

POTENTIAL OF COLI FRUIT AS ANIMAL FEED IN MOA DISTRICT SOUTHWEST MALUKU

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ABSTRACT

This study aims to determine the distribution area and population of Koli trees on Moa Island and to determine the amount of fruit and mesocarp juice in one production. This research used a survey method, simple random interviews of 30 respondents and direct observation at the research location. Research variables: Respondent profile: age, gender, education level and occupation. Coli tree population structure. Calculating the production of cauliflower and mesocarp fluid. The results of the study: Respondents' age was 23-64 years old, male sex (100%), education level of respondents: Elementary school graduates (SD) 70%, respondent's main occupation: farmer 93.33%, sideline: breeder 80.00%. Koli tree production area/sample village: 16,000m²/1.6Ha consisting of 4 lanes, area of each lane 4,000m²/0.4Ha, consisting of 4 plots, area of each plot: 1,000 m²/0.1Ha, number of coli trees per plot : 8 trees, number of koli trees in the production land area/village: 8×4×4=128 trees. Coli fruit production for 1 harvest is 20 bunches × 20 fruit = 400 fruit/tree, multiplied by the number of koli trees from one village: 400×128 = 51,200 fruit harvested 2/year: 51,200×2 = 102,400 fruit/village/year, liquid mesocarp/fruit: 260grams and 446grams. Mesocarp fluid/village: 446 gram×102,400 fruit = 45,670,400 gram/45,670.4 Kg/45.7 Ton (large fruit), 260 gram×102,400 fruit = 26,624,000 gram/26,624 Kg/26.62 Ton (small fruit). 1 year mesocarp fluid production in 3 sample villages is 79.86-137 tons/year.

Keywords: *production, coli fruit, mesocarp*

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INTRODUCTION

Koli or siwalan trees, commonly referred to as lontar trees, are a type of palm that grows in several areas in Indonesia. Koli tree (*Borassus flabellifer*), types from the palm family are coconut, oil palm, sago, rattan, sugar palm, nipa, and lontar. Apart from being known as a food producing plant for human life, this palm plant has enormous benefits because all parts of this plant can be used, namely the leaves, fruit stems and flowers, and also fermented into palm wine or processed into brown sugar (Lina 2018). Utilization of coli fruit plants is also still very limited, both seen from the parts of the plant that can be utilized. Coli fruit ovaries are found in bunches of around 20 grains, round fruit with a diameter of between 15-20 cm with green skin when young and becomes blackish purple when old, each grain has 3-4 flesh which is still easy to taste sweet, texture like agar and watery, covered by a thick and hard shell (Tambunan, 2010).

Coli fruit can only be consumed if it is still young by humans. Coli fruit that has been separated from its skin cannot last long and spoils quickly. Why does coli need to be developed because so far the fruit is abundant and the price is very cheap and not very popular with the public and its nutritional content is also high. Of the many koli trees that produce old koli fruit, they are not widely used by the community but can be used simply as food for semi-ruminant and ruminant livestock, namely pigs, horses, cows and buffalo on Moa Island. Farmers on Moa Island have sufficient knowledge about how to use the results of the koli tree, namely fruit and mesocarp fluid, old fruit is black (falls to the ground) and has orange fibers which contain

mesocarp fluid which can be used as animal feed, as well as views separately