

# The Nexus of COVID-19 Pandemic and Rural Agroforestry Farmers' Livelihoods in Tasikmalaya Regency, East Priangan, Indonesia

Levina Augusta Geraldine Pieter<sup>1</sup>, Marcellinus Mandira Budi Utomo<sup>1,2</sup>, Suhartono Suhartono<sup>1,2</sup>, Aris Sudomo<sup>1</sup>, Sanudin Sanudin<sup>1</sup>, Eva Fauziyah<sup>1,2</sup>, Tri Sulistyati Widyaningsih<sup>1,3</sup>, Maria Palmolina<sup>1</sup>, Aditya Hani<sup>1,2</sup>, Carmen M Siagian<sup>4</sup>

## AFFILIATIONS

- <sup>1</sup> National Research and Innovation Agency (BRIN), Jakarta, Indonesia
- <sup>2</sup> Faculty of Forestry, Universitas Gadjah Mada, Yogyakarta, Indonesia
- <sup>3</sup> Leadership and Policy Innovation Program, The Graduate School, Universitas Gadjah Mada, Yogyakarta, Indonesia
- <sup>4</sup> LPPM Universitas Kristen Indonesia, East Jakarta, Indonesia

Correspondence:  
marcellinus.mandira.budi.utom  
o@brin.go.id

## ABSTRACT

The agricultural sector is one of the aspects that was affected by the COVID-19 pandemic. Therefore, this study aims to describe the impact of the COVID-19 pandemic on agroforestry farmers' livelihoods in rural areas. It was carried out in Tasikmalaya Regency, East Priangan, where mixed garden agroforestry farming supports part of the economic life of the community. The data used were collected between August and September 2021 by interviewing 33 farmer households. A coding and descriptive analysis were carried out to discuss the impact of the COVID-19 pandemic on agroforestry farmers and their strategies. Subsequently, the cost-income, revenue cost ratio, and labor productivity analyses were used to assess the feasibility of agroforestry farming before and during the pandemic. The results showed that government policies related to handling the pandemic in form of Large-Scale Social Restrictions (PSBB) and the Implementation of Community Activity Restrictions (PPKM) significantly affected the lives of farmers. These include decreased demand and commodity selling prices, difficulties in marketing agroforestry products, and a decrease in farmers' incomes by 38.45%. The agroforestry business has become less viable due to a reduction in farm productivity from R/C 1.1 before the pandemic to 0.85 during the pandemic, while farmer labor productivity decreased from US\$ 3.00 to US\$ 2.10. The farmers used direct cash assistance from the government and processed agroforestry products for sale and consumption as a survival strategy during the pandemic. Meanwhile, the government can help agroforestry farmers by increasing road access to rural areas, providing fertilizer and superior seeds, and also optimizing the role of livestock farmer groups.

## KEYWORDS

agroforestry, COVID-19 pandemic, farmers' livelihoods, livelihood strategy, Tasikmalaya

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## 1. INTRODUCTION

Agroforestry is the integration of trees with seasonal agricultural crops and/or grasses (Essa, Nizami, Mirza, Khan, & Athar, 2011; Khadka, Aryal, Bhatta, Dhakal, & Baral, 2021). It is practiced globally as one of the most sustainable land-use systems due to the abundance of direct economic benefits for farmers such as increased access to wood, food, fodder, and construction material (Ahmad, Caihong, & Ekanayake, 2021; Quandt & McCabe, 2017). Furthermore, it provides social benefits such as strengthening the cohesion with neighbors when the yield is shared, providing hiding place from attackers, and securing the land ownership (Quandt & McCabe, 2017; Rahman, Imam, Snelder, & Sunderland, 2012). Agroforestry also provides ecological benefits, which include the use of landscape as soil conservation, habitat, and carbon sequestration (Essa et al., 2011). In the international publications, agroforestry is dominantly discussed in Asia, Africa, and Latin America and has significantly

contributed to farmers' livelihoods (Ahmad et al., 2021; Duguma, 2013; Fouladbash & Currie, 2015; Kinyili, Ndunda, & Kitur, 2020; Pietersen, López-Acosta, Gomez-Díaz, & Lascurain-Rangel, 2018; Quandt, Neufeldt, & McCabe, 2019; Singh, Gohain, & Datta, 2016).

Multi-storey agroforestry is the most dominant model out of the several types of agroforestry in Indonesia, which has been a part of the tradition, especially for rural people. This was proven by Michon, Mary, and Bompard (1986) who discussed the multi-storey agroforestry system in West Sumatra several years ago and is still being practiced by farmers. One of the centers of agroforestry development with the mixed garden systems adopted by farmers in the country is West Java (Parikesit, Withaningsih, & Rozi, 2021) and are being developed in rural areas (e.g. Butarbutar et al., 2018; Iskandar & Iskandar, 2016; Luth & Setiyono, 2019; Widiarti & Prajadinata, 2008). Recently, farmers' livelihoods and the supply chain of agricultural products were affected by the COVID-19 pandemic (Kumar et al., 2021). The pandemic significantly affected the national economy because 13.7% of Indonesia's GDP depends on the agricultural sector (Indexmundi, 2019). Yazdanpanah et al. (2021) stated that the impact of the pandemic on social and economic conditions is enormous. The government has imposed various policies to respond to the spread of the COVID-19 virus, leading to restrictions on community activities. This affected the changes in consumption patterns in the community (Djalante et al., 2020) and the emergence of a wave of layoffs (Widiyanto et al., 2021).

