



Status of Cassava Production and Distribution Channels in Cambodia: Prospects for Sustainable Production

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Abstract Cassava is expected to become a major industrial crop in Cambodia, but most studies on its cultivation only discuss the potential for improving its production scale, productivity, and suitable cultivation techniques, including ways to protect the crop from diseases and pests. However, sustainability of its cultivation as the country's main industrial crop cannot be achieved only by introducing agronomically suitable cultivation methods. The cultivation must be economically viable, socially beneficial, and environmentally sustainable. Therefore, this study aims to identify and analyze the characteristics of cassava cultivators and their business activities, the current distribution channel and the challenges and prospects for sustainable cassava cultivation in Cambodia. Semi-structured interviews of 24 cassava cultivators were conducted in two major cassava-growing provinces in Cambodia—Battambang and Pailin—to understand the series of production events, including the way they sell their produce. In addition, owners of six consolidating points that collect and process cassava root to sell domestically or for export were interviewed about their sales partners and destinations to identify the distribution channel. As a result, three different distribution types, from producers to collecting points, were identified, and their selection criteria appeared to be the distance between the producers and the collection points. The direct and indirect destination of the produce from the collecting points was identified as Thailand. The identified distribution channel, including collection points, comprised only cassava cultivators and exporters to Thailand, and no production specialization was observed. This reveals that building an efficient and viable distribution mechanism and strategy by utilizing the existing system will be one of the most important challenges in making cassava cultivation a major industrial crop and thus expanding the revenue source for the country.

Keywords cassava, distribution channel, small farmers, Cambodia

INTRODUCTION

Cassava (*Manihot esculenta* Crantz) is an important food crop cultivated in more than 90 countries, mainly in the tropical and subtropical latitudes in Latin America, Africa, and Asia. Cassava products are consumed by 770 million people worldwide. In Cambodia, cassava is one of the most important cash crops for farmers, even though it is consumed less as human and animal food. The market demand for dried cassava chips has increased because of ethanol production and starch processing in China, which is the largest buyer of the produce (RGC, 2020). Cambodia is located between Thailand and Vietnam, which are the two main suppliers of cassava to the Chinese market. However, these two countries have limited cassava cultivation area because of their governments' policies. This situation provides an opportunity for Cambodia to become a major producer of the crop in the region.

Cassava cultivation in Cambodia has been increasing rapidly since 2010, and it has become the country's largest crop, exceeding rice, which is the country's staple food (Fig. 1). In 2020, over 13 million tons of fresh cassava that is more than that of Vietnam were harvested (FAO, 2021). Cassava has been exported indirectly to China as a raw material through Thailand and Vietnam, therefore, the country is unknown in the market and is recognized as a marginal supplier despite being 3rd in the regional and 7th in the global production of the crop (FAO, 2021). Recently, cassava is envisioned to be a strategic crop for the country in line with the Cambodia Industrial Development Policy 2015-2025 (RGC, 2015). Furthermore, the government of Cambodia has prepared a National Policy on Cassava 2020-2025 to transform the country into a cultivation and processing hub of the crop by improving the cultivation, processing, and exporting mechanisms (RGC, 2020).

The development must be economically viable, socially beneficial and environmentally sustainable, and it must be beneficial for both commercial and individual producers because cassava cultivation is an important source of income for small-scale producers in Cambodia. To establish such a system, it is essential to identify current status and challenges from both socio-economic and agronomic points of view. However, the majority of existing studies have focused on the potential of cassava cultivation in Cambodia from an agronomic point of view, including cultivation methods (Sopheap et al., 2012; Ou et al., 2016), occurrence of insect pests and diseases (Wang et al., 2015; Uke et al., 2018), management of insect pests and diseases (Smith et al., 2018), and land suitability (Teamhy et al., 2017). Although a limited number of studies have reported on cultivators' perception (Sopheap et al., 2011, Chanda et al., 2016) and their profit (Sopheak, 2017), little is known about locally existing sales and distribution mechanism that will contribute to maintain or improve the economic viability of cassava cultivation in Cambodia.

