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Cultivation and Processing of Cimanggu Cassava Harvest Waste at SMK Negeri I Borong, East Manggarai Regency

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ABSTRACT: Cassava is one of the agricultural crops that has been widely cultivated in the East Nusa Tenggara region. The cimanggu variety is a cassava variety that is quite tolerant to drought and can produce 80 tons/ha. Additionally, the cimanggu variety is one of the most suitable cassavas for mocaf production. The East Manggarai Regency area is one of the fertile regions in NTT suitable for cassava cultivation, especially Cimanggu cassava. This research aims to understand the cultivation techniques of Cimanggu cassava in the Borong area and the role of SMK Negeri I Borong as a region for planting Cimanggu cassava. In addition, to understand the waste processing techniques generated during the harvesting process of Cimanggu cassava. The data collection method used a qualitative approach with data collection through field observation techniques. The research results show that the cultivation of cimanggu cassava plants carried out by students of SMKN 1 Borong includes land preparation (soil loosening), preparation of cimanggu cassava seeds, planting methods, planting distance, fertilization, weeding, and harvesting. The waste from the harvest of cimanggu cassava, in the form of cassava leaves and cassava peels, is processed into fermented livestock feed for animals.

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INTRODUCTION

Cassava (*Manihot esculenta* Crantz) is the third staple food after rice and corn in Indonesia. Besides being a staple food, cassava is also used as a raw material for industrial products such as starch, glucose, alcohol, and the production of bioethanol. (El-Sharkawy, 2004). In cassava plants, almost all parts can be utilized (Purwono dan Purnamawati, 2007).

According to BPS (2015), cassava production in Indonesia in 2015 was 21.79 million tons of fresh tubers, a decrease of 1.65 million tons (-7.02%) compared to 2014, which was 23.44 million tons of fresh tubers. The decline in cassava production occurred due to a decrease in harvest area of 54.24 thousand hectares (-5.41%). This is influenced by land productivity and the inappropriate cassava cultivation technology.

According to Hidayat (2008), high production can be achieved through several methods, namely extensification by expanding agricultural areas by opening new regions as new agricultural land. Intensification by increasing the yield per unit area of a certain region through the application of new technologies such as planting distance and the use of organic fertilizers.

Plants require both macro- and micronutrients. The essential macronutrients for cassava plants include nitrogen (N), phosphorus (P), and potassium (K). (Sunardi dan Sarjono, 2007). According to Rivai et al. (2017), the application of organic materials from plant residues and animal manure can contribute to the availability of N, P, and K nutrients and reduce the use of inorganic fertilizers.

Cassava is one of the agricultural crops that has been widely cultivated in the East Nusa Tenggara region. Besides being one of the staple food substitutes for rice, cassava is also sold by the community as a source of income in various regions of NTT Province, such as Ende and Ngada. Selling cassava as a livelihood can improve the community's welfare, and it is not uncommon for the community to support their lives solely from selling cassava or cassava products.

Cassava is a shrub that originates from the American continent, specifically Brazil. Cassava is known as katela pohon or ubi kayu in English, and it is a perennial tropical and subtropical tree from the Euphorbiaceae family. (Akparobi, 2009).

Cassava tubers are long tubers or roots of the tree with an average diameter of 2-3 cm and a length of 50-80 cm, depending on the type of cassava planted. Cassava tubers originate from the secondary growth of adventitious roots. (Lipsey, 1995).

The cimanggu variety is a cassava variety that is quite tolerant to drought and capable of producing 80 tons/ha. Additionally, the cimanggu variety is one of the most suitable cassavas for the production of mocaf. (Subagio dkk, 2013).

The Cimanggu variety has the following plant characteristics: non-branched, plant height 300-400 cm, old stem color light brown, young stem color green, stem diameter 3.0-4.5 cm, leaf tips pointed, petiole color red, petiole length 30-40 cm, leaf length 12-25 cm, leaf width 4 cm, flower corolla color yellow, sepal color green, tuber skin color brown, tuber flesh color white, diameter 5-8 cm, tuber length 30-40 cm. (Pusat Perlindungan Varietas Tanaman dan Perizinan Pertanian, 2016).

The East Manggarai Regency area is one of the regions in NTT that is fertile and suitable for planting cassava, especially Cimanggu cassava. Therefore, there is a need for Cimanggu sweet potato cultivation activities as one of the efforts to improve welfare in the agricultural sector. This article aims to understand the cultivation techniques of cimanggu cassava in the Borong area and the role of SMK Negeri I Borong as a region for the growth of cimanggu cassava. In addition, to understand the waste processing techniques generated during the harvesting process of Cimanggu cassava.

METHOD

The data collection method uses a qualitative approach. Data collection is conducted using field observation techniques. The research was conducted from August to November 2024 at the practice field of SMKN 1 Borong, Borong District, East Manggarai Regency.

RESULT AND DISCUSSION

Cimanggu Cassava Cultivation Techniques at SMK Negeri I Borong

East Manggarai Regency is one of the fertile areas in East Nusa Tenggara that is suitable for planting cassava, especially Cimanggu cassava. Most of its territory is hilly, with only 31,352 hectares below 100 meters above sea level (masl). The land owned by SMKN I Borong is utilized for the cultivation of cimanggu cassava plants. The area of land used for cassava cultivation is 0.76 ha.

To obtain a large yield of tubers, the cultivation of cimanggu cassava must be done correctly and in the right manner. Here are the steps that must be followed during the cultivation process:

First, soil tilling is done with a plow using a tractor. This is done to restore soil fertility, increase crop productivity, eliminate weeds, facilitate plant roots in receiving oxygen, and create ideal soil conditions for plant growth. According to Lebot (2009), loose soil and cassava crumbs are very important for tuber formation. Additionally, perfect processing, namely plowing and loosening, will result in better tuber growth.