In West Java province, Tasikmalaya is among the regencies whose contribution from the agricultural sector is dominant due to its approximately 37.8% gross regional domestic product (BPS Kabupaten Tasikmalaya, 2021). Meanwhile, the pandemic greatly affects the economy of the Tasikmalaya Regency because it will reduce farmers' income (Lioutas & Charatsari, 2021). The dominant agricultural landscape developed by rural communities in this regency is mixed garden agroforestry. This is also being developed in East Priangan Region, consisting of two municipals, namely Tasikmalaya as well as Banjar, and five regencies, which include Ciamis, Tasikmalaya, Pangandaran, Sumedang, and Garut Regencies (see Hani, Fauziyah, Widyarningsih, & Kuswantoro, 2018; Indrajaya & Siarudin, 2015; Indrajaya & Widiyanto, 2019; Parikesit et al., 2021; Rachman & Hani, 2014; Siarudin & Indrajaya, 2014; Sudomo & Hani, 2014; Utomo, 2020).

There is a need to urgently investigate the impact of the COVID-19 pandemic on agroforestry businesses and farmers, especially since most of the rural people in West Java with a piece of land, even in a small size, practice agroforestry planting. This is because the study on the impact of the COVID-19 pandemic on agroforestry farmers in Indonesia, especially the Tasikmalaya Regency is limited. Therefore, the results of this study will enrich the discourse of the difficult time faced by rural people due to the pandemic. Bidarti (2021) only focused on the COVID-19 pandemic impact on the socio-economic conditions of farmers such as income and debt. Widiyanto et al. (2021) also investigated its impact on the economic conditions of bamboo craftsmen. Meanwhile, this study focuses on the COVID-19 pandemic impact on the economy of agroforestry farmers, and their products, the feasibility of the businesses, and the strategies of agroforestry farmers to overcome the pandemic. It also aims to enrich the disregarded interconnection among society, agriculture, and the economy (Lioutas & Charatsari, 2021), which was unraveled by the pandemic.

## 2. AGROFORESTRY AND COVID-19 PANDEMIC IN GLOBAL PERSPECTIVE

The impact of the pandemic on agroforestry businesses is felt in different ways across the world. Generally, the pandemic had more negative effects than positive

impacts on social life, ecological agroecosystems, and the global economy. This can be felt both directly such as loss of job and decreased income, and indirectly such as impacts on economic activity, production systems, and supply chains (Morton, 2020). In developing countries, most studies stated that they experienced the most severe impacts due to the disruptions of economic activities (Cheval et al., 2020; Reardon, Bellemare, & Zilberman, 2020; Roubík et al., 2022).

In agroforestry, the commodities that received more negative impacts during the pandemic are agricultural products compared to forestry commodities (wood). Agriculture commodity, which is highly related to food commodities, experiences formidable trading challenges because the pandemic disrupted local and global food chains (Rasul, Neupane, Hussain, & Pasakhala, 2021; Roubík et al., 2022). Arita, Grant, Sydow, and Beckman (2022) also stated that global agricultural trade reduced by 5 to 10 percent during the pandemic. Some studies indicated that a phenomenon of decreasing the price of agricultural commodities also occurs globally (e.g., Balcilar & Sertoglu, 2021; Dixon et al., 2021; Hung, 2021; Udmale, Pal, Szabo, Pramanik, & Large, 2020). Therefore, a price reduction impacted farmers' income that led to an increase in poverty (Udmale et al., 2020). In Nepal, the pandemic reduced job opportunities (Rasul et al., 2021), which is also occurring in Indonesia.

There are some impacts of the pandemic to agriculture that specifically occur in certain places or countries. In China, the pandemic had a positive effect on vegetable prices and a negative effect on the prices of fruit (Liu, Liu, Ye, Tang, & Wang, 2022). Another study in China by Lin and Zhang (2020) showed an increase in the exports of fruit, herbaceous plant, and grain increased, while horticultural products declined. In India and China, the lockdown policy affected the availability of labor, which led to productivity losses and threatened food security (Balwinder et al., 2020; Salisu, Akanni, & Raheem, 2020). Roubík et al. (2022), Rasul et al. (2021), Bakalis et al. (2020), and Thapa et al. (2021) stated that food insecurity occurred particularly in Southern countries. In the African sub-region, the pandemic threatened the production of agricultural commodities (Funmilayo & Ademola, 2021; Nchanji & Lutomia, 2021). The COVID-19 impacts on agroforestry in particular disrupt farmer livelihood and suppress ecology at agroforestry in developing countries (Cheval et al., 2020). The negative impact of the pandemic was greater in developing countries because of their higher dependence on agro-ecosystems. Moreover, this pandemic has exposed the vulnerability of agro-ecosystems for local people's livelihoods, especially on income and consumption (Duguma, Noordwijk, Minang, & Muthee, 2021).

