



Basic Industry Strategy and Orientation Strategy

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ABSTRACT

This study aims to analyze the portrait of Indonesian agriculture, especially in the development of secondary crops. The method used is a literature study and interviews with agricultural experts in Indonesia. The results of the analysis show that palawija plants have the potential to be further developed in Indonesia. However, the challenges faced in developing palawija crops in Indonesia are climate change which affects rainfall and seasonal patterns, limited land available for cultivation, and low productivity. One solution that can be taken is to develop palawija varieties that are more resistant to climate change and more productive. In addition, the use of modern technology such as drip irrigation, the proper use of fertilizers and pesticides, and good land management can increase the productivity of crops. The conclusion from this analysis is that the development of palawija crops in Indonesia still has great potential, but must be accompanied by efforts to develop technology and good management to increase productivity and overcome the challenges faced.

Keywords: *Agriculture, Productivity, Technology.*

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INTRODUCTION

Indonesia has great agricultural potential with various types of plants that can grow in tropical areas like Indonesia (Banerjee dkk., 2019). One type of plant that has the potential to be developed in Indonesia is palawija. Palawija crops are included in the category of plants that are important to meet the needs of food and industrial raw materials (Tamburini dkk., 2020). Some examples of secondary crops that are often found in Indonesia are green beans, peanuts, soybeans, corn, cassava, sweet potatoes, and sorghum (Y. Huang dkk., 2020). Even though Indonesia has great agricultural potential (Tamburini dkk., 2020), the development of secondary crops in Indonesia still faces various challenges. One of the main challenges is climate change which can affect the productivity and production of secondary crops (Liu dkk., 2019). In addition,

limited land and low productivity are also challenges in the development of secondary crops in Indonesia.

Indonesia has a tropical climate, so rainfall is quite high. However, climate change can affect rainfall patterns and air temperature, which can affect the productivity and production of secondary crops (Lezoche dkk., 2020). Therefore, it is necessary to increase the variety of crops that are more resistant to climate change (Agriopoulou dkk., 2020). Limited land is also a challenge in the development of secondary crops in Indonesia (Gour & Jain, 2019). The available land for agriculture is shrinking as a result of urbanization and infrastructure development (Kamble dkk., 2020). In addition, low productivity is also an obstacle in the development of secondary crops (Ghisi dkk., 2019). Low productivity can be caused by the lack of use of modern technology, poor management, and the use of low quality seeds.

Previous research has been carried out regarding the development of palawija plants in Indonesia (Hanach dkk., 2023). Several studies have shown that climate change affect(Lenton dkk., 2019)s the productivity of palawija crops in Indonesia and the development of palawija varieties that are more resistant to climate change is needed (K. Huang dkk., 2019). In addition, the use of modern technology such as drip irrigation and good land management can also increase the productivity of crops.

Climate change is a factor affecting the productivity of secondary crops in Indonesia (Battaglia dkk., 2020). In Indonesia, climate change that is occurring includes increasing air temperature, increasing rainfall, and erratic rainfall patterns (Cohen & Rodgers, 2020). This climate change can affect the productivity of crops, especially in terms of the availability of water needed by plants.

Increasing air temperature can affect the availability of water for plants (Fasihi dkk., 2019). This happens because at high temperatures, plants will need more water to maintain a stable body temperature (Gabriela dkk., 2022). In addition, an increase in erratic rainfall can also affect the productivity of crops (Grossiord dkk., 2020). Erratic rainfall can result in a lack of water for plants during the dry season and flooding during the rainy season (Olanrewaju dkk., 2019). Climate change can also affect the quality and quantity of secondary crops production (Yang dkk., 2019). Increasing temperature and erratic rainfall will result in pest and disease attacks that affect crop productivity and quality. In addition, climate change can also affect the planting time and harvest period of palawija crops.

To overcome climate change that affects the productivity of palawija crops in Indonesia, proper management and adaptation efforts are needed (Catoira dkk., 2019). Handling efforts can be carried out through the use of environmentally friendly agricultural technology (Cohen & Rodgers, 2020), the use of plant varieties that are resistant to climate change, and efficient water management (Tschakert dkk., 2019). Meanwhile, adaptation efforts can be made through crop diversification and the development of agricultural practices that are appropriate to the current climate change conditions.

Good management in the development of crops such as using quality seeds and using the right fertilizers and pesticides also needs attention (Wood dkk., 2019). In addition (Powers dkk., 2019), it is important to provide assistance and counseling to farmers to improve their skills in developing secondary crops.

