planting [Bie 1991: 19, 136-142]. Although Bie does not indicate the timing of sowing, Oki argues that, in the case of swidden fields in East and Central Java at the turn of the 20th century, sowing was started at the beginning of the rainy season [Oki 1987: 18]. It can be concluded that burning was carried out in the dry season and that seed rice was sown at the beginning of the rainy season. As early-ripening varieties of rice were usually used for swidden fields, the harvest would occur near the end of the rainy season [Oki 1989: 40; Haan 1910-1912: vol. 3 643].

Fields (*tipar*): According to Wilde, this type of fields was located in gently sloping or hilly areas. The land was plowed, and the soil was prepared. Then, the field was enclosed with a bamboo fence. Seed rice was sown upon arrival of the

rains [Wilde 1830: 90]. Raffles describes the work as follows: dry field cultivation was used for land at high elevations. First, the land was plowed. Next, holes were dug and sown with seeds. In some cases, the seeds were simply scattered. The soil was prepared before the arrival of the rains; sowing occurred in September or October, and the rice was harvested in January or February. [Raffles 1988: vol. 1 120-121]. Olivier notes that *tipar* fields were established in high elevation areas to which water could not be drawn, and that successive cultivation could only be carried out for two years. The fields were plowed, and sowing was carried out in the middle of the dry season [Olivier 1827: 62].

Bie viewed *tipar* cultivation as a swidden cultivation with a shorter fallow period. Former swidden fields overgrown with weeds and underbrush were cleared, burned, and then tilled. Ridges were furrowed before sowing [Bie 1991: 19, 145-146]. According to Bie, *tipar* fields at the beginning of the 20th century continued to have been used certain years. However, if these fields (*Tipar*) in 1820s were fallowed relatively long period after two years use as Olivier mentions above, the former *tipar* fields would have to have been cleared again in the first year.

The timing of sowing described by the documents above differed. Bie does not mention when the crops were sown. Igarashi reported that the peasants sowed dryland rice, corn, and other crops at the beginning of the rainy season, noting that there was a risk of the crops withering and dying if the seeds were sown too early or too late [Igarashi 1987: 94-96]. Thus, it can be concluded that sowing was carried out at the beginning of the rainy season.

Rain-fed wet fields and fields with insufficient irrigation facilities: According to Raffles, seedbeds were prepared one month before planting. Plowing, seedbed preparation, and planting were carried out from November to March during the rainy season [Raffles 1988: vol. 1 119]. Olivier describes the workflow as follows. The work was carried out with the help of the heavy rains of the rainy season. Plowing started with the arrival of the heavy rains. Rice seeds were sown in nearby seedbeds. After 14 days, the seedlings were moved to the fields, and two seedlings were planted per hole. The fields were continuously flooded up to two weeks before harvest. Ears were cut in the dry season [Olivier 1827: 62-63]. Wilde indicates that October to November was suitable timing for rice planting in irrigated fields with insufficient water supply [Wilde 1830: 89].

Bie does not describe work in this type of field, noting that there were hardly any rain-fed wet rice fields in the Priangan region [Bie 1991: 14]. From the documents above, it can be concluded that work in rain-fed wet fields began after the beginning of the rainy season when the soil became soft. In addition, the age of seedlings at transplanting indicated by Olivier is likely a mistake, with the real age being 40 days not 14. Furthermore, if Wilde's description is accurate, irrigated fields with insufficient water supply apparently relied on rainwater after planting.

Focusing on the seasonal concentration of labor for the three types of rice cultivation, it is clear that, for all field types, the work was seasonally constrained. The type with the strictest seasonal constraint was swidden cultivation, which required work by able-bodied men—the felling of trees, burning, and soil preparation—from the middle to the end of the dry season. In particular, delaying the burning until after the beginning of the rainy season carried the risk

that few crops could be cultivated. Furthermore, because of reliance on rainwater, sowing seeds too early in the dry season was also risky. Compared to swidden cultivation, the timing of work for *tipar* and rain-fed field cultivation was a little more flexible. Where a new field was opened, work by able-bodied men was needed for a certain period near the end of the dry season to clear, plow, and prepare the soil. However, considerably less labor was required when an existing field was used. In the case of rain-fed cultivation without land clearing, plowing was started after the beginning of the rainy season and, to a certain extent, delays in the work were not problematic. However, as this type of cultivation also relied on rain during the rainy season, the growing period, which was four of five months for early-ripening varieties, could not extend much into the next dry season.