The long-term prediction of the COVID-19 pandemic has caused a shock to all sectors, including the agricultural sector. Since this study focused on the impacts of the pandemic on agroforestry farmers' livelihoods, it is expected to show whether the trend of the impact of the pandemic experienced globally is also occurring at the research site. Similarly, the results are expected to enrich the academic discourse on the impact of the pandemic in agroforestry on a larger scale.

### **3. MATERIALS AND METHODS**

#### **3.1 Data Collection Method**

This study was conducted in Cukangkawung Village, Sodonghilir District, Tasikmalaya Regency (see Figure 1), which was selected purposively. Tasikmalaya Regency is representative to show the integration of agroforestry to rural peoples' daily life and culture. The form of agroforestry in East Priangan is relatively typical and the discoveries are still relevant to represent the current impacts of the COVID-19 pandemic on farmers' livelihoods. In some situations, the case study approach is reliable for a bigger picture of a certain phenomenon (Gerring, 2008).

The data were collected between August and September 2021 by applying the health protocol standards. The three approaches, namely in-depth interview, key informant interview, and field observation were applied to assure that the data is valid. In this study, there is an awareness of the data triangulation issue in social research (see. Carter, Bryant-Lukosius, DiCenso, Blythe, & Neville, 2014; Leech & Onwuegbuzie, 2007). The in-depth interviews were carried out with the respondents who were capable of answering the questions because their capability is fundamental (Tongco, 2007). As a qualitative study, several respondents depend on the data saturation consideration (Guest, Bunce, & Johnson, 2006). The total number of respondents interviewed was 33 out of the 521 farmers, where each respondent represents a different farmer household to avoid the same data source. The consideration is that agroforestry business is commonly in a form of the family business, where each member works as a farmer on the same piece of land. The information collected was the market of agroforestry products, the practice, landscape profile, input-output of agroforestry farming, and farmers' livelihood strategy during the pandemic. The key informant interview including five local government officials and three farmer group leaders was determined. To triangulate data, the field observation was carried out on the areas of agroforestry farming, the practice of cropping patterns, the types of commodity plants developed, and the management of agroforestry products. Furthermore, the policy of COVID-19 responses from the Government website was collected to complete the understanding of the relationship between the pandemic and agroforestry-based business.

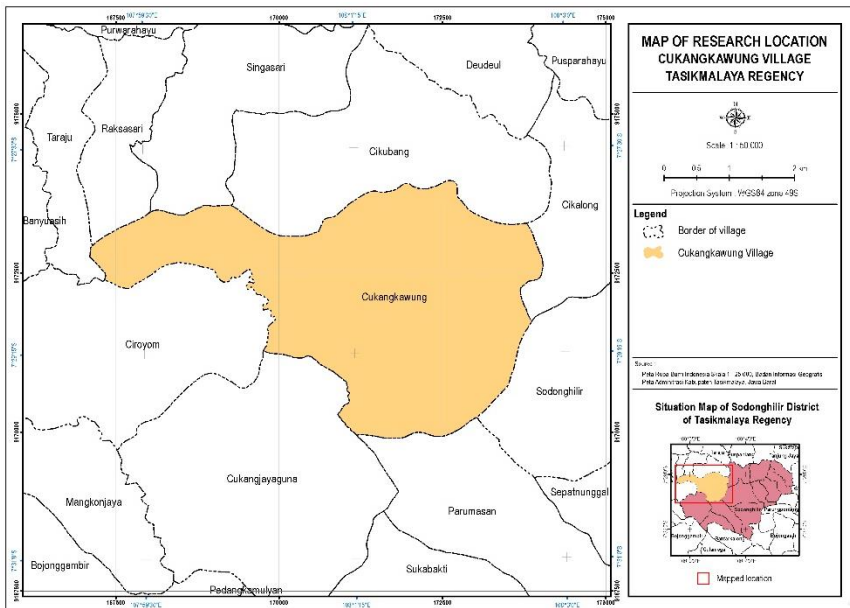


Figure 1. Research Location

### 3.2 Data analysis

The data were analyzed using coding (Creswell & Poth, 2016) and descriptive analysis (Lawless & Heymann, 2010) to discuss the impacts of the COVID-19 pandemic on agroforestry farmers and their strategy to cope with this severe situation. The approach of cost-income farming, revenue cost ratio, and labor productivity analyses (Rahim, Supardi, & Hastuti, 2012; Soekartawi, 2013) were used to assess the feasibility of agroforestry farming for perennial commodities (non-timber plants). At the end part

of the discussion section, a proposed policy was recommended to support agroforestry farmers based on the sustainable livelihood approach from Department for International Development UK (1999).

