Coconut cultivation management in Central Maluku

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Abstract. Currently, coconut is still managed and produced as black copra due to farmers' limited human resources and capital. In addition, the condition of coconut plants is also old and unproductive. It is time to manage coconut plantations for maximum quality and quantity of production. The utilization of coconut products is not only to primary products but was developed into secondary products. Central of Maluku is one of the centers for plantation commodities in Indonesia. The most dominant plantation commodities in Central Maluku are coconut, nutmeg, cloves, and cocoa. Demand for these 4 commodities competes with each other. Coconut is one of the sources of life for the local community. The management is very traditional, especially downstream, to produce black copra and coconut oil. Coconut oil was produced for local consumption, and part of it was sold to the local market. Meanwhile, mainly copra is produced to supply industrial demand. Therefore, good management practices of coconut cultivation are needed, including improving good coconut cultivation and coconut farming diversification horizontally and vertically.

Keywords: utilization, coconut, management, farmer, copra

1. Introduction
Recently, the expansion of coconut utilization was increased and is increasingly in demand by industry owners and world consumers. The utilization of products made from coconut is not limited to primary products but has developed into secondary products with economic value. However, over time the condition of coconut plantations is also old and unproductive. Based on [1] that various problems in coconut plantations, for example, in the Northeastern Brazil region where tall coconut is grown, but its sustainability is threatened by different abiotic stresses, including drought, mineral nutrition, and salinity. Likewise, [2] also stated that coconut cultivation faces biotic and abiotic stressors that will ultimately threaten its productivity and competitiveness. In addition, there are also problems with harvesting, and some areas use the assistance of monkeys, which causes legislative controversy [3] and concerns about the welfare of farmers [3].

Furthermore, the problem of pest and disease attacks, especially Phytophthora attacks, dominates coconut plantations [4]. In addition, the problem of limited understanding and education of farmers as coconut producers is an important point that needs to be addressed. According to [5], coconut vendor/producer education positively affects food safety knowledge for consumer health. Several solutions to problems related to coconut plantations have been attempted. According to [6], inventory and monitoring of ownership of coconut plantations are very necessary. In addition, the detection of pests and diseases on coconut trees through deep learning techniques has also been carried out [7].
Likewise, the formulation of the right strategy to manage coconut plantations planted on the coast in the face of seawater abrasion under climate change [8]. The genotypic selection approach to drought has also successfully addressed environmental issues affecting annual coconut plantations. Likewise, in Brazil, remote sensing techniques have been used to optimize the management and production of coconut plantations [6]. Furthermore, coconut clones have also been propagated through shoot organogenesis [9].

According to [10], applying new technologies and research strategies such as metabolomics, proteomics, genomics, and transcriptomics in coconuts yields interesting data that will help improve the management and marketing of this valuable crop. This, in turn, will lead to progressive genetic improvement of C. nucifera while enabling current producers to meet market demands. Furthermore, the association of some bacteria with coconut tree rhizosphere can reduce the adverse effects of salinity on plant growth in sustainable agriculture [11]. Likewise, efforts to irrigate and mulch coconut plantations have been carried out to support growth and increase production [12]. Likewise, assessing environmental impacts and economic benefits is an important subject in sustainable management in agriculture [13].

Advances in coconut management, especially in the mass propagation of coconut seeds through tissue culture and somatic embryogenesis. This effort is a form of the limitations of conventional seed propagation. Coconut biotechnology is focused on improving various protocols for large-scale propagation through somatic embryogenesis, while protocols in the fields of cryopreservation and clonal propagation are under investigation and evaluation.

Various solutions and efforts in solving problems in coconut management have been carried out and further research, but they are generally limited to smallholder plantations. The current community coconut management still has limitations in all its aspects. Therefore, good and correct coconut management is needed in this case, with improvements from upstream to downstream. One way of coconut management that can be applied is improving coconut cultivation technology and coconut diversification horizontally and vertically. This cultivation improvement is expected to provide optimal results with minimal costs without compromising quality.

