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Research Article

Rush Farming of Konjac (*Amorphophallus muelleri*) Among Novice Farmers in Ciamis Regency, West Java Province, Indonesia: A Descriptive Study

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Dian Diniyati¹, Budiman Achmad^{2,3}, Marcellinus Mandira Budi Utomo^{4,5}, Dewi Maharani⁶, Wuri Handayani⁷, Yana Febiana⁸

1. Research Center for Social Welfare, Village, and Connectivity, National Research and Innovation Agency (BRIN), Indonesia; 2. Institute for Economic Research, Ljubljana, Slovenia; 3. Research Center for Macroeconomic and Finance, National Research and Innovation Agency (BRIN), Indonesia; 4. Universitas Pembangunan Nasional Veteran Yogyakarta, Sleman, Indonesia; 5. Research Center for Society and Culture, National Research and Innovation Agency (BRIN), Indonesia; 6. Research Center for Plant Conservation, Botanical Gardens, and Forestry, National Research and Innovation Agency (BRIN), Indonesia; 7. Research Center for Ecology and Ethnobiology, National Research and Innovation Agency (BRIN), Indonesia; 8. Independent researcher

Rush farming among novice farmers because of incomplete information on konjac crop management needs further investigation. Nonetheless, the rush in West Java province has positively impacted farmers and rural economic improvement. This study is intended to identify the factors responsible for the farming of konjac, its implications, and the necessary response. The survey was conducted in Jelegong, Ciamis district, West Java province, using the triangulation method to interview 37 farmers. The finding was that rush farming was triggered by the misinterpretation of incomplete information on cultivation technology and the inaccurate projection of market demand due to excessive forecasting of profits. This rush is probably a phenomenon that is supposed to be maintained carefully because such farming still provides additional income and does not require specific skills. The rush also successfully attracted the interest of new investors to be involved in the konjac business and government attention in distributing various incentives. Despite the rush stimulating economic growth in the village, it threatens the supply of other agricultural commodities because konjac has replaced other crops on the same land. This research also found that there are two types of konjac farming in rural society, i.e., (i) cultivating konjac without shade, which is better suited to smallholder farmers with less capital and less maintenance, and (ii) cultivating konjac in the shade, which is better suited to rich farmers or industries requiring intensive maintenance. Therefore, we suggest that the government issue a map about the site suitability of various crops for the West Java region, allowing farmers to seek advice on the appropriate crop types to grow by region. To meet future demand, it is necessary to combine traditional knowledge, mainly on collecting corms (ngabolang) and planting methods, with scientific knowledge.

Corresponding author: Budiman Achmad, budi071@brin.go.id

Introduction

Konjac (*Amorphophallus muelleri*) is a tuber with a glucumannan content of about 35% - 78.23% (Mustafa et al., 2015; Siswanto, 2016). The magnitude of the demand and the high price of konjac, as well as extensive news on social media describing the success of farmers engaged in the konjac

business (Alawi, 2019), increased the interest of novice farmers in developing konjac. Therefore, many new konjac farmers have emerged in almost all parts of Indonesia (Hermudananto et al., 2019; Sjah et al., 2021). For example, the farmers of Semanu Gunung Kidul grew konjac because of the propaganda and testimony of some people on television and social media (Internet, WhatsApp, Instagram, magazines, etc.) about the benefits of konjac. They expect to make a profit and earn some money when harvesting (Puspitaningrum et al., 2020). Konjac

in West Java province is commonly cultivated on both state and private lands.

The popularity of konjac in the community cannot be separated from the nature of konjac crops that are shade-tolerant, easy to cultivate, have high productivity, are rarely exposed to disease/pests, and have potential export market demand. The Agricultural Quarantine Agency stated that the export of konjac in 2018 was recorded at 254 tons, with an export value of 11.31 billion IDR to Japan, China, Vietnam, Australia, and others. In 2019, konjac exports reached 60 tons, equivalent to 1.2 billion IDR to China (Febian, 2020). Furthermore, the Belawan Quarantine Center noted that exports of konjac from North Sumatra Province throughout 2020 reached 861 tons with a value of 19.1 billion IDR to China, Thailand, Vietnam, and Japan (Biro Perekonomian Setda Sumatera Utara, 2021). Information on the high demand for the international market can anesthetize farmers to be eager to develop konjac but pay less attention to knowledge of farming.