## 4. RESULTS

### 4.1 Farmer characteristic and agroforestry-silvicultural practices

The dominant form of agroforestry is the mixed-garden type, which is carried out by the community in Cukangkawung, where the location of the agroforestry land is close to settlements with multi-strata vegetation (Widyanisngsih, Diniyati, & Fauziah, 2012). Therefore, it is often categorized as a home garden or homestead by some academics (Park et al., 2019; Widagda, Abdoellah, Marten, & Iskandar, 1984). Farmers' agroforestry land ownership is relatively small, on average it is less than 0.7 hectares per farmer family. This makes agroforestry farmers, especially in Java to be generally classified as smallholders. The information on the socio-demographic of the respondent is shown in Table 1 below.

**Table 1.** Socio-demographic information of respondent

Gender	Male		Female
	66.66 %		33.33 %
Category	Min.	Mean	Max.
Age	22	46.61	71
Year of Education (year)	6	7.30	12
Total Size of Agricultural Land (hectare)	0.02	0.69	4
Size of Agroforestry Land (hectare)	0.02	0.63	4
Farming Experience (year)	2	19.81	49
Total Family Member	2	4.61	11
Number of Dependent Family Member	0	1.74	5

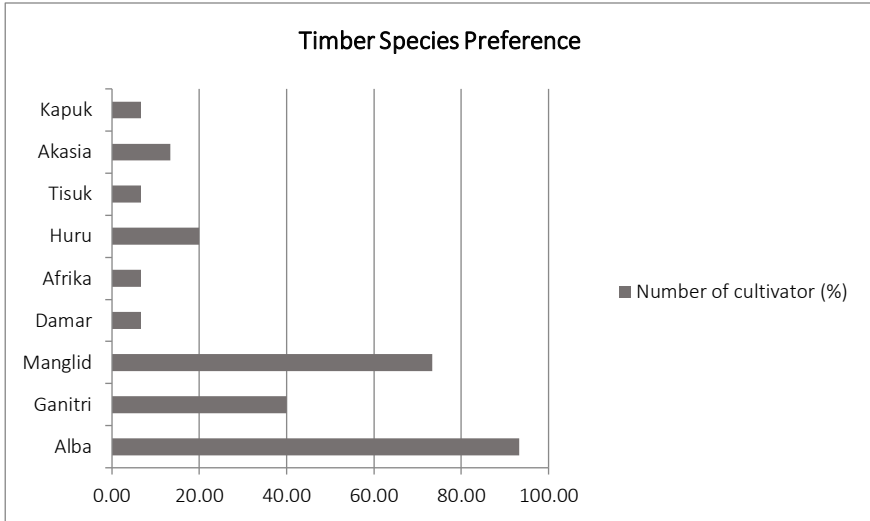
Limited land, especially for farmers on the island of Java, makes them not fully depend on agroforestry farming for livelihoods due to low productivity (Sabastian et al., 2019). However, the yields from agroforestry lands play an important role when the fund is needed for medium-long term income. In general, complex agro-forests are developed by the rural communities to get medium-long term income (Foresta, Michon, & Kusworo, 2004). Timber commodities are used as a source of income in this situation, which is known as the cutting-and-take system (Achmad & Diniyati, 2015).

Based on the respondent's interview, farmers, especially those below the age of 50-year-old, have other jobs such as laborers in both the agricultural and non-agricultural sectors to generate profitable income. It was discovered that farmers have been engaged in various jobs such as becoming motorcycle taxi drivers, street food sellers, religious teachers, brokers, etc.

According to the results of other studies in various parts of the world, the motivation of farmers in Cukangkawung to plant certain types of crops is due to considerations of income, liquidity or ease of sale, land suitability, market demands, and medium-term food provisions (Essa et al., 2011; Fouladbash & Currie, 2015; Gosling, Reith, Knoke, & Paul, 2020; Manurung, Roshetko, Budidarsono, & Kurniawan, 2008; Park et al., 2019; James M. Roshetko et al., 2013). The Figure 2 shows the preference for timber species cultivated.

Alba (*Falcataria mollucana*) and manglid (*Manglietia glauca*) are the most preferred wood species, which contribute as the main agro-forest timber in East Priangan Region. Ganitri tree (*Elaeocarpus ganitrus*) is attractive to farmers as seen from 40% of farmers in the research location planting this species. In addition, damar (*Agathis dammara*), afrika (*Maesopsis eminii*), tisuk (*Hibiscus macrophyllus*), akasia

(*Acacia mangium*), huru (*Neolitsea triplinervia*), and kapuk (*Ceiba pentandra*) gain less attention from farmers. Alba, ganitri, and manglid have a suitable place to grow at the site in an area with an altitude of 800-900 m above sea level. This type of wood is used for construction with fairly good quality and is planted in tea plantations as a shade tree. The existence of shade trees as a form of adaptation of tea farmers to protect tea plants from sunlight that is too intense and wind (Muench, Bavorova, & Pradhan, 2021).