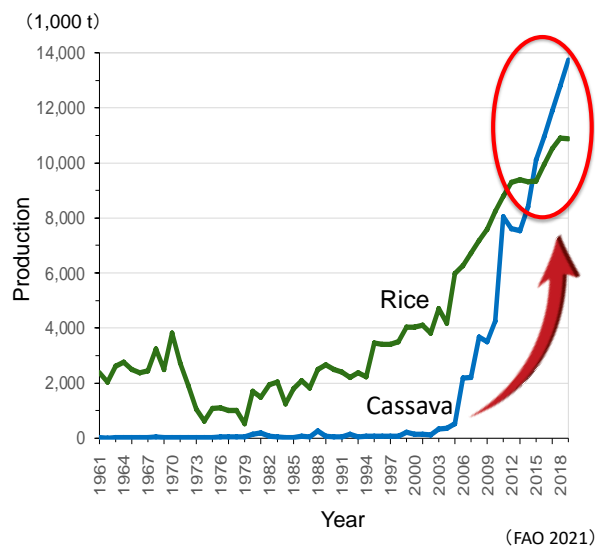


Fig. 1 Cassava production in Cambodia

Study area

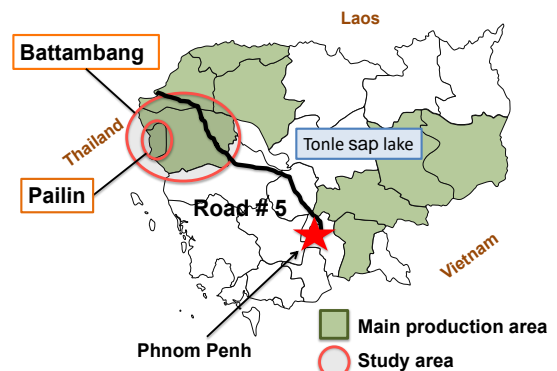


Fig. 2 Study area

OBJECTIVE

This study aims to identify and analyze the characteristics of cassava cultivators and their business activities, the distribution channel, and the challenges and prospects for its sustainable production in Cambodia.

METHODOLOGY

This study selected two major cassava producing provinces in Cambodia—Battambang and Pailin—as the study area (MAFF, 2018). These two provinces are located in the north-western part of the country, and both border on Thailand, the third largest cassava producing country in the world (Fig. 2). Semi-structured interviews of 24 cassava producers in the study area were conducted to understand their cultivation methods, annual schedule, and sales destination. Additionally, owners of six collection and processing points (known as silos in Cambodia) that collect cassava roots, make dried chips, and sell domestically or export them were interviewed about their customers and sale destinations to identify the distribution channel. The collection and processing points were located mostly in Pailin, along the National Road No. 57 near the country's border with Thailand. This survey sampled six major points to conduct the interviews. The field surveys were conducted between July 2017 and February 2018.

RESULTS AND DISCUSSION

Interviewees and Characteristics of their Households

Table 1 shows the numbers of producers interviewed for this study as well as their valid responses for analysis. Cassava cultivators in Battambang were younger, had been living there for longer time, and had longer experience of agriculture than those in Pailin. By contrast, cultivators in Pailin had larger cultivation area, more experience in terms of cassava cultivation, and a larger variety of agricultural produce. The Pailin province was invaded by the Khmer Rouge because of its extensive gem deposits and former leaders of the Pol Pot regime continued in the area even long after the war. Additionally, the province was extensively mined during the war, and demining activities continue. Therefore, it is inferred that migration from the other provinces and agricultural production became active very recently, and that these situations influenced cassava cultivation.

Table 1 Interviewees

Summary of producers*	Battambang (n=18)	Pailin (n=6)
Age (year)	35.0	50.8
Length of stay (year)	23.1	11.3
Agri experience (year)	18.4	9.8
Cassava experience (time)	2.3	4.0
Cassava area (ha)	5.3	12.5
Other Agri products (ha)	10.6	18.5

* average

Created by authors according to the results of the survey

Table 2 Scale of production

Area	Cassava* (ha)	Own land* (ha)	#of HHs
Small (< 5ha)	2.55	5.76	14
Medium (5ha < 10 ha)	5.50	11.22	5
Large (> 10ha)	21.50	17.33	5

* average

Created by authors according to the results of the survey

To analyze the characteristics of cassava cultivators, the interviewees valid answers were divided into three groups according to the size of their cassava plantations. Those with less than 5ha of cassava plantations were categorized as small-scale (58.3%), 5ha or more but less than 10ha as medium-scale (20.8%), and 10 ha or more as large-scale (20.8%) (Table 2). Even though the large-scale cultivators owned larger farmlands, their cassava plantations were even larger than their own lands. This indicated that large-scale producers were renting farmland to produce cassava. Small- and medium-scale producers were using about half their own farmland to cultivate cassava. However, the small- and medium-scale cassava cultivators grew slightly more varieties of crops than their

large-scale counterparts (Fig. 3). These results imply that unlike the others, large-scale producers focus more on cassava cultivation than other crops. However, almost half of the small- and medium-scale producers were not cultivating rice, an important staple food in Cambodia; therefore, they may be part-time farmers who have income generating activities other than agriculture that make them capable of buying rice (Fig. 4).