Ciamis County, one of West Java's regencies, is booming in the farming of konjac crops mostly cultivated on private land. The village that was beginning the konjac business was in the sub-district of Cidolog, with a total area of 50 hectares. Compared to other counties (Hermudananto et al., 2019), the development of konjac in Ciamis began rather later, i.e., started planting konjac in 2019. Initially, konjac was collected and taken from forests and around the shorelines by the community; this activity is known as "ngabolang". However, as demand continues to increase while the number of konjac from natural forests is decreasing, the community is unable to "ngabolang" anymore, and therefore they start to domesticate konjac on their land instead. In 2020, the price of konjac tubers at the farmer level was quite high, which was 10,000 IDR/kg. This price attracted more and more public interest to join the konjac business. Although in 2021 the price of konjac experienced a drop to 7,000 IDR/kg, attempting to plant konjac is still practiced in the community. There is great interest in the cultivation of konjac among farmers, including newcomers (novices), but there is less available information about the model of farming they practice. Most novice farmers are practicing the minimum tillage model for konjac development. Does this pattern have profit potential or not? If this is not feasible, but farmers are passionate about growing konjac, this will lead to their decision to stop growing it. This situation is unfavorable for the environment and farmers' livelihoods. Meanwhile, the interest of the people of Ciamis to learn konjac planting technology and its growth behavior is still low. So this study aims to enrich the discourse on konjac cultivation by knowing the types of cultivation and its economic benefits for farmers by looking at the feasibility of the cultivation business.

Theoretical Framework

1. Theory of Phenomenon

A common phenomenon in our daily lives is subjectivity, affectivity, mediation, exploration, and limited use of models

(Grusche, 2019). Moreover, phenomenology indicates that to properly study humans, simple experiments will not be enough (Fabian, 2014). As we recognize, social phenomena are far more intrinsic to research than to the natural sciences. Dealing with humans is not simply because they are complex, unique, vulnerable objects influenced by the information captured, and local traditions; to understand them requires the involvement of many disciplines of knowledge. For this reason, a single approach may be difficult to provide a complete picture of human behavior. Cacciattolo (2022) offers a combination of quantitative and qualitative approaches to improve understanding of social phenomena. This complexity is typically studied using mainly qualitative methods. However, the argument also emphasizes that for research to be successful, it must have an element of objectivity that is usually obtained by quantitative methods. A feature of a phenomenon is description, whereas natural science has been characterized by explanatory modeling. The nature of instruction may be phenomenon-based and model-oriented. For this reason, a combination of two methods known as the triangulation method is necessary because it elaborates a wide range of data that can be used to develop evidence. The method has been developed based on three theories (Erzberger & Prein, 1997), namely convergence, complementarity, and dissonance. The convergence approach was used to identify other results of the same research problem that could enrich and develop evidence that enhances the validity and reliability of the results. On the other hand, complementarity involves the integration of various results into the framework of common theoretical hypotheses, which determine the problem to be studied. While dissonance is a constructive approach that revises or modifies theoretical hypotheses when the results, according to qualitative and quantitative methods, contradict one another.

2. Theory of perception

Gibson proposed an alternative theory: perception is innate rather than learned. Humans evolved to make accurate judgments based solely on the sensory information we receive. Gibson observed that as we move, we receive a great deal of information about depth and distance directly, without any necessary inference about visual cues (COSTALL & STILL, 1989).

Gregory's theory proposed that how we perceive things is not just based on what we can see before us but also on our past experiences as well. This is known as a constructivist theory or a 'top-down' theory (as in our memories - in the top of our heads - help us to perceive things!). Interaction between people in a community is encouraged by the social constructivist theory (B R & G, 2023). There are difficulties in measuring perception because it cannot be tested empirically but relies on subjective methods, namely the respondent interprets what they see. Perception is a subjective process that is influenced by individual differences, meaning that the way a person perceives something will be completely different from other people. The constructivist theory of perception states that what is perceived comes from the surrounding environment, is based on previous information/experience,

and is as expected. In this study, the theory that fits the behavior of novice farmers who expect excessive profits is the constructivist theory, whereas farmers expect profit too much despite little experience.

Materials and Methods

1. Location of the study

The site, Jelegong Village, was deliberately selected, beginning with a discussion with the Ministry of Agriculture and Plantations of Ciamis Regency (Figure 1). We are aware of the representational issue. Since konjac cultivation is typical in Ciamis Regency, the village of Jelegong would be representative of konjac culture in the general population (Gerring, 2008).

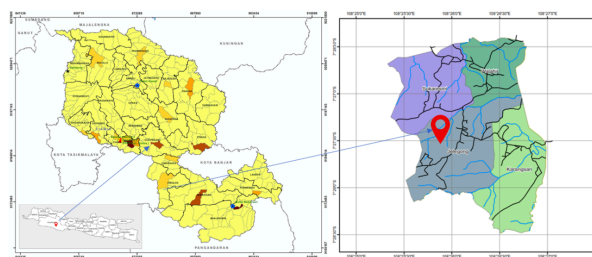


Figure 1. Research Location

2. Collection of Data

Data were collected over two months, from May to June 2021. A triangular approach (Cacciattolo & Sci, 2022) was used to capture emerging konjac planting phenomena among Ciamis Regency farmers. The primary data were collected through interviews using a questionnaire that was prepared in advance and followed by an open discussion using a guideline for questions. Furthermore, observations were made about konjac plants planted by farmers. Qualitative data include the pattern of farming, perception of the konjac market, the reasons for konjac farming, maintenance of crops, the way to obtain bulbs, the relationship with intermediaries, and knowledge sharing. While quantitative data include the cost of konjac farming, income from konjac, needs for seedlings, maintenance cost, labor, farmer ages, education level, etc. Secondary data were collected through a literature study.