Development of palawija plant varieties that are highly resistant to climate change is important considering the effects of an uncertain climate that are increasingly being felt in Indonesia (Dietrich dkk., 2020). Climate change can have a negative impact on the productivity and production of secondary crops, especially during natural disasters such as droughts, floods and other extreme weather (Shahrizaila dkk., 2021). The development of palawija plant varieties that are more resistant to climate change can be done by identifying the characteristics of existing varieties and choosing the varieties that are most resistant to climate change (Allemani dkk., 2018). In addition, the development of new varieties using biotechnology technologies such as genetic engineering can also be an alternative for producing secondary crop varieties that can survive various climatic conditions.

Developing palawija plant varieties that can withstand various climatic conditions can also help improve food security in Indonesia (T. Li dkk., 2021), because palawija plants are a source of vegetable protein which is important for human health (Z. Li dkk., 2020). In addition, the development of palawija plant varieties that are more resistant to climate change can also help increase overall agricultural productivity and production, thereby increasing the welfare of farmers and the people of Indonesia (Q. Li dkk., 2019). In this study, developing palawija varieties that are more resistant to climate change will be one of the research focuses (T. Li dkk., 2021). Therefore, this article will be able to provide useful recommendations for the development of palawija plants that are highly resistant to the erratic climate in Indonesia.

The technical aspect in agricultural development is the use of modern technology such as drip irrigation (Lurie dkk., 2020). Drip irrigation is a modern technology with use in agriculture to optimize water use and increase crop productivity (Garrido-Castro dkk., 2019). In drip irrigation, water is slowly channeled through small pipes and dripped directly onto the plant roots. In this way, the plants only get the water they need, so there is no wastage of water and the plants can grow better. In addition, the use of drip irrigation can also reduce the risk of plant diseases caused by excess moisture in the root area (Chenu dkk., 2019). The use of drip irrigation can also help farmers to reduce costs and time in managing water (Alayba dkk., 2018). Compared to traditional irrigation using sprayers or other irrigation devices, drip irrigation is more efficient in using water and can save water management costs.

However, the use of modern technology such as drip irrigation also has some challenges that need to be overcome. One of them is the limited access of farmers to this technology (Han dkk., 2019). The price of drip irrigation equipment is still relatively expensive, so many small farmers cannot afford it. In addition, farmers also need to be provided with assistance in using this technology in order to maximize the benefits of drip irrigation.

The use of quality seeds is an important factor in increasing the productivity and quality of secondary crops. Quality seeds will have good characteristics, such as resistance to diseases and pests, resistance to environmental conditions that are not ideal, good growth and development, and so on. The use of quality seeds will provide better yields, reduce the risk of crop failure, and increase product competitiveness in the market (Ahmad & Rahmad, 2019).

In addition, the use of appropriate fertilizers and pesticides is also an important factor in the development of crops. The fertilizer used must be adjusted to the type of plant and the existing soil conditions. The right fertilizer will provide sufficient nutrients to plants so they can grow optimally. Excessive or inappropriate use of fertilizers can cause damage to the environment and have a negative impact on crop quality. Then, the use of pesticides also needs to be considered so as not to have a negative impact on environmental conditions and human health. The pesticides used must be adjusted to the types of plants and pests present. Excessive or inappropriate use of pesticides can cause damage to the environment and increase the risk of pest resistance to the pesticides used (Arsi, et al., 2022).

In developing palawija crops in Indonesia, the government and related stakeholders have made various efforts to increase the use of quality seeds, appropriate fertilizers and pesticides that are safe and effective. The type of effort that can be carried out is to improve sustainable agricultural systems that are environmentally friendly and encourage the use of appropriate technology in agriculture. In addition, information dissemination and training regarding the proper use of seeds, fertilizers and pesticides were also carried out to increase farmers' awareness of the importance of using specific agricultural materials.

The purpose of this article is to be able to find out a portrait analysis of the development of palawija plants in Indonesia with case studies of certain palawija plants and to evaluate the challenges and solutions in the development of palawija plants in Indonesia. Then, this article was created to provide recommendations regarding the development of palawija crops in Indonesia by considering technical, managerial and socio-economic aspects.

In achieving this goal, this article was prepared using a qualitative method which conducted case studies on certain palawija plants in Indonesia. Data will be collected through interviews with farmers, researchers and stakeholders related to the development of palawija crops in Indonesia. In addition, data will also be collected through direct field observations and analysis of documents related to the development of palawija plants in Indonesia. This article provides results that are expected to contribute to the development of secondary crops in Indonesia by providing recommendations that can increase the productivity and production of secondary crops and overcome the challenges faced in developing secondary crops in Indonesia. Therefore, it is hoped that this article will have an impact on the development of agriculture in Indonesia, especially in the development of secondary crops, which will ultimately develop the welfare of farmers and Indonesian society as a whole.

RESEARCH METHODOLOGY

This research will be conducted using literature study and interview methods. Literature studies will be carried out by seeking data sources from scientific journals, books, and official government publications that are relevant to the research topic. Interviews will be conducted with agricultural experts in Indonesia to gain a deeper understanding of the challenges and solutions in developing pulses in Indonesia.