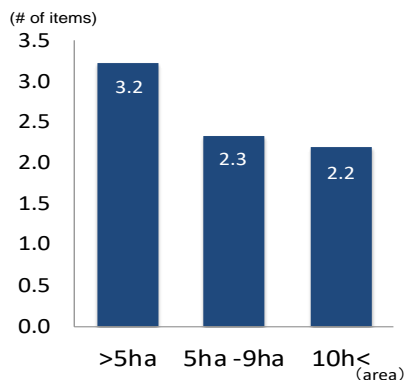


Fig. 3 Other agricultural production

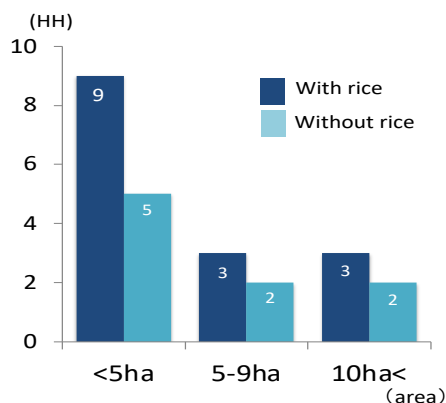


Fig. 4 Rice production of cassava producers

Production Status

Annual schedule and cultivation methods were compiled as Fig. 5 according to the results of interview. Cultivators in the study area plant cassava stems at the beginning of the rainy season, and all of them used stem cuttings from the previous crop as usual. For most cassava varieties, the stems can be stored vertically in the shade for up to two months before planting (IAEA 2018). Some producers also bought stem cuttings from neighbors and sellers for planting and replanting. The cassava is harvested after 9–12 months, generally after the onset of the dry season. Most cultivators prepare their land for the next cultivation in February and March, immediately after the harvest.

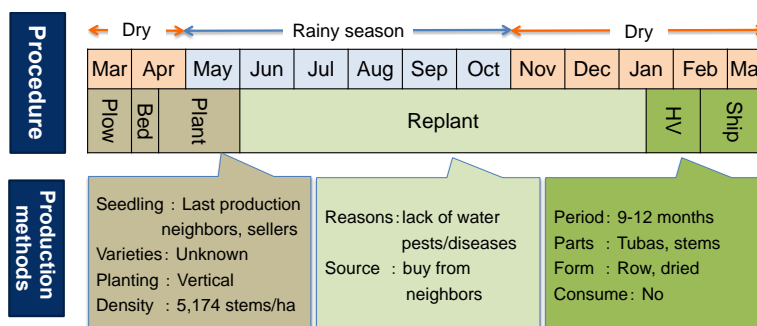


Fig. 5 Annual production schedule and methods

Distribution from Producers to Collection and Processing Points

This study identified (Table 3) three different types of cassava distribution: (1) harvested, transported, and sold to collection points directly by producer; (2) harvested, transported and sold to collection points exclusively by middleman; and (3) harvested by producers, but transported and sold by middlemen. Cultivators adopting Type 1 need to own or rent all necessary machines and equipment for planting, harvesting, and transportation, such as power tillers, harvesters, and trucks.

By contrast, those adopting Type 2 do not need any machinery or equipment except those for land preparation and planting. Cultivators adopting Type 3 need to own or rent machines and equipment for both planting and harvesting but not for transportation. The results discussed in the previous section show that most cassava cultivators are also growing several other crops. These cultivators have some machinery available to them that can also be used in cassava cultivation.

Middlemen who harvest or transport the cassava roots are mostly large-scale cultivators in the neighborhood. According to Table 3, the majority of cultivators are categorized as Type 3, however, there is no clear relationship between their production scale and the distribution type. At the same time, the producer's location (province) seems to have an effect on the distribution type. Most cultivators (six out of five) in Pailin belong to Type 2, whereas only one of 18 cultivators in Battambang belong to this type. On the contrary, most producers (14 out of 18) in Battambang belong to Type 3.