The konjac rush is an agricultural phenomenon within Ciamis Regency. Thus, the phenomenology approach is relevant to be applied in this research by comprehensively studying the individual's experience (Neubauer et al., 2019), and if so, the experience of an individual farmer. In the study of the phenomenon, the minimum or the maximum number of respondents was not pre-determined; however, according to Fusch and Ness (2015), some 30-35 respondents were projected as the number to reach saturation. In this study, 37 farmers were interviewed and therefore are regarded as

sufficient. In addition to our understanding, secondary government data were collected online.

3. Analysis of Data

To illustrate the character of konjac farmers, the data from the interviews and observations were analyzed descriptively and presented in tables and images to facilitate interpretation. In addition, data about farming patterns, government policies related to konjac culture, and the konjac phenomenon for well-being are also analyzed descriptively. The term descriptive research refers to a written description of the current situation of an item under investigation, as it was at the time the research was conducted. A technique that utilizes observation to evaluate the current state of human groups, a set of circumstances, a system of thinking, or a class of occurrences.

The commercial value of konjac was calculated by analyzing costs, revenues, net income, and the benefit-cost ratio (Boediono, 1993; Soekartawi, 2002). The profits of konjac enterprises are derived from the difference between the amount of revenue and the total costs incurred. The formulation used is as follows.

$$\pi = TR - TC \quad (1)$$

Note:

- π = Profit (IDR)
- TR = Total revenue (IDR)
- TC = Total cost (IDR)

In addition, the total revenue (TR) is the result of the multiplication of output (Y) obtained from the konjac harvesting with the selling price (Py), so the formula used is as follows,

$$TR = \sum YxPy \quad (2)$$

Note:

- TR = Total revenue (IDR)
- Y = Number of productions (kg)
- Py = Price for Y (IDR/kg)

The efficiency of business operations is calculated with a B/C analysis. This analysis is a comparison between Total Revenue (TR) and Total Cost of Production (TC), which is formulated in the following equation

$$\frac{B}{C} = \frac{TR}{TC} \quad (3)$$

The B/C value > 1 indicates that the konjac business is profitable. The value of the ratio B/C = 1 indicates that the konjac business is in equilibrium, which is neither profitable nor harmful. The value of the ratio B/C < 1 can be interpreted as that the konjac business is not cost-effective or inefficient.

Results and Discussion

1. Features of Konjac Farmers

The characteristics of the konjac farmers at the research site are depicted in Table 1.

No.	Description	Unit	Average
1	Age	Year	42.24
2	Education Level	Year	8
3	Job	Type	
	a. Main Job		Farmer
	b. Side Job		Farm Labor
4	Experience in non-konjac farming	Year	20.5
5	Land Ownership	Hectare	0.771
	a. Home Garden		0.062
	b. Fishpond		0.011
	c. Rice Field		0.181
	d. Private Agro-Forest		0.518

Table 1. Konjac farmer characteristics.

The main fieldwork of konjac farming is usually performed by men. Nevertheless, in the konjac trade, more women farmers are involved. Farmers in the village of Jelegong who are actively engaged in konjac cultivation are all men (100%). The age of farmers ranges between 21 years and 62 years, with an average of 42.24 years. This shows that farmers involved in konjac cultivation are still categorized as being of productive age. This range is consistent with the age of Bantaeng Regency konjac farmers, i.e., between 27 years and 62 years (Putri, 2021). It turns out that the average age of farmers in Asaita Woreda (Ethiopia) is also almost similar, ranging from 28 to 80 years (Adem & Tesafa, 2020). The characteristics of farmers at the research sites varied according to levels of education, from primary school drop-out to baccalaureate, with an average duration of 8 years (equivalent to grade 2 junior high school). This demonstrates that the konjac business does not require a certain level of education, or that the konjac business is not an enterprise that highly educated people avoid. Similarly, the types of work performed are very diverse, including farmers, agricultural/construction workers, village officials, contractors, drivers, retired public servants, private employees, and teachers. While the work is varied, the average agricultural experience is 20.5 years, indicating that agricultural activities have been conducted over a long time. This experience made them overconfident, resulting in farmers fully investing their capital to grow konjac. The konjac crop is not expected to be a problem for Jelegong farmers under these conditions. Their indigenous knowledge of food crop plantations is not enough to support konjac development, particularly when it is developed on a large scale. Each crop has its characteristics and specific climatic requirements, making konjac agriculture ideally require appropriate treatment too.