Data collection techniques used in this study are as follows: Literature study: Data will be collected from various sources such as scientific journals, books, and official government publications that are relevant to the research topic. Interview: The interview will be conducted with agricultural experts in Indonesia. These experts were selected based on criteria of expertise and experience in developing secondary crops in Indonesia.

Sources of data used in this study are as follows: Scientific journals: Scientific journals that are relevant to the research topic will be used as data sources. Books: Books that discuss agriculture and the development of secondary crops in Indonesia will be used as data sources. Official government publications: Official government publications such as reports, policy documents, and statistical data will be used as data sources.

The method of data analysis used in this study is as follows: Literature study: Data from literature study sources will be analyzed qualitatively by identifying important themes related to the development of palawija crops in Indonesia. Interviews: The data from the interviews will be analyzed qualitatively using content analysis techniques. The data will be categorized into themes that have been previously identified from the literature study. Furthermore, the data will be analyzed to obtain further information about the challenges and solutions in the development of palawija crops in Indonesia.

By using literature study and interview methods, this research is expected to provide sufficient and in-depth information about the portrait of Indonesian agriculture with a focus on the development of secondary crops.

RESULT AND DISCUSSION

Based on literature studies and interviews with agricultural experts in Indonesia, information was obtained that palawija plants have the potential to be further developed in Indonesia. Corn, soybeans, green beans, peanuts and cassava are types of secondary crops that are widely cultivated in Indonesia. In addition, palawija plants also have high economic value and can be a source of food and industrial raw materials.

However, the development of palawija crops in Indonesia is still faced with various challenges. Climate change that is happening in Indonesia affects the production of secondary crops and can result in crop failure and decreased productivity. In addition, limited land and low productivity are also obstacles in the development of secondary crops in Indonesia.

To overcome these challenges, it is necessary to develop palawija plant varieties that are more resistant to climate change, use modern technology, and good management in crop development. In addition, government support in the development of agricultural infrastructure and training programs for farmers is also considered important to increase the productivity and production of secondary crops in Indonesia.

Based on this information, it can be concluded that the development of palawija crops in Indonesia still has great potential, but efforts need to be made to overcome the challenges faced. Thus, the development of palawija crops can make a significant contribution in meeting food needs and become a potential source of industrial raw materials for Indonesia.

Table 1. data on palawija production in Indonesia for the last few years

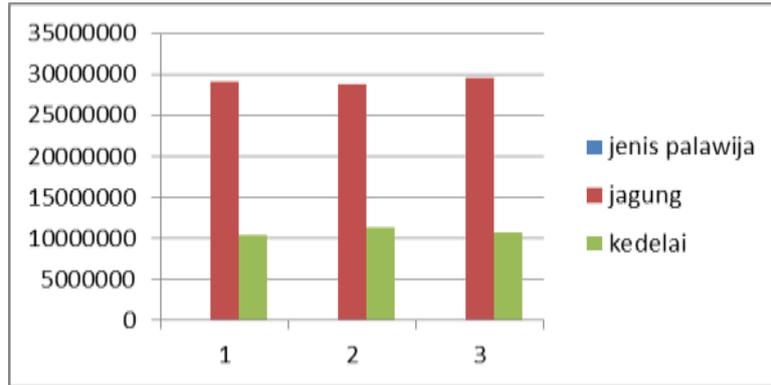
Palawija type	Production 2019 (ton)	Production 2020 (ton)	Production 2021 (ton)
Corn	29.112.534	28.758.679	29.492.135
Soya bean	10.482.102	11.314.238	10.720.354
Mung beans	1.413.901	1.537.214	1.408.932
Peanuts	3.277.847	3.225.837	3.393.763
Cassava	20.262.652	21.498.751	20.882.815

From the table above, it can be seen that corn and soybean production in Indonesia has tended to be stable in the last three years. Meanwhile, the production of mung beans and peanuts decreased slightly in 2020, but increased again in 2021. Cassava production has also tended to be stable in the last three years. The table consists of five types of secondary crops, namely corn, soybeans, green beans, peanuts and cassava, as well as three columns for each year, namely 2019, 2020 and 2021.

The data in the table was obtained from the Central Bureau of Statistics (BPS), which is an official Indonesian government agency that collects, processes and presents statistical data on various aspects of social, economic and environmental life in Indonesia. In the table, palawija production is measured in tonnes. The production data shows the amount of production produced by grain farmers throughout Indonesia in 2019, 2020 and 2021. Corn production was the highest compared to other types of crops, followed by soybeans, cassava, peanuts and green beans.