**Figure 2.** Cultivated Timber Species

The dominant non-timber forest product (NTFP) plants cultivated are banana, cassava, and cardamom which grow in a place with shade intensity of 30-70% (Sudiarto, 1986). In the mixed gardens in East Priangan, alba and manglid are the predominant shade for cardamom (Diniyati, Fauziyah, & Widyaningsih, 2014; Sudomo & Maharani, 2018). Apart from being a source of medium income, NTFP commodities in the mixed gardens have a function as subsistence food (Affandi, Zaitunah, & Batubara, 2017; Belcher, Imang, & Achdiawan, 2004).

In the study of agroforestry applications, the form of land use that is generally carried out by rural communities is traditional agroforestry. This is because it is subsistence, cultivated on a relatively narrow land with simple application and non-intensive stand maintenance (James Michael Roshetko & Manurung, 2009; Sardjono, Djogo, Arifin, & Wijayanto, 2003; Suryanto, Budiadi, & Sabarnurdin, 2017). As a form of optimizing land use (Mercer, 1985), traditional agroforestry is considered a sustainable land-use system from an ecological, economic, and social perspective (Bettles et al., 2021; Lagerlöf et al., 2014; Park et al., 2019).

The application of intensive silvicultural principles such as selection of superior seeds, environmental manipulation, as well as pest and disease control (Soekotjo, 2004) also does not gain great attention from farmers. Financial condition is the main limitation that affects the farming culture.

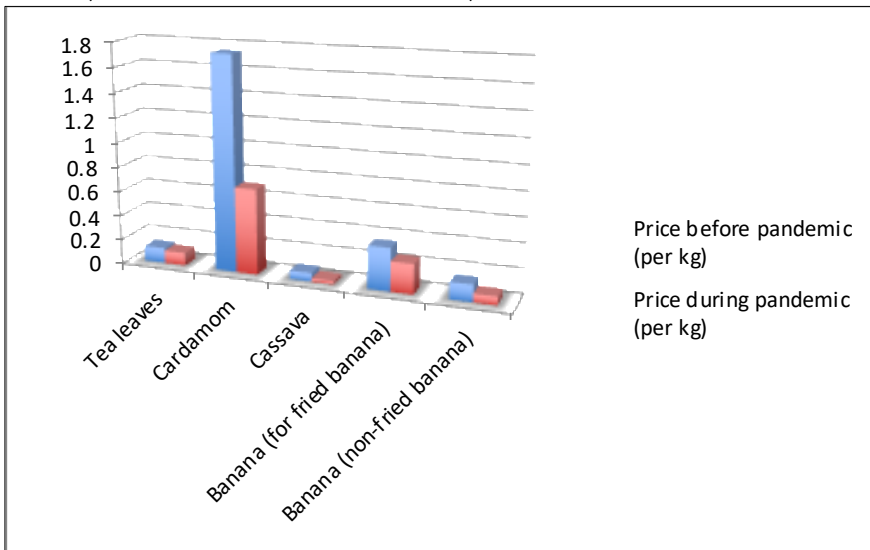
The consideration of economically optimal interaction patterns between tree, perennial, and annual crops (Hairiah, van Noordwijk, & Suprayogo, 2008; Wu et al., 2020) has also not received serious attention from farmers. This occurred due to the entrenched pattern of agroforestry land use (Hiola & Puspaningrum, 2019). However, the environmental contribution of the mixed garden is visible, especially with climate change mitigation. Through the application of mixed gardens, smallholders can get short, medium, and long-term yields (Sardjono et al., 2003).

### 4.2 Impacts of the Covid-19 pandemic on farmers and their agroforestry products

Farmers are feeling the impact of the COVID-19 pandemic in Cukangkawung village due to the effect of economic that greatly affected the farmers. The economic impact begins with a decrease in demand, followed by a reduction in the selling price of agroforestry commodities. Before the pandemic, complex agroforestry produced a relatively lower value compared to monoculture systems per hectare of land (Kusters et al., 2008) and it takes longer for the benefits to become visible (Sewando, 2014). Therefore, this pandemic exacerbates the economic condition of farmers who have used to live in limitations.

The respondents and key informants indicated that the COVID-19 pandemic has a profound impact on agroforestry farmers' income. They experience a reduction in commodity prices due to market disruption and lost jobs from labor activities. These impacts are similar to those experienced in other parts of the world. Tiftonell et al. (2021) stated that the COVID-19 pandemic affected the distribution, trading, food production, and land-use systems. Meanwhile, Lioutas and Charatsari (2021), Lumapow, Hamdi, and Santie (2021), and Jaacks et al. (2021) stated that the ability of farmers to sell their agricultural products has decreased due to the pandemic. In addition, Davila et al. (2021) also stated that loss of jobs and income is the most severe impact of the pandemic for farmers.