3-4. Coffee production and rice cultivation

As was examined in Section 2, the tasks related to coffee cultivation requiring young able-bodied men's labor were concentrated in the period from mid-dry season to mid-rainy season. As was examined in this section, this coincided with the need for labor by able-bodied men for swidden cultivation as well as for *tipar* and rain-fed cultivation. Thus, the period was the busiest agricultural season for able-bodied men. In addition, as coffee cherry picking was concentrated in the early half of the dry season, it is likely that there were competing demands for labor by women and children for the harvesting of coffee fruit and the harvesting of rice when the latter was carried out after the end of the rainy season, which was the case for rain-fed cultivation. Accordingly, for cultivation other than irrigated cultivation, it was difficult to mobilize large numbers of local people engaged in subsistence agriculture for long periods of time. Between 1804 and 1806, new plantations were developed intensively on the slopes of remote volcanoes. In Parakanmoentjang regency, where the proportion of wet rice fields was not so high, people were unable to cultivate rice because they were kept in the plantations during the rainy season, which resulted in localized famines [Haan 1910-1912: vol. 3 612-613, vol. 4 436].

In contrast, because irrigated rice fields with adequate water supply and year-round drainage enabled accommodation of competing demands for labor between coffee and other *corvée* and subsistence agriculture, irrigated fields became a device used by native chiefs and the Dutch colonial government to mobilize large amounts of local people's labor for long periods. The Dutch colonial government funded native chiefs and ordered them to construct wet rice fields and irrigation facilities. The native chiefs, in turn, allowed the local people to use these rice fields and irrigation facilities [Algemeen Verslag 1827: 6, 1828/29: 23] while imposing *corvée*. The Europeans admitted that they themselves initiated the staggering of rice cultivation timing. Olivier points out that the staggering of irrigated field cultivation was especially evident on private lands (*particuliere landlayen*) and reflected the land lords' will [Olivier 1827: 63]. Raffles indicates that dry season cultivation in which planting was carried out from June to July was also encouraged by the Europeans [Raffles 1988: vol. 1 119]. It is in this manner that the local people were ordered by the

native chiefs to engage in corvée labor and would start rice cultivation in their own fields after returning home [Justitie en Politie May 22, 1822].

For the local people, although they found themselves subject to heavier corvée than before, irrigated rice cultivation had the merits of increasing and stabilizing yield. Wilde writes that the maximum yield from a field cultivated by one man with two water buffalo was eight to ten *tjaen* for a high-quality irrigated field but only six *tjaen* for a *tipar* field and three *tjaen* for a swidden field. He further notes that the wealthiest common people lived in areas with high-quality wet rice fields [Wilde 1830: 90].

However, although irrigated field cultivation freed the local people from natural constraints, it also brought new disadvantages stemming from constraints by political powers. The local people were not told beforehand when they would have to engage in corvée for district chiefs and other native chiefs and, thus, could not start farm work at their own discretion. When the duration of the corvée was excessive, not enough time was left to cultivate rice. This situation forced some to flee [Justitie en Politie May 22, 1822] or to choose early-ripening varieties over late-ripening varieties that yielded more in irrigated rice fields [Wilde 1830: 40; Oki 1989: 41-42]. In addition, the coexistence of rice at different stages of growth in adjacent fields may also have increased the risk of damage by field mice [Igarashi 1984a: 43; Wilde 1830: 86]. However, it is surmised that the local people's prioritization of work at the time was not forced on them but, rather, was the result of a their choice to improve their lives, and that the local people felt that the advantages gained with irrigated fields outweighed the disadvantages of corvée labor, so long as it was not excessive.

4. Conclusions

This paper examined the cultivation calendars of coffee, dry-land rice, and wet rice cultivation as well as the age and gender of common people carrying out the various tasks and pointed out the following: (1) The main works of coffee production and especially transportation were carried out by able-bodied men; (2) irrigated rice cultivation was not seasonally constrained and enabled the accommodation of competing labor demands between coffee transportation and subsistence agriculture, which were both carried by able-bodied men in the dry season ; and (3) staggering the timing of rice cultivation in adjacent fields was encouraged by the Dutch colonial government.