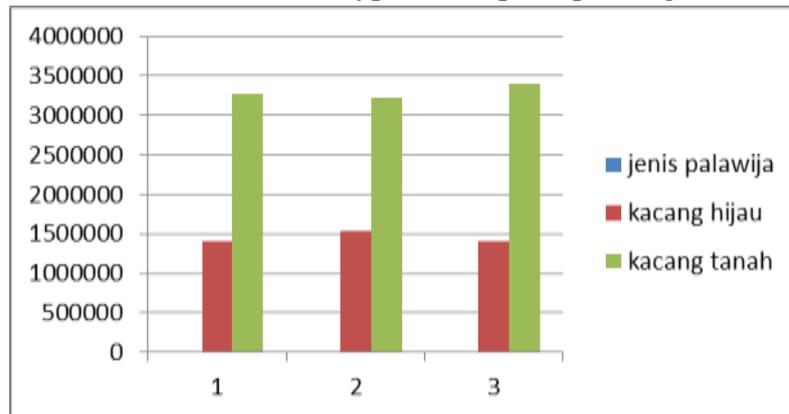
Palawija production data can provide important information in understanding food production in Indonesia. This information can be used by the government, business actors, and farmers to make decisions regarding policies and strategies for the development of secondary crops in the future. In addition, with this table, it is possible to analyze the trend of palawija production in Indonesia over the past few years. This can provide an overview of changes in grain production and can be used as a reference in planning a strategy for developing sustainable and effective grain agriculture in the future.

In conclusion, the table of palawija production in Indonesia can provide very useful information in understanding the condition of food production in Indonesia, and can be used as a reference in making strategic decisions regarding the development of palawija agriculture in the future.



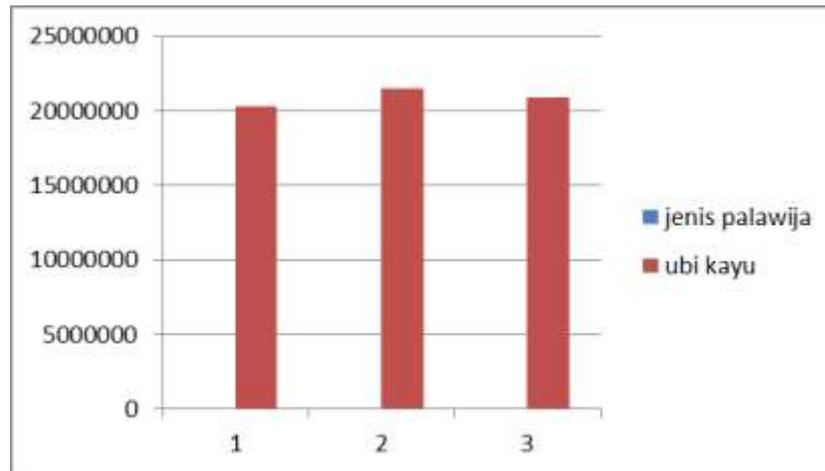
Graph 1. Corn and soybean production

In chart 1, corn and soybean production in Indonesia has tended to be stable over the last three years. This can be caused by the government's efforts to increase the production of the two types of palawija through agricultural development programs, such as providing superior seeds, fertilization, and counseling to farmers. In addition, corn and soybeans are also very much needed commodities in the food and animal feed industries, so the demand for these two types of crops is quite high.



Graph 2. Production of mung beans and peanuts

Production of mung beans and peanuts in Indonesia has decreased slightly in 2020, but has increased again in 2021. The decline in production in 2020 can be caused by bad weather and pest or disease attacks on peanut plants. However, with the implementation of better agricultural development and pest and disease control programs in 2021, mung bean and peanut production will increase again.



Graph 3. Production of cassava

Cassava production in Indonesia has tended to be stable over the past three years. This will have an impact on the fact that cassava is a type of palawija that is easy to grow and has good adaptability to various environmental conditions. In addition, the demand for cassava is quite stable, both from the domestic market and the export market.

Based on the results of the analysis, it was concluded that palawija production in Indonesia is caused by various factors, such as weather conditions, pests and diseases, as well as agricultural development programs carried out by the government. Therefore, efforts are needed to continue to increase the productivity and quality of crops in Indonesia, so that it will affect food needs and increase the welfare of farmers.

CONCLUSION

Based on the results of an analysis of the portrait of Indonesian agriculture, especially in the development of secondary crops, it can be concluded that the development of secondary crops in Indonesia has great potential but is still faced with several challenges, such as climate change, limited land, and low productivity. To overcome these challenges, efforts are needed to develop palawija varieties that are more resistant to climate change, use modern technology, and good management in crop development. By making these efforts, it is expected to increase the productivity and production of secondary crops in Indonesia, so that they can meet food needs and become a potential source of industrial raw materials. In addition, the development of secondary crops can also help reduce Indonesia's dependence on imports of food from abroad. Therefore, there is a need for support from the government, agricultural experts, and the community in the development of secondary crops in Indonesia.

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