Both preparations of the cimanggu cassava seedlings, the stems used are 10-12 months old. The length of the cimanggu sweet potato cuttings ranges from 20 to 25 cm. Then soaked with ZPT and BSM Hormone for approximately 2 nights with a dosage of 1 bottle cap/liter of water. The benefit of soaking cassava cuttings with growth regulators and hormones is to accelerate bud growth. Fertilizers increase plant biomass, the number of tubers, and cassava yield. This indicates that the application of fertilizers enhances the growth and nutrition of cassava. (El-Sharkawy, 2003 & Fermont et al., 2010).

Third, the planting pattern of cimanggu cassava at SMKN 1 Borong is intercropping cassava with corn. In the intercropping pattern, this planting method is recommended because it requires more intensive maintenance and is made efficient through the care of companion plants during the early growth period until they are 4 to 6 months old, or until the canopy develops and covers the land. (Alves 2002).

Fourth, the purpose of regulating planting distances is to ensure that each plant has access to nutritional resources, water, and light. Cimanggu cassava is planted in rows with a distance of 1 x 2 meters from north to south and a distance of 10 meters between rows. Because cassava has a somewhat slow initial growth. The planting distance arrangement is intended to ensure that each plant has access to the most appropriate resources of nutrients, water, and light, as well as to ensure that the plant population has an optimal production level. (Supanjani, 2012).

Fifth, the cimanggu sweet potato is fertilized twice: once fifteen days after planting and twice thirty days after planting. (HST). The second fertilization was done with Bowuli Subur Makmur organic fertilizer. Fertilizer can be applied by mixing it with water first before spraying it around the cimanggu sweet potato plants. Organic fertilizers consist of various organic materials, such as plant residues and animal manure. The application of organic materials from plant residues and animal manure can increase the availability of N, P, and K nutrients while reducing the use of inorganic fertilizers, ensuring the availability of nutrients. (Rachman et al., 2028).

Sixth, weeds hinder the growth of cassava, especially at the early stages, primarily through competition with the plants in utilizing nutrients, water, and sunlight. Relying on the presence of sugar manually using a hoe and a tofa.

Seventh, cimanggu cassava is harvested when the tubers are ready to be harvested. After the cassava is harvested quickly, they experience physiological damage known as post-harvest physiological deterioration, which indicates that the cassava harvested quickly is not tasty and cannot be marketed. Cassava can grow larger if left in tropical conditions for a longer time. Although the

cultivars vary, the ideal harvest time in Africa ranges from 10 to 24 months. (Lebot 2009). Young cassava contain less starch than old cassava. The middle part of the aging sweet potato is mushy and should not be eaten. By meeting these criteria, some cassava clones in Indonesia can be harvested after 6 months or less.

SMK Negeri I Borong as the Area and Growth of Cimanggu Cassava

One aspect that needs to be considered in establishing SMK Negeri I Borong as a cassava center is the extent of the school's contribution to cassava production at the regional or national level. This is because the potential impact of developing a cassava center in an area on increasing production at the regional level is partly determined by the share of cassava production generated.

The development of cassava areas is expected to make a significant contribution to the increase in national cassava production in the context of food security. Agronomically, efforts to increase cassava production can be achieved through increased productivity and expanded planting area. In the long term, cassava productivity generally increases due to the improved quality of cassava cultivation technology, such as the use of superior variety seeds and perfect soil processing.

Processing Cassava Cimanggu Harvest Waste into Fermented Livestock Feed

The waste from the harvest of Cimanggu cassava consists of cassava leaves and the inner skin of the Cimanggu cassava tuber. Both types of waste are processed into fermented livestock feed. The processing of fermented livestock feed is carried out through several stages, namely the preparation of tools and materials, mixing the ingredients, and fermentation. The materials needed include cassava cimanggu leaf waste, inner cassava cimanggu skin, corn flour, minerals, fish meal, calcium, EM4, molasses, and water. The tools required include a barrel, bucket, and stirrer.

The leaves and inner skin of the Cimanggu cassava are cut, washed first, and then cut into small pieces. After that, it is mixed with corn flour, minerals, fish meal, and calcium, then placed into a barrel. Next, 4 bottle caps of EM4 are mixed with 10 liters of water and 2 liters of molasses, then added to the barrel. All the mixtures are stirred until evenly combined, then the barrel is tightly closed, ensuring no air enters the barrel. The mixture is fermented anerobically for 7 days. After fermentation is complete, the fermented animal feed can be given to livestock.

CONCLUSION

The learning experience of cultivating cimanggu cassava can be utilized by students of SMKN 1 Borong. This activity includes land preparation (soil tilling), preparing cassava seedlings, planting methods, planting distance, fertilization, weeding, and harvesting. To cultivate cassava cimanggu, it is necessary to determine the most suitable location to produce the best yield. Although cassava is a tropical plant, it can also adapt and grow well in subtropical environments. Cassava does not require a special climate to grow. Generally, cassava can thrive in climates with rainfall of 1,500–2,500 mm/year. Due to its diverse nutritional content, cassava is considered to have many health benefits, such as boosting energy, serving as a source of fiber and complex carbohydrates, and having a high antioxidant content.

The processing of fermented livestock feed is carried out through several stages, namely the preparation of tools and materials, mixing the ingredients, and 7 days of fermentation.

In establishing SMK Negeri I Borong in the cassava area, one of the factors that need to be considered is the extent of the school's contribution to cassava production both at the local and national levels. This is due to the potential impact of developing an area on increasing production at the regional level, which is partly determined by the volume of cassava produced there.

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