A further supporting factor for the development of the konjac business is the availability of land; their average land ownership is 0.77 ha. The extent of tenure impacts the type of crop mix and the intensity of crop management (Satriawan & Fuady, 2013). Farmers in the village of Jelegong grow konjac on their land, practicing agroforestry with an average area of 0.518 ha. Meanwhile, in East Java, konjac is mostly cultivated in the forest area of Perum Perhutani (Soekartawi, 2002; Dian et al., 2021; Mutmaidah & Rozi, 2015; Mutmaidah & Rozi, 2015). These two types of farming have different levels of knowledge because farmers who plant konjac on Perum Perhutani land are under supervision by extension officers, while farmers who grow konjac on their land work alone. Supported by self-confidence, long farming experience, land and stand conditions that meet the requirements for growing konjac, and the character of konjac, the hope for the success of the konjac plant can be achieved despite not being optimal.

2. The Process for Domesticating Konjac

The konjac tubers in the village of Jelegong were obtained by "ngabolang" around the forest of Ciamis Regency. A similar model of konjac collection also occurred among North Sumatra farmers (Yudha, 2022), and also in Southeast Asian countries (Shenglin, Xuekuan, et al., 2020). Most exported konjac tubers still originate from smallholder agriculture by collecting tubers that grow wild in plantations and forests. The volume of konjac exports from 2018 to 2020 increased, i.e., from 11,058.18 tons to 20,577.11 tons, but it decreased in 2021 (6,084.55 tons) and in 2022 (767.11 tons) because of the limitation of exports to China (Yudha, 2022). In the past, konjac was a wild plant that inhabited the forest (Wahidah & Afiati, 2021). Konjac originated in the lower layers of tropical forests in Asia and thus has the characteristics of plants growing in warm and moist environments, in half shade

(Shenglin, Purwadaria, et al., 2020). To improve farming technology and to meet the demand for industrial-scale production, in 2020 the government allocated land of 17,886 ha in West Java, Central Java, East Java, Banten, East Nusa Tenggara, and South Sulawesi Provinces (CNBC, 2020). Unlike potatoes, konjac corms cannot be cut into pieces to grow; this is a reason why most varieties of konjac cannot meet the demand (Shenglin, Xuekuan, et al., 2020).

The ngabolang has been carried out in groups of 5 to 7 persons, on foot or by motorbike. If a konjac crop is found, it will be collected and sold to village middlemen. Ngabolang can travel up to 75.2 km–112 km. Ngabolang's activities are carried out irregularly, but only if an order exists. Ngabolang participants were 11 (30%), and they came from different groups. In 2021, Ngabolang was still performed by the population of Jelegong, but as more people do ngabolang, the konjac plants in the forest are decreasing. Lately, the demand for konjac tubers continues to increase, while the konjac that grows near the forest border decreases, and this condition forces konjac searchers to walk further. This creates an imbalance between demand and supply of raw materials. This also creates mindset changes among communities to start domesticating konjac in the private forest, as indicated by (Sang, 2011) that domestication can ensure the availability of resources.

Konjac has been widely grown in the village of Jelegong since 2017. Two factors encourage changes in people's behavior from ngabolang to cultivation, including (i) *economic factors*, about 51% of respondents cultivate konjac because of the high selling value, and 3% of them thought that selling konjac was very easy. (ii) *Crop factors*, around 19% of respondents copied the success story of other farmers in cultivation, and 14% reported that planting konjac was easy, while 5% just used unoccupied land. Domestication is intended to facilitate harvesting and enhance taste and nutritional quality. A similar perception is also experienced by beginning farmers in Semarang who grow konjac because they were inspired by the success of konjac farmers in East Java.

When konjac was first planted (2017), only a few farmers were involved, with 3% planting for 37–48 months and 16% planting for 25–36 months. Furthermore, in 2019, interest in planting konjac was quite high, with 35% planting for 13–24 months and 46% planting for 0–12 months. Approximately 62.2% of farmers reported that planting konjac was easy because it did not interfere with other plants and could grow under minimal fertilizer. In addition, up to 29.7% of farmers reported that sales of konjac tubers were very easy and that prices were higher than those for cassava and bananas. About 8.1% of farmers are interested in planting konjac because the production of tubers is high, does not rot easily, and can be stored for a long period. At the location of the study, konjac was planted with the following patterns: (i) under the shade with a line pattern and intercropping, (ii) without shade, carried out by 43.24% of farmers by replacing various other types of plants, and (iii) a combination of both patterns. The crop pattern carried out by the farmers is adjusted for the available area. At initial planting, about 56.76% of farmers used ngabolang seeds, while 43.24% of farmers purchased

seeds from middlemen and online shops. Farmers are more fascinated by the information on the benefits of konjac development than by the associated risk of how that would happen if the price falls or the market is already saturated. Market information is crucial for making decisions related to the supply chain (Magesa et al., 2019).