The sluggishness of the economic sector also affected the agricultural sector, indicating that farmers who are the lowest node in a business chain cannot avoid the impact of the pandemic. Supply chains were disrupted during this pandemic, and actors above farmers in the chain such as collectors and processed food producers lowered their demand and purchase prices for farmers' commodities. The most common commodities that were affected include cardamom, banana, cassava, and tea. Their declining purchased prices are shown in Figure 3 below. The price of wood does not experience price and demand constraints; however, the wood stands have a function as savings farmers and are only produced after 5 to 7 years. Therefore, the biggest impact is on crop sales, which were the main and regular source of income for agroforestry farmers (Essa et al., 2011; Rahman et al., 2016).



**Figure 3.** The Declining Price of Main Agroforestry Commodities in Cukangkawung Village

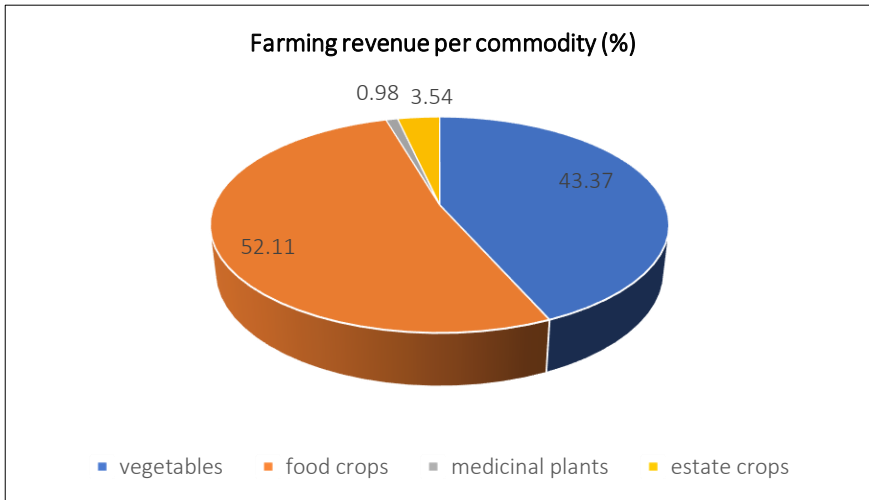
The price of tea leaves slightly drops from US\$ 0.125 to US\$ 0.104 per kg, while cardamom and cassava plummet by 60 % and become US\$ 0.7 and US\$ 0.028 per kg respectively. The purchased price for fried bananas falls from US\$ 0.348 to US\$ 0.224 and for non-fried ones were reduced by 50% from US\$ 0.14 at the normal situation.

Farmers also experienced a hit on the side of declining demand for farm and non-farm labor. Meanwhile, those who usually receive the results of work as laborers, rarely get a call for work and the contribution of labor is significantly large for farmers' livelihoods. Due to this pandemic, employers have also tightened their spending and decided to work independently without relying on labor.

The trend of ruralization also occurs from the younger generation who initially worked in the city because the youths who were laid off or fired decided to return to the village. Some re-cultivated the land, while others were unemployed because there is no land to work on. This showed that the pandemic reduces farmers' income from agroforestry commodity sales ranging from 17.1 % to 77.7 %. It also makes their crops more neglected due to difficulty in buying manure that is normally used to support the growth of their crops, while only those who have livestock fertilize their crops.

**4.3 Agroforestry business feasibility before and during the Covid-19 pandemic**

The agricultural sector was one of the businesses that survived the 1997/1998 monetary crises that hit Indonesia (Hamidi, 2002; Mantra, 1998; Sadono, 2008). Similarly, at the emergence of the COVID-19 pandemic in the country, almost all economic sectors were paralyzed due to various social restrictions policies, both small and large scale (Hadiwardoyo, 2020; Nasruddin & Haq, 2020; Yazid & Lie, 2020), which also affected the agricultural business sector. In on-farm activities, the impact of the pandemic may not be felt immediately, however, the off-farm sector such as marketing activities affected the distribution of agricultural products due to restrictions on vehicle mobility from and to outside the region (Khairad, 2020; Muliati, 2020; Sadiyah, 2021). However, the agricultural sector is considered still quite competitive despite policy restrictions during the COVID-19 pandemic (Abidin, 2021; Assidikiyah, Marseto, & Sishadiyati, 2021; Sibarani, 2021).