It was this development of irrigated rice fields under the direction of native chiefs that likely enabled the mobilization of labor for native chiefs and the Dutch colonial government at a qualitatively different stage from that before. Although quantitative evaluation is difficult, for peasants who cultivated irrigated rice fields in the 1820s, the first priority for work have had to be coffee cultivation arranged to profit the Dutch homeland and other corvée labor for the Dutch colonial government and native chiefs. In this context, the local people increasingly timed their own rice cultivation to start after corvée or between stints of corvée. This meant (1) the Dutch colonial government was able to implement its

preferred coffee production and transportation schedule and, at the same time, (2) The local people's labor became to structurally subordinated to the decision of the colonial government at Batavia, and the local society gradually lost its indigenous seasonal calendar.

Endnotes

- 1) This book was published in the Netherlands to provide information to those interested in the Priangan region, especially those involved in agricultural development. For Wilde, it was a problem that so little was known about the region despite the fact that goods produced in the region made up a substantial portion of Dutch international trade [Wilde 1830: I-II]. This is why Wilde devoted 19 pages to coffee cultivation. At this moment, Wilde's account of coffee cultivation is known as the most detailed document in the 1810s and 1820s (see Chapter 16 Section 2 for a detailed description of Wilde and this work). This book is used because no handbooks or other work procedural manuals could be found. Because coffee, at that time, was not produced by companies or individuals who would have needed such manuals, it is unlikely that such documents exist. In addition, as the majority of local documents written at the time were works of literature or religious texts, no attempt was made to examine documents written in the local language.
- 2) , The author, J. Heijting, was the chief inspector for coffee cultivation. He subsequently became the resident of Priangan residency. The descriptions in the book mainly deal with the Priangan region.
- 3) Regarding the number of years that a coffee tree remained highly productive, Wilde estimates as that in the body [Wilde 1830: 61]. Raffles estimates this to be six to 20 years [Raffles 1988 I: 127]; Heijting, eight to 25 years [Heijting 1887: 60].
- 4) 1 *voet* is equal to 31.3946 cm.
- 5) 1 *roede* is equal to 12 *voet* or 376.7358 cm.
- 6) Coffee trees were planted more densely in poorer quality soil because, in such soils, the trees remained highly productive for fewer years and became unproductive before becoming fully grown. Heijting writes that the densest spacing was six *voet* square and that the sparsest was 14 *voet* square [Heijting 1887: 33].
- 7) Here, Wilde used "Javanese" to mean the inhabitants of Java island. As Wilde explains in a different part of the book, Sundanese-speaking people made up a considerable share of these inhabitants [Wilde 1830: 167].
- 8) As *The History of Java* was first published in 1817, there is no possibility that Wilde's book was used as a reference. However, the possibility that Wilde was one of Raffles' informants cannot be dismissed [Haan 1910-1912: vol. 1 287]. Raffles seems to include information based on his own observations as well as those of other Europeans.