2. Expansion of coconut products utilization

Coconut has been widely used today, including the food, medicine, non-food, and energy industries. According to [1], coconut is an important crop explored as a rich source of oil, milk, and water in some tropical countries. Coconut and its derivative products have been widely used and widely used. The parts of coconut can produce primary and secondary products beneficial to humans and other living things and provide economic benefits. This can be seen in the use of VCO [14];[15]. Besides that, the use of activated carbon from coconut shells is used as an adsorbent to remove sulfamethaxazole content [16], coconut fiber [17], coconut pulp from coconut pulp fiber used in the paper industry [18]. Coconut flour is also a product that can increase the body's bioactive components [19]. Coconut fiber [20]. Coconut coir provides economic benefits [21]. Coconut husk also has a comparative advantage in the paper industry [22].

Furthermore, the use of coconut shells provides a positive side to be developed [23] by utilizing waste green coconut shells [24]. On the other hand, the potential of coconut shell biomass for charcoal production [25]. Shell as a fuel that is very important in meeting global energy demand sustainably [26], alternative energy from shell biomass [25]. In addition, coconut shell biomass is renewable and sustainable for fuel [27], coconut husk [28] yogurt from Coconut milk [29]. Likewise, consumer acceptance is also high on coconut chip production with improved nutritional quality [30].

Coconut also produces a natural health drink that is common in South Asian countries. Coconut sap is obtained from tapping activities on coconut trees. The use of coconut sap is widespread in South Asian countries [31]. Utilization of sap for synthetic biodiesel [14]. In addition to sap, coconut water is known to provide important nutrients for the body [32] and is used as an energy drink [33]. Although several studies have found residues in coconut water, an analysis of the residues of caneconazole in water, kernels, and coconut leaves has also been carried out [34]. The explanation above shows that
coconut with multifunction makes coconut products more desirable and necessary to meet consumer needs and demands.

3. Coconut utilization in central Maluku
According to Sirappa and Matitaputty [35], the development of plantation commodities in the Central Maluku Regency is relatively slow compared to the available potential land. The strategy for developing superior plantation commodities must be implemented based on benefit, sustainability, and integration principles. To achieve this goal, plantation development in Central Maluku Regency must be based on land potential. Therefore, it is necessary to empower the people of Central Maluku to realize integrated and sustainable coconut processing. In addition, solutions to problems faced by the community through an integrated approach increase the economic value of coconuts that are still not utilized optimally [36].

The increasing global demand for coconut-based products, especially in the health sector, is in line with population growth and industrialization. Coconut is known as a subsistence and commercial crop. Therefore, coconut is known as the tree of life in some areas [2]. Coconut is one of the plantation crops that have economic value for the community. Besides being consumed, coconut can be tapped (such as early coconut), the sap is taken to make coconut sugar with a low glycemic index content. Some coconut farmers have carried out coconut plants as a source of sap since time immemorial.

Maluku is a province consisting of hundreds of small islands. According to [37], Maluku is very vulnerable to the decline in biodiversity of plant resources for agriculture. Due to pressure from pest and disease attacks, difficulty in seed storage, market demand, and the introduction of new high-yielding varieties will impact food security.

The most dominant plantation commodities in Central Maluku are coconut, nutmeg, cloves, and cocoa. Demand for these 4 commodities competes with each other. Coconut, which is one of the sources of life, makes the local community very dependent on its existence.

The challenge in producing coconut in Maluku, especially Central Maluku, is the limited human resources, including knowledge, understanding, and skills in managing coconut products to become value-added and economical products. In addition, there is also limited knowledge of farmers in good and correct cultivation techniques for coconut commodities, so that coconut management does not provide high yields and productivity, even though the expanse of coconut looks very wide in Central Maluku area. Therefore, it is very necessary to practice coconut cultivation management with good and correct cultivation improvements.

4. Coconut cultivation management
A coconut plant is a multipurpose plant or a plant that has high economic value. All parts of the coconut tree can be used for human benefit, so this tree is often called the tree of life because almost all parts of the tree, roots, stems, leaves, and fruit, can be used for daily life needs. According to [13] said that there are five dimensions of sustainability includes (1) landscape ecology, (2) environmental quality, (3) socio-cultural values, (4) economic values, and (5) management and administration.