**Figure 4.** The composition of not tree commodities in agroforestry pattern according to the farming revenue



Agroforestry or intercropping is still one of the mainstays for the community, especially those who live in areas that have agricultural potential which is dominated by dry land (Prasetyo, 2016). Cukangkawung is among the villages in Tasikmalaya with quite intense agricultural activities on dry land. The cropping systems with agroforestry patterns that combine woody plants with various crops have been carried out by most people. The type of wood planted by the community to obtain long-term income or savings. Meanwhile, planting food crops such as cassava, bananas, peanuts, and other types of vegetables aims to meet daily needs for consumption and sale. The Figure 4 below shows the home garden plant composition in the site.

Types of food-producing plants such as peanuts, cassava, and bananas are dominant (52.11%) and the second most cultivated commodities are vegetables (43.37%) such as mustard, leek, watercress, spinach, and black eggplant. The two commodities are mostly cultivated based on the contribution of farmers' income because they are the main commodities needed for daily household consumption.

In one planting season, agroforestry farmers cultivate the types of food crops among wood plants with a composition of cassava, corn, peanuts, vegetables, and bananas, while others cultivate tea and cardamom on their land. Generally, the farming carried out is still classified as traditional agriculture, therefore, it is not expensive in practice. The costs that must be directly incurred include rental fees or taxes for land, purchase of large quantities of manure production facilities, superior seeds, and labor outside the family. The Table 2 below summarizes the economic analysis of non-tree crops before and during the pandemic.

**Table 2.** The economic analysis of non-tree crop farming on agroforestry planting: before and during the pandemic COVID-19 (per hectare)

No	Description	Pre pandemic Cov-19 (US\$)	During pandemic Cov-19 (US\$)
1	Explicit cost (tax/land rent, seed, fertilizer)	50.57	36.65
2	Implicit cost (family farmworker, equal to 54 and 51 labor working days on pre and during the pandemic, respectively)	150.34	139.21
	Total cost (explicit and implicit)	200.91	175.85
3	Farming revenue	212.63	150.31
4	Farming income	162.06	113.66
	Farming profit	11.72	-25.54
5	Farming productivity:		
	R/C	1.06	0.85
	Labor productivity (family labor wages)	3.00	2.10

Crops are commonly planted during rainy season and crop rotation is sometimes applied. Cassava, banana, tea, and cardamom plants with a longer lifespan are usually planted together, in contrast to maize and peanuts that have a shorter production cycle. The average cost to farmers is US\$ 50.57 for the area of cultivation per hectare, which is relatively low when compared to the monoculture system of food crop farming. The low cost incurred by farmers because of the farming system practice is not yet intensive, while the labor spent by the farmers is not counted as farming costs.

There were some changes in the explicit and implicit costs in association with fertilizing. During the pandemic, farmers cannot afford the fertilizer due to the declining income, which reduced the explicit cost. Moreover, it affected the implicit cost since there was no fertilizing activity and the working days were also reduced from 54 to 51 days (Table 2). The other aspects for explicit and implicit costs remained the same due to the same the plant commodities and farming areas.

Although the farming system has not been carried out intensively, the average farming income in one planting season was US\$ 212.63 per hectare before the pandemic, which decreases to US\$ 150.31 per hectare during the pandemic. Unsold commodities such as cassava and bananas, and the significant reduction in their prices contributed to this fall. For vegetable commodities, the selling price before and during the pandemic was relatively stable, while tea and cardamom commodities experienced a decline in prices. Considering the explicit costs spent, farmers still obtain a fairly high income of US\$ 162.06 per hectare, however, it decreased to US\$ 113.66 during the pandemic. Based on the total cost, the profit per hectare gained by farmers before and during the pandemic was US\$ 11.72 and US\$ -25.54, respectively.

Financially, agroforestry farming that was carried out before the pandemic was still in the feasible category. However, the productivity of the farm that was run decreased due to the effect of the pandemic. The ratio of revenue to cost of 1.1 (before the pandemic) and 0.85 (during the pandemic) showed that every US\$ 1 of capital allocated by farmers for the business can generate US\$ 1.1 and US\$ 0.85, respectively. This indicated that farming activities provide less benefit during this pandemic. Furthermore, the labor productivity of US\$ 3.00 per labor working day (before the pandemic) showed that USD 3.00 can be paid per working day based on the time spent by farmers for farming activities. This wage is higher than the standard payment for farmworkers, which is US\$ 2.78 per working day for male workers and US\$ 2.09 for female workers. During the pandemic, labor productivity decreased to US\$ 2.10 per labor working day, therefore, the farming activities become less feasible financially. However, many farmers are loyal to this business because searching for another job during the pandemic is difficult.

#### 4.4 Government restriction policies and agroforestry farmers' livelihood strategies during the Covid-19 pandemic

Farmers have been experiencing the hardship of selling products for more than a year due to the response of the central government to stop the spreading of the virus (see Table 3 below). These regulations, which changed over time slows down various business sectors. Generally, the relationship between agricultural and non-agricultural businesses is directly and indirectly correlated. Java and Bali Islands, where the spreading of the virus was at the peak rate received more attention from the central government, therefore, social restriction in these regions is more stringent compared to other islands. Provinces in Java, in which national economic activities and contributions remain dominant experience the most severe impacts of the pandemic.