Table 3 Flows from cultivators to collection points and selling price

	(1) Producer only		(2) Middleman only		(3) Combination		Total (%)
	BTB (%)	PL (%)	BTB (%)	PL (%)	BTB (%)	PL (%)	
Production scale							
< 5ha	1 (100.0)	2 (40.0)	2 (66.6)	0 -	8 (57.1)	1 (100.0)	14 (58.3)
5-9 ha	0 -	1 (20.0)	1 (33.3)	0 -	3 (21.4)	0 -	5 (16.7)
> 10ha	0 -	2 (40.0)	0 -	0 -	3 (21.4)	0 -	5 (25.0)
sub-total	1 (100.0)	5 (100.0)	3 (100.0)	0 -	14 (100.0)	1 (100.0)	24 (100.0)
Total number (%)		6 (25.0)		3 (12.5)		15 (62.5)	24 (100.0)

BTB: Battambang province, PL: Pailin province

Created by authors based on the results

“-“ indicates no respondents for the category

The number of cultivators and the selling price of cassava roots according to distribution types and location (province) are shown in Table 4, and the selling prices according to production scale and location are shown in Table 5. In these tables, cassava roots are categorized as fresh and dried, and the numbers of cultivators and sales are analyzed according to the province and distribution type. The dried cassava roots are generally made by chopping them into small bits and drying them in the sun. Drying reduces the weight by two thirds, making it easier to transport even though chopping is heavy work and requires a large space for drying.

Table 4 shows that five out of six producers in Pailin sell their cassava as fresh roots, whereas majority of producers (14 out of 24 producers) in Battambang sell their cassava as dried roots. This difference might also have influenced the selection of distribution type. Table 6 shows the information about the collection and processing points surveyed, where both producers and middlemen were selling their cassava roots. Five out of six points were in Pailin, which is closer to the border with Thailand than Battambang. It is inferred that producers in Battambang were trying to avoid heavy and costly work such as harvesting and transporting the cassava, and either depended more on middleman or dried the roots so that they could transport them in one lot. It is also inferred that proximity to the collection points and ease of transportation allows cultivators in Pailin to save the effort of drying the roots and they do everything themselves as mentioned in Type 1. Although it is difficult to analyze the selling price according to the distribution type owing to lack of data for some categories, the price of fresh roots in Pailin is slightly higher than that in Battambang. It is assumed that the selling price reflects the transportation fee from the collection points to the next destination, which is mostly Thailand.

Table 4 Distribution types from producers to collection point and selling price

	(1) Producer only		(2) Middlemen only		(3) Combination		Total	
	price	HHs	price	HHs	price	HHs	price	HHs
Fresh roots	177.48	5 (38.5)	135.44	3 (23.0)	192.25	5 (38.5)	182.97	13 (100.0)
BTB	-	0 (0.00)	176.67	3 (42.9)	184.25	4 (57.1)	181.00	7 (100.0)
PL	177.48	5 (83.3)	-	0 (0.00)	224.25	1 (16.7)	185.28	6 (100.0)
Dried roots	440.00	1 (6.7)	-	0 (0.00)	492.36	14 (93.3)	488.87	15 (100.0)
BTB	440.00	1 (6.7)	-	0 (0.0)	492.36	14 (93.3)	488.87	15 (100.0)
PL	-	0 (0.0)	-	0 (0.0)	-	0 (0.0)	-	0 (0.0)

BTB: Battambang province, PL: Pailin province

Created by authors based on the results

“-“ indicates no respondents for the category.

An analysis of the production scales and selling prices according to location revealed that the average selling price at each location is the lowest for middle-scale cultivators and the highest for large-scale producers (Table 5). This trend was observed for both fresh and dried roots. However, this survey did not have enough variables to explain the cause.

Table 5 Production scale and selling price by location

	Small (< 5ha)		Medium (5<10 ha)		Large (>10ha)		Total	
	price	HHs	price	HHs	price	HHs	price	HHs
Fresh roots	183.63	7 (53.8)	166.00	3 (23.1)	198.42	3 (23.1)	182.97	13 (100.0)
BTB	185.75	4 (57.1)	168.50	2 (28.6)	187.00	1 (14.3)	181.00	7 (100.0)
PL	180.81	3 (50.0)	161.00	1 (16.7)	204.13	2 (33.3)	185.28	6 (100.0)
Dried roots	509.44	9 (60.0)	429.00	3 (20.0)	487.00	3 (20.0)	488.87	15 (100.0)
BTB	509.44	9 (60.0)	429.00	3 (20.0)	487.00	3 (20.0)	488.87	15 (100.0)
PL	-	0 (0.0)	-	0 (0.0)	-	0 (0.0)	-	0 (0.0)

BTB: Battambang province, PL: Pailin province
 “-“ indicates no respondents for the category.