According to Matana et al. [38], the management of good coconut cultivation practices recommended being applied from the Indonesian Palm Crops Research Institute includes providing plant material, nurseries, nurseries, field planting, and maintenance. Most of the coconut plants that exist today are old. Therefore, for rejuvenation, it is necessary to provide superior seeds so that it is hoped that coconut plantations, both owned by the government/private sector and the people, have been planted with all types of superior coconut, and coconut productivity nationally can increase. One way to improve the quality and accelerate the growth of coconut seedlings is by applying liquid fertilizer. According to Padang et al. [39], the application of fertilizer to coconut has a significant effect on the growth of coconut seedlings. Manambangtau et al. 1 [38] said that one way to reduce the negative impact of the use of inorganic fertilizers is the use of organic fertilizers. Organic fertilizers in composted form play an important role in improving the chemical, physical and biological properties of the soil and as a source of plant nutrients. The organic fertilizer used in this study came from
coconut coir dust and goat dung compost. In addition, Matana et al. [38] said that N, P, K, and Mg fertilization positively responded to soil nutrient content.

Production and growth can be increased through intensive fertilization. Fertilization is an effort to provide or add macro and microelements needed by plants. Balanced fertilizer application is the key to successful land and plant management. A balanced fertilization system is carried out by providing fertilizer with a dose of fertilizer and the type of fertilizer according to the type of soil, plant age, and plant nutrient needs [40]. Currently, at the farmer's level, the use of inorganic fertilizers continues to increase. This is due to the availability of inorganic fertilizers that are easy on the market and prices that are still affordable by farmers. In addition, there are several inorganic fertilizers in the form of compound fertilizers that are widely available forged. Continuous use of inorganic fertilizers can reduce soil fertility physically, chemically, and biologically. This situation causes the ability of the soil to support the availability of nutrients and the life of microorganisms to decrease. Therefore, if fertilizer is applied for a long time, the land is no longer able to give a good influence on plant growth [38]. One way that can be done to reduce the negative impact of the use of inorganic fertilizers is the use of organic fertilizers.

Diversification of coconut farming can be done through vertical and horizontal diversification. Coconut is one of the plantation crops that have economic value for the community. Vertical diversification through diversification of coconut products. Almost all parts of the plant can be utilized, especially coconuts which are very beneficial for humans. The fruit's flesh can be processed into coconut milk, oil, and other products with high economic value. Likewise, other parts of the fruit, namely coir, water, and shell as by-products that can provide added value if processed optimally. To further increase the added value of coconut plants for farmers and industry, it can be directed to the production of sap which can be processed into sugar. The added value generated can reach 10 times the value obtained if the fruit is taken. Some coconut farmers have carried out coconut plants as a source of sap since time immemorial. However, its development so far has not been optimal. Various problems become obstacles in the development of coconut for sap production. The survey results in several centers of coconut sugar production obtained information on several problems related to the development of coconut for the production of sap. The decreasing number of tappers, the relatively old age of coconut plants so that the trees are too tall are obstacles to the development of sugar production from coconut sap. Besides being consumed, coconut can be tapped (such as early coconut), the sap is taken to make coconut sugar with a low glycemic index content.

Furthermore, horizontal diversification is also a solution to obtain added value in the management of coconut farming. One of the new strategies to increase food sufficiency, security, and self-sufficiency is using yardland or land optimization combined with food crops, horticulture, and other plantation crops. Statistical data shows that the area of yardland in Indonesia reaches an area of 10.3 million hectares. If the function of the yard can be optimized, it will contribute significantly to the food sufficiency, security, and self-sufficiency of the community. In addition, the combination of early coconut plants with other productive crops will add value to farmers' income and support food security.

5. Conclusion
The expansion of coconut utilization was increased and is increasingly in demand by stakeholders and world consumers. However, coconut is still managed and produced as black copra due to farmers' limited human resources and capital. In addition, the condition of coconut plants is also old and unproductive. It is time to manage coconut plantations for maximum quality and quantity of production. Central of Maluku is one of the centers for plantation commodities in Indonesia. The most dominant plantation commodities in Central Maluku are coconut, nutmeg, cloves, and cocoa. Demand for these 4 commodities competes with each other. Coconut is one of the sources of life for the local community. The management is very traditional, especially downstream, to produce black copra and coconut oil. Coconut oil was produced for local consumption, and part of it was sold to the local market. Meanwhile, Mainly copra is produced to supply industrial demand. Therefore, good
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