- 9) Although Heijting's description of work from the clearing of new land up to the end of transplanting was much more detailed than those by Wilde and Raffles, the order of the work and the methods used for main work were essentially the same, especially for land clearing, burning, and transplanting. However, Heijting notes that the fields were terraced to prevent the loss of soil, which Wilde also notes as being problematic [Wilde 1830: 63-64]. Perhaps for the same reason, Heijting does not mention the triplicate plowing of non-terraced fields, which both Wilde and Raffles describe. In addition, Heijting describes that seedbeds had become popular and that seedlings were collected from old plantations only when the seedbeds did not produce sufficient numbers of seedlings [Heijting 1887: 3-5, 16-21, 26-27].
- 10) For example, in early August of 1820, the European resident inspected locations for new plantations proposed by his junior staff and granted final approval [Register August 7, 8, & 10, 1820].
- 11) According to Olivier's travelogue published in 1827, seedlings were searched for and removed from old plantations at the height of the rainy season in November and December [Olivier 1827: 81].
- 12) Heijting notes that June and later months were not suitable for land clearing and that land clearing ideally should have started in March or April just after the rains had become lighter. Although he did not indicate when land clearing and soil preparation was completed, given that the transplanting of seedlings was carried out at the beginning of the rainy season, it can be assumed that the work would have been completed before then. The reason for this timing of transplanting was likely because seedlings needed water [Heijting 1887: 3, 21].
- 13) The genders and ages of those mobilized were not mentioned by any of the authors. However, because the documents in the 1810s and 20s specifically noted when work was carried out by women and children, it is likely that this work was carried out by able-bodied men.
- 14) Considerably more work was described by Heijting. As maintenance work after planting in a new plantation, Heijting mentions the cutting of weeds that were taller than the coffee seedlings, which was carried out once a month in the first year, twice every two months in the second year, once three months in the third year, and once a year in the subsequent years [Heijting 1887: 6]. Non-terraced fields were plowed to a depth of 0.5 to 1 *voet* in the first two years [Heijting 1887: 36-37]. Manuring and pruning were also carried out [Heijting 1887: 49-51, 55-58].
- 15) Heijting's description was also simple and similar to the descriptions by Wilde and Raffles. The harvest period was essentially the same as that noted by Raffles. The cherries were picked before becoming overripe and falling to the ground; the underbrush was cut before picking; and particular attention was aroused to not pick unripe cherries. At the time, the harvesting of entire branches was prohibited to prevent the picking of unripe cherries and potentially reducing harvest in subsequent years [Heijting 1887: 101-103].
- 16) Heijting's description was simpler. During the dry season, drying was done either on the ground or in a shack with a raised floor (approximately three *voet* above ground) and a roof that could be opened and closed. It is unknown

whether fire was used in such drying shacks. During the rainy season, the cherries were dried in the peasants' houses or specially-constructed shacks [Heijting 1887: 105].

- 17) 1 *duim* is equal to 2.5739 cm.
- 18) Heijting's description was essentially the same. A mortar for rice husking or a conic hole dug in the ground were used. Several layers of water buffalo hide were laid in the conic hole, and the cherries were struck with a wooden mallet [Heijting 1887: 105].
- 19) Heijting's paper contains no heading for transportation. This was perhaps because the paper focused on cultivation and processing or because a railway network had been constructed and transportation was no longer problematic.
- 20) 諸蕃志, 卷下 *the latter volume*, 志物 goods, 胡椒 pepper. Japanese translation by the Kansai University Institute of Oriental and Occidental Studies [1991: 296].
- 21) Bie [1901-1902]. However, the information cited in this chapter were from Bie [1991].
- 22) Although all of the documents and literature cited in this section included descriptions of rituals, rituals are not examined in this chapter.
- 23) Born in Utrecht around 1790, died in 1858 at Batavia. Left the Netherlands in 1817 for the Dutch East Indies. Was employed by the Dutch colonial government at Batavia in 1821. Returned the Netherlands temporarily in 1826 and published [Olivier 1826].
- 24) This does not mean dual cropping whereby all tasks from seedbed preparation to harvest were carried out twice in one year. See Igarashi [1984a: 44-49].
- 25) Non-seasonal irrigated rice cultivation was still seen in the Priangan region in 1980s. This is possible because most varieties of rice cultivated were non-sun-light-reactive earing types [Igarashi 1984a: 44-49].
- 26) Igarashi also does not describe the repair of irrigation facilities [Igarashi 1984a: 53-54].
- 27) Regular rice field and seedbed preparation in the 1970s involved essentially the same tasks [Igarashi 1984a: 33-36].
- 28) Igarashi's description was essentially the same except for the use of insecticide [Igarashi 1984a: 36-37].
- 29) It is unlikely that the fields would be dried in the delicate period when the seedlings were taking root. In contrast, Igarashi records that, after seeds were sown in the seedbeds, flooding and drying were carried out repeatedly every two to three days [Igarashi 1984a: 34].
- 30) Guard huts were not observed in the 1970s. The job of driving birds off from the fields was carried out by children [Igarashi 1984a: 38]. Who carried out this work differed depending on the distance between the hamlet and the rice field and the danger of staying in the field for extended periods.
- 31) Raffles described the general situation on Java island as follows: Anyone could participate in rice harvesting. Although reward for this work was normally one sixth to one eighth of the ears harvested by a reaper, when there was shortage of reapers, this could be as high as one fifth or one fourth. When there were too many reapers, this

could be as low as one tenth to one twelfth [Raffles 1988: vol. 1 121]. Bie also indicates that the reward ranged from one fifth to one twenty-fifth depending on labor supply [Bie 1991: 82-83]. In the villages investigated by Igarashi, rice harvesting was mainly women's work, and the reward was one tenth [Igarashi 1984a: 40].