**Table 3.** Government Policies Affecting the Business Activity During The COVID-19 Pandemic

Type of Policy, starting date, and validity	Implication on the business sector
Large-scale social restriction ( <i>PSBB-Pembatasan Sosial Berskala Besar</i> ) 1 April 2020 Not valid	Restrictions on community mobility to enter and exit other administrative areas
Implementation of restrictions on community activities in Java and Bali ( <i>PPKM-Pemberlakuan Pembatasan Kegiatan Masyarakat</i> ) 11 January 2021 Not valid	Limiting the number of crowds, visiting times, and operational duration in provinces in Java and the Bali Islands. The objects of implementation include workplaces or offices, teaching and learning activities, restaurants or places to eat, malls or shopping centers, and places of worship.
<i>PPKM mikro (for all provinces)</i> 9 February 2021 Not valid	As above, but implemented in all provinces and applied the regulation until neighborhood association, the lowest level of government.

Type of Policy, starting date, and validity	Implication on the business sector
<i>PPKM darurat</i> 3 July 2021 Not valid	As above, firstly only implemented in Java and Bali, in all provinces. The social restrictions were more stringent than the previous <i>PPKM</i> . This is the response to the second wave of virus transmission that reached its peak and hit many business sectors, trying to awake after the first wave. The opening hours and the number of visitors in business centers, traditional markets, groceries, and shops are limited, with strict penalties applied to violators.
<i>PPKM level 4</i> 21 July 2021 Still valid when the manuscript was being prepared in early November 2021	The regulation was categorized for each regency and municipal in 4 levels. For levels 3 and 4, the implementation refers to <i>PPKM Darurat</i> . The higher the level indicates the stricter regulation. Municipals and Regencies in East Priangan Region are mostly in levels 3 and 4 from July to September 2021.

The impact of the COVID-19 pandemic requires farmers to set strategies as summarized in Table 4 to stay afloat. Agroforestry is a sector that lacks policy support from the government (Alviya & Suryandari, 2006). During the pandemic, farmers are still struggling without any assistance to run their agroforestry business.

**Table 4.** Farmers' livelihood strategies during COVID-19 pandemic

Livelihood strategy	Actor	Application
Taking advantage of direct cash assistance ( <i>Bantuan Langsung Tunai-BLT</i> )	Central Government and caretaker of neighborhood association ( <i>Rukun Tangga-RT</i> )	The central government provides direct cash assistance during this pandemic to help the poor. A total of 3 times have been rendered, where all donations were collected and distributed equally to each family at US\$ 0.7 – 2.1 per family.
Keep selling tea and cardamom at a cheap price	Farmer's family	Farmers cannot keep tea and cardamom for a long time. Therefore, they agree to make some cash, farmers agree to sell it at a cheap price to make some cash since the commodities cannot be consumed as a staple food.
Relying on remittances from children who work in the city	Farmer's family	Many farmers received remittances from children who work in the city, although the number has decreased or even stopped because they are also affected by the pandemic.
Living a simple way of life	Farmer's family	It was easier for farmers who are used to a simple lifestyle to survive during the pandemic. To reduce expenses, many lower their food standards with the priority of continuing to eat rice with modest side dishes, even with only salt. Results from other studies (Fajri, Rachman, & Zulkarnain, 2021; Yuana, Kholifah, & Anas, 2020) showed similar strategies to adapt the household financial condition during the pandemic.
Making loan	Farmer's family and neighbor	In urgent need of money, farmers receive help from other family members or neighbors. The need for children's

Livelihood strategy	Actor	Application
		education is dominant. This is also in line with a study by Bidarti (2021) in South Sumatra, where people survive during the pandemic by making debt loans.
Consuming their harvest of bananas and cassava	Farmer's family	Instead of being sold very cheaply, farmers choose to consume them, either directly or processed first, such as chips, <i>combro</i> , <i>opak</i> , and various processed dishes. Furthermore, it was also distributed to neighbors and other relatives.
Relying on other sources of income	Farmer's family	Farmers focus on trading jobs, especially for those who have the capital, energy, and expertise, especially by opening stalls and selling food around.

## 5. CONCLUSION

The COVID-19 pandemic affected the lives of agroforestry farming communities in rural areas. This is because several government policies on COVID-19 have caused a decrease in demand for agroforestry products, followed by a decline in commodity price and productivity of agroforestry farming to decline during the pandemic. As a survival strategy, farmers process agroforestry crops for sale or their consumption. Based on the results, improving road access, strengthening business capital for the agricultural sector, providing fertilizer and superior seeds, as well as optimizing the role of livestock farmers are strategies that the government can take to mitigate the impact of the COVID-19 pandemic on farmers in rural areas.

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