Jelegong farmers are very excited about developing konjac, so they are eager to explore knowledge through (i) asking business actors of konjac (37.84%) such as relatives, neighbors, and friends, (ii) exploring social media (24.32%), (iii) experimenting by themselves (24.32%), and (iv) learning from business partners (13.51%). These conditions show that the desire to cultivate konjac is self-existent and that there is no coercion from the outside. This type of knowledge exploration is therefore not effective in resulting in yield. There is no intense involvement of extension workers in developing konjac in Ciamis because the rush of farming is too sudden, and the institution in charge is not ready yet. According to Karjanto (2022), konjac farming by Javanese farmers who usually practice the “Pranata mangsa” tradition needs to adopt scientific knowledge to get optimal yield sustainably.

3. Response of local government to konjac phenomenon

The growing number of novice farmers growing konjac is a positive phenomenon, considering food security is one of the main problems in adapting to climate change (Utomo & Pieter, 2022). In addition, the presence of konjac, which is considered attractive to farmers, is also good news. This is because konjac can provide more definite benefits in comparison with other tuber products, perhaps even other non-rice agricultural products. Farmers' decisions to grow a commodity are, of course, also based on various important considerations (Suratha, 2015), including the beginning of konjac planting. It is hoped that the great attention of farmers toward konjac will improve the condition of degraded farmland since 2010 (Ministry of Agriculture, 2020). In this study, stakeholders involved in konjac breeding have been mapped, and Table 2 summarises the stakeholders involved in konjac cultivation. The central players in the konjac plantation at the research site, and possibly in other places, are farmers who are interested in konjac cultivation. They are very interested and strong in the cultivation of konjac plantations (Quadrant I). The technical capacity and willingness to spend money and use their land to grow konjac are key factors in the growing number of new konjac plantations in the Ciamis Regency. Meanwhile, the players that are very interested but not very powerful are seed dealers. They have an interest in operating a company that sells konjac seeds as bulbs. Such activity takes advantage of the enthusiasm of farmers to invest in konjac plantations. Although less powerful than the farmers in the cultivation of konjac, they have a rather strong bargaining position. This is because, at the marketing stage of the products, the seed seller is only prepared to buy the konjac harvested from the farmers who buy their seeds. This suggests that the konjac market is oligopolistic, just like what is happening in East Java (Budi et al., 2018).

High	Subjects • Seed sellers	Players • Interested farmers
INTEREST Low	Crowd • Skeptical farmers • Farmer groups	Context Setters • Agricultural Service • Forestry Service • State-owned enterprise
	Low POWER High	

Table 2. Power-interest matrix of konjac culture in Ciamis Regency

In the meantime, skeptical farmers and the group of farmers are in Quadrant III, which is powerless and not of much interest. The existence of farmer groups has no impact on farmers' high interest in planting konjac. Farmer groups tend to further legalize access to government support programs for farmers. Whereas Quadrant IV includes the public and public enterprises. The government has a lot of power in terms of facilitating capacity building for farmers and improving the quality of the konjac crop. Moreover, increasing the productivity of konjac is still a challenge for farmers (Budi et al., 2018). Although konjac tends to be considered an agricultural commodity, there is an area where forest services can play a greater role in supporting farmers, particularly in agroforestry areas. Public enterprises, on the other hand, have the power to provide land to plant konjac under the main stands. The rush to farm konjac shows that economic value is the main motivation for farmers in Jelegong Village; this is common in all parts of the world (Mutmaidah & Rozi, 2015; Greiner & Gregg, 2011; Yuan et al., 2021). Motivated farmers are valuable human resources for strengthening the farming sector. Even without direct government assistance for this konjac farming, farmers can survive on their current

knowledge. However, that does not mean that farmers do not expect the government to support konjac's business. Interview results showed that 100% of respondents expected support, especially when it came to fertilizer supply. The programs from the Central Government through the Ministry of Agriculture called GRATIEKS (Three-fold Export Movement, 2021) noted that konjac, being one of the three priority commodities, has yet to be implemented in this village.

The high enthusiasm for growing konjac in Jelegong Village positively impacts the village's economy and governance, i.e., Jelegong Village became the focal point of district and central government attention. Although konjac has been cultivated on some separate private land (on average 0.8 ha each), the crops in Jelegong Village cover the largest area in Ciamis Regency (50 ha in total). It has also attracted many investors to get involved in the business of konjac in Jelegong and has established a partnership with local farmers.