32) Igarashi also notes that the cultivation period was a little over six months [Igarashi 1984a: 45]. Wilde and Bie's descriptions of the main tasks of wet rice cultivation were so similar that the latter is suspected to have used the former as a source. However, Bie used the Sundanese narrative of four stage rice cultivation (weeding, sowing, transplanting, harvest) [Bie 1991: 35]. The similarity between the two authors' descriptions may stem from the fact that both seem to follow this narrative.

References

Archival materials

National Archives of Republic Indonesia

Priangan Residency

Algemeen Verslag, Preanger Regentschappen. 1827, 28/29.

Justitie & Politie, Preanger Regentschappen. 1822(22 Mei)

Register der Handelingen en Besluiten van den Regident der Preanger Regentschappen 1819, 1820, 1821.

Published materials, books and articles:

Anonymous. 1856. Hoe't vroeger in de Bataviasche bovenlanden en de Preangerregentschappen uitzag. *Tijdschrift voor Nederlandsch-Indie*. 2: 161-180.

Bie, H. C. H. de. 1901-1902. De Landbouw der inlandsche bevolking op Java. Met aanhangsel, inhoudsopgave en alfabetischen index. *Mededelingen uit 's lands plantentuin*. 45:1-143, 2:1-107.

Breman, J. 2010. Koloniaal Profijt van Onvrije Arbeid: Het Preanger stelsel van gedwongen koffieteelt op Java. Amsterdam: Amsterdam University Press.

Breman, J. 2015. Mobilizing Labour for the Global Coffee Market: Profits from an Unfree Work Regime in Colonial Java. Amsterdam: Amsterdam University Press.

Blusse, L. 1984. Strange Company: Chinese settlers, Mestizo Women and the Dutch in VOC Batavia. Dordrecht: Foris Publications.

Haan, F. de. 1910-12. Priangan, De Preanger-regentschappen onder het Nederlandsch Bestuur tot 1811. 4vols. Batavia: G.Kolff & Co.

- Heijting, J. 1887. *Handelingen voor de governements koffiecultuur op Java*. Batavia: Landsdrukkerij.
- Igarashi, T. 1984. Wet Rice Cultivation in the Priangan highlands, West Java. (in Japanese) (五十嵐忠孝. 1984. 「西ジャワ・プリアガン高地における水稲耕作—若干の人類生態学的考察」. 『農耕の技術』。7:27-60.
- Nederburgh, S.N. 1855. Consideratien over de Jaccatrasche en Preangerregentschappen, onder Batavia sorteerende en of daaruit meerder voordeelen dan thans, voor de Compagnie te behalen zijn ?. Tijdschrift voor Indische Taal-, Land-, en Volkenkunde. 3:110-148, 195-246, 300-318.
- Ohashi, A. 2010. The Global Economy and a Local Society: Sweets and Bitters of People in West Java, 1700-1830. (in Japanese) (大橋厚子. 2010. 『世界システムと地域社会:西ジャワの得たもの失ったもの 1700-1830』)
- Oki, A. 2006. *Social History of Rice Cultivation in Java*. (In Japanese) 『稲作の社会史』 東京: 勉誠堂.
- Olivier, J.Jz. 1827. Land- en zeetogten in Neederland's Indie, en eenige Britsche etablissementen, gedaan in de jaren 1817 tot 1826. Amsterdam: C.G. Sulpke.
- Raffles, T.S. 1888. *The History of Java*. Singapore: Oxford University Press. reprint.
- Wilde, A.de. 1830. *De Preanger Regentschappen op Java gelegen*. Amsterdam: M. Westerman.
- Zhu Fan Zhi* 諸蕃志. 1991. 卷下 the latter volume, 志物 goods, 胡椒 pepper. Japanese translation by the Kansai University Institute of Oriental and Occidental Studies.