Created by authors based on the results

Table 6 Surveyed collection and processing points

Collection point	A	B	C	D	E	F
Location	PL	PL	PL	PL	PL	BTB
Chipping period	Dec-Mar	Nov-Mar	_*	Nov-Apr	-	Oct-Mar
Amount (t/day)	1,820	20~30	-	50	-	200
Production (ha)	6		300		15	50

* Collection points that do not do processing activities such as chipping and drying
 Average daily quota for chipping workers was 1 ton per person of family.

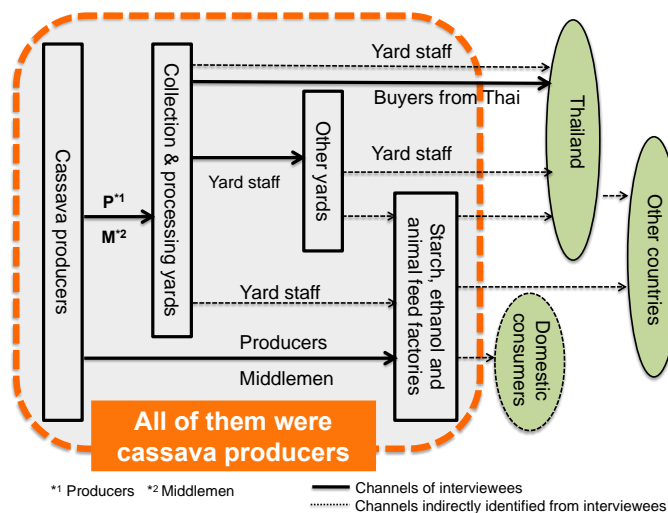


Fig. 6 Distribution channel of cassava root

Destination: From Collection Points to Consumers or Exporters

To study their modes of operation and the destination of collected cassava roots (Table 6), data were collected from interviews with the owners of six collection and processing points and revealed several types of operations. Whereas collection points A, B, D, and F were making dried cassava chips, the other two were not. From these consolidating points with processing facilities, the cassava chips are sent to other collection and processing points, starch factories, and even directly to Thailand

by trading companies from that country. This type of consolidating point was trading both fresh and dried roots. The fresh roots were either sold to other consolidating points for processing or exported to Thailand without processing, whereas all the dried roots were directly exported to Thailand. Fresh roots exported to Thailand are processed in starch factories across the border. Collection points without processing facilities such as C and E (Table 6) were only transporting and selling fresh roots to starch factories which in turn exported them mainly to Thailand. Thus, the characteristics of collection and processing points are found to have a relation to the destination of the collected cassava roots. Interestingly, most collection and processing points are established and operated by large-scale cassava cultivators such as A, C, E, and F in Table 6. In addition to owning large cassava plantations, these cultivators also play the roles of harvesters, middlemen, collectors, processors, transporters, and traders. They collect cassava roots from small-scale cultivators to fill the gap between the demand from Thailand and their own production. In sum, this research has found that the cassava distribution channel in the study area comprised only various types of cassava cultivators and traders from Thailand, and there was no division of labor for efficiency (Fig. 6).

CONCLUSION

This study aimed to identify cassava distribution channels in Cambodia as well as the characteristics of cultivators and their mode of business operations. The results revealed that the production scale and characteristics of the producers, such as average age and experience in agriculture, especially cassava cultivation, are influenced by the historical and geographical characteristics of each province. This study identified three different types of distribution channels from producers to consolidating points. The first type is direct distribution wherein all related processes such as planting, harvesting, transporting and selling are handled by the cultivators. In the second type, apart from cultivation, everything is handled by middlemen. The third type features a combination of both cultivators and middlemen. The distribution type also depended on the type of root being traded—fresh or dried—and the distance from farms to the collection and processing points. Moreover, analysis of selling price and characteristics of income from cassava cultivation need further study with sufficient sampling with statistical methods. This study also found that large-scale cassava cultivators, who also operate root collection and processing points, were playing important roles as collectors, middlemen, and transporters in the cassava root distribution system of Cambodia. The existing cassava root distribution mechanism in the country is well-concerned about its benefit to cultivators including small-scale producers; however, there is more room for improving efficiency such as introducing division of labor. Thus, building an efficient and viable distribution mechanism and strategy by utilizing the existing system as its base will be one of the most important challenges for making cassava a major industrial crop and increasing revenue from its cultivation. The results of this study were based on qualitative analysis only due to small number of samples. Further studies with quantitative analysis on cultivators' profits, characteristics of sales activities, and distribution types according to their production scale and location are desirable to find out suitable distribution mechanism that is efficient and viable as main industrial crop in Cambodia.

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