4. Konjac Farming

In the village of Jelegong, konjac is farmed under two conditions, with and without shade. These crop patterns affect agricultural conditions, as can be seen in Table 3.

No	Description	Unit	Average
1	Konjac production without shade		
	a. Number of plants	Stand	990
	b. Tuber production	Kg	1,980
	c. Bulbs production	Kg	17
	d. Income from tubers	IDR	13,860,000
	e. Income from bulbs	IDR	1,700,000
	f. Total income	IDR	15,560,000
	h. Number of farmers practicing this method	People	25 (67.57%)
2	Konjac production with shade		
	a. Number of plants	Stand	650
	b. Tuber production	Kg	1,300
	c. Bulbs production	Kg	11
	d. Income from tubers	IDR	9,100,000
	e. Income from bulbs	IDR	1,100,000
	f. Total income	IDR	10,200,000
	h. Number of farmers practicing this method	People	15 (40.54%)
3	Planting cost		
	a. Konjac farm without shade	IDR	11,671,000
	• Seed	IDR	7,805,000
	• Workforce	IDR	2,602,000
	• Fertilizer	IDR	1,240,000
	• Herbicide	IDR	24,000
	b. Konjac farm with shade	IDR	8,425,000
	• Seed	IDR	5,030,000
	• Workforce	IDR	2,600,000
	• Fertilizer	IDR	765,000
	• Herbicide	IDR	30,000
4	Profit		
	a. Without shade	IDR	3,889,000
	b. With shade	IDR	1,775,000

Table 3. The economic advantage of konjac farming (with 0.5 ha of land under cultivation in one planting season)

Planting materials used include tubers and bulbs. Shade-free konjac plants accounted for 990 stems, 152.31% more than the shaded growing pattern of 650 stems. The difference in the konjac population is adjusted to the availability of land and budget, while the more konjac there are, the higher the costs incurred. The cost of konjac cultivation without shade is 23,342,000 IDR/ha, whereas with shade it is 16,850,000 IDR/ha. As displayed in Table 3, the highest allocation cost for konjac planting was the purchase of plant material and labor, which was 89.17% (without shade) and 90.56% (with shade). This condition is consistent with Klangon Village, Madiun Regency (Dermoredjo et al., 2021). According to Qin et al., (2019), the konjac plants had strong photosynthetic capacity and high yield when the shading rate was 50%-70% for the area. It means that when shade decreases, the konjac plants still produce corm but are less optimal. The konjac crop has tall plants and strong heat resistance, but not higher than 35°C in temperature (Shenglin, Xuekuan, et al., 2020). The

farmers of Jelegong Village prefer to plant shade-free konjac because they think that it is more profitable than planting konjac with shade. It is common sense among traditional farmers in rural areas that the more the population, the more income. The developed farming model is that shade plants are planted as land borders so that only a portion of the plants are shaded. According to Santosa, (2015), konjac is a shade-tolerant species. The best production and quality of tubers in a limited field trial were achieved at 75% shade with a yield of 40 tons/ha, and it was still cost-effective at 25% shade. Farmers in Ciamis mostly plant konjac in high-altitude areas, and therefore no shade treatment is needed in such areas with poor light. For instance, in mountain areas where the konjac is in the shade of mountain chains and numerous trees, temperatures are low, and humidity is high, shading can generally be avoided. The higher the latitude or altitude, the lower the shade density that is needed (Shenglin, Xuekuan, et al., 2020). The differences between shaded and non-shaded konjac according to farmers are given in Table 4.

No	Konjac Plants in the Shade	Konjac Plants Without Shade
1	The stem is taller	Shorter stem
2	Konjac leaves are green	Konjac leaves are less green
3	The size of the bulb is small	The size of the bulb is bigger
4	The size of the tuber is small	The size of the tuber is bigger

Table 4. Comparison of konjac plant phenotypes from a farmer's perspective.

The konjac harvest is adjusted by the price. When the price rises, farmers cultivate konjac for 1 season (1 year), but when the price falls, some farmers do not harvest and leave the konjac on the ground. This means that the konjac continues to grow until the next harvest season. This is beneficial for farmers because it can produce bigger konjac, so it should contain more glucomannan. Konjac tubers from 2 to 3 years are preferable as they are high in glucomannan. Konjac is normally harvested at the start of the dry season, i.e., May–June or by July (Wahidah & Afiati, 2021). At that time, the plants begin a period of rest or dormancy. However, sometimes in response to high market demand, konjac is harvested before going into dormancy. They noted that early-growing konjac has lower levels of glucomannan than when the plant is dormant. Planting konjac is like saving money in the bank, which farmers can use at any time for emergency needs.

Konjac produces tubers and fruits called bulbs. At this age, konjac produces on average 2 kg of tubers per plant and 5 bulbs. In addition, 1 kg of bulbs contains an average of 300 grains. Therefore, the more konjac there is, the more tubers and bulbs there are. The sale price for konjac tubers ranges from 5,000 IDR/kg to 10,000 IDR/kg, but farmers generally sell for 7,000 IDR/kg. The total income of konjac farmers without shade is 31,120,000 IDR/ha, whereas konjac farmers with a shade earn 20,400,000 IDR/ha. This income is considerably lower than that of farmers in the Mancak district, which is 248,000,000 IDR/ha (Rahayuningsih & Isminingsih, 2021). This happens because the management of konjac in the village of Jelegong is still traditional and not maintained optimally, so-called minimum tillage. Farmers' income is not maximized either; the average income of shadow-free konjac is 3,889,000 IDR, while the average income of konjac with shade is 1,775,000 IDR. Furthermore, the B/C ratio is calculated to determine whether konjac farming in the village of Jelegong is effective or not, as shown in Table 5.

No.	Description	Value
1	Without Shade Area	
	a. Total Revenue (IDR)	15,560,000
	b. Total Cost (IDR)	11,671,000
	c. B/C Ratio	1.33
2	With Shade Area	
	a. Total Revenue (IDR)	10,200,000
	b. Total Cost (IDR)	8,425,000
	c. B/C Ratio	1.21

Table 5. The average konjac farm efficiency.

Cultivation of konjac in the village of Jelegong is ranked as feasible with a B/C ratio of 1.21 and 1.33 for shaded and shadeless agricultural models, respectively. This means that for every 1.00 IDR that the farmer spends on the konjac business, a revenue of 1.21 - 1.33 IDR will be obtained. Compared to the B/C of the konjac business in Mancak District, Serang Regency (3.72), and Saradan District, Madiun Regency (2.77), the B/C ratio value in Jelegong Village is lower but has the potential to be increased by applying advanced cultivation technology (Rahayuningsih & Isminingsih, 2021; Dermoredjo et al., 2021). While there are different perspectives between Semarang and Jelegong farmers on the role of shade in tuber production, there are similarities in land management, i.e., building mounds for drainage to prevent rot. The contradiction of konjac yields in response to shade over shade-free, demonstrated by farmers' experiments with research results in Madiun, is caused by differences in management intensity. As mentioned, konjac plants are shade-tolerant or need moderate shade, so if they are not shaded, the plants will continue to grow, but with different responses. However, if the konjac plants were not fertilized, the shade-free treatment provided a better answer than the shade treatment. This is because the energy of growing plants in the shade is used more to capture sunlight so that the stems look taller. On the other hand, the growth energy from non-shaded konjac is used to produce bulbs and tubers. When crops are stressed, including konjac, they respond naturally to make regeneration by flowering (Wada & Takeno, 2010), producing seeds as bulbs and tubers. Also, plants that grow under low light intensity (thick shade) result in low photosynthesis (Setiawati et al., 2018). Such a condition in future growth can affect the productivity performance of the plant (Zervoudakis et al., 2012). Strain Violet of *Pharbitis nil* flowers under continuous light when exposed to a fluence rate greater than 30 W m⁻² (15,000 lux) for 12 days or longer, but strain *Kidachi* does not flower (Shinozaki et al., 1994). The photosynthetic efficiency of konjac is lower than that of many

other tuber crops, and the optimum temperature is also low, as is the efficiency of producing and accumulating the reserve substances (Liu, 2004).



Figure 2. Various plant organs are used for the reproductive process (a-flower, b/c- spore seeds, d/e-bulbils, f-tuber)

Manure is intended to improve the physical properties of the soil, including soil porosity and bulk density (Celik et al., 2010), while inorganic fertilizer NPK supplies nitrate that is readily available for plants (Roba, 2018). However, it is important to consider that NPK fertilizer is expensive when most farmers are self-sufficient in manure. Consequently, instead of using expensive inorganic fertilizers, manure is more appropriate for small farmers (Moyin-jesu, 2015). An advantage of manure use is the improvement of soil structure and biology, including increased microbial activity, soil aeration, and water retention (Agbede et al., 2017), and increased organic matter levels (Han et al., 2016). Improvement in soil structure resulting from manure application would reduce soil bulk density and increase soil porosity, enhancing the rhizosphere and enabling

crops to expand their root system (State et al., 2010). Soil microbial activity and species richness are also increased by the addition of manure to improve organic matter. Using manure on its own as fertilizer is more cost-effective for farmers (to be used in combination with shade). As the information received by farmers to develop konjac is incomplete, they face not only marketing problems but also agricultural problems, especially related to climate change (Borodin et al., 2016). This causes inefficient interactions between farmers and traders in developing countries (Pagare et al., 2023).

5. The Konjac phenomenon

Everyone loves a booming market, and most booms are happening to the detriment of technological change ("The Power and the Glory," 2008). Konjac's development was also driven by social media technology (Wahidah & Afiati, 2021), where there is no longer any boundary between the communities for the exchange of information. It has become a stereotype that rural communities around forests are beginning to plant crops triggered by the expanding market phenomenon. In many cases, they do not take into account the suitability of the species to the environment. The theory of attraction is related to the behavior of konjac business actors, where farmers imitate other actors in their performance to achieve a similar level. This attitude is the result of a combination of physical attractiveness, social interest, and interest in the job. However, since rural residents are those who prioritize social recognition over actual achievement, this outperformance can turn into a placebo effect or a zero outcome. Under these conditions, farmers need positive motivation from a strong leader, typically a leader of a group of farmers or an extension agent. Positive motivation is going to create a positive effect, the Pygmalion effect, that will change from "if" to "how" (Mahling et al., 2014). This will provide farmers with clear directions to achieve their goals. The cultivation of konjac in the village of Jelegong is still relatively new but can be used as an alternative source of income because farmers experience the benefits of cultivation. That was stated by 68% of farmers. Revenues from the konjac business are between 3,550,000.00 IDR and 7,778,000.00 IDR/ha/season. However, the number of benefits is determined by the size of the land. According to the interviews, it is known that the benefits of konjac cultivation are equivalent to the price of a motorbike. Sometimes, conversion to attractive goods such as motorcycles or cars is important in encouraging konjac farming. Rural communities are very obsessed with the appeal of social recognition attributes like having a new vehicle, having lots of cattle, and going on a pilgrimage, which elevates their social status within society. All efforts will be made to achieve this, even if a debt is necessary. It may thus serve as a point of entry to motivate farmers to develop konjac. However, this motivation should be underpinned by a policy of keeping prices stable and closing the gap with the market. It is also known that the cultivation of konjac is not the main work because farmers also do other tasks such as working as laborers, teachers, village government employees, tradesmen, and drivers.

Therefore, the cultivation of konjac is always traditionally practiced because the shedding of the work of the farmers is not only concentrated on the trade of konjac but is also dedicated to other businesses. The farmer, therefore, is reasonable to have a variety of jobs because he wants to obtain additional income to attain a decent standard of living and increase purchasing power (Birthal et al., 2017). Small farmers can increase their income by helping manage other people's land with better rewards (technology transfer, seeds, money). This method is inferior to the contribution but superior to the standard salary. Konjac cultivation is financially achievable on private land because the B/C ratio is positive, although the value is still low, e.g., 1.21 - 1.31. This financial achievement can be enhanced by various incentives, including government regulation, such as training in advanced konjac agriculture and the provision of konjac seeds.

The combination of high public interest and konjac's advantageous characteristics (very easy to grow, does not require special care, does not perish easily, does not require special storage, and especially its relatively high price) makes the konjac business attractive to anyone, and no failures have been reported.

Conclusions

The financial appeal of konjac farming drives novice farmers to eagerly grow konjac while they have land capital. Only with land, the acquisition of incomplete information and interpretation that is not based on business feasibility results in the perception built by the farmers regarding the konjac business being vague. The rush into konjac farming is, therefore, triggered by several factors, including (i) novice farmers being more aware of the financial benefits of konjac farming than of the related risks, (ii) easy access to information related to konjac cultivation, (iii) konjac farming being very easy and can be practiced by anyone as a part-time job, (iv) not requiring special skills, and (v) the availability of a large market. Konjac is a type of plant that promises benefits even though it is not fertilized if planted without shade. However, for higher yields, the crop should be placed on shaded land with intensive fertilization. Despite the absence of government intervention, the konjac trade was readily accepted by the market because the business community supported one another. The abundance of konjac in the village has become a potential industrial raw material that has indirectly contributed to popularizing the village, thus attracting the attention of the central government and investors. Despite the rush, konjac cultivation has a positive impact on rural economic growth due to the increasing number of new sources of income from the konjac processing industry, which also diversifies products and requires a lot of local workers. However, it is necessary to anticipate the scarcity of other agricultural products due to the replacement of crops with konjac, which could impact the price of agricultural products. As a result, there is a need to map commodities throughout West Java, allowing farmers to plan the development of various commodities based on soil suitability and the local climate.

It is recommendable that konjac can be developed under two conditions, i.e., 1) for small farmers who own low capital and require low maintenance, konjac should be cultivated without shade, while for high capital (investors) and intensive maintenance, konjac should be cultivated with shade. Rush farming of any type of crop is reasonable for farmers as long as the crop has profitable characteristics such as the market still being wide open, not perishing easily, the price being higher than the crops normally cultivated by farmers, and one planting being able to harvest several times. Even though local wisdom is still practiced in rural areas, scientific knowledge needs to be combined with local wisdom to meet future demands.

Conflict of Interest

There is no conflict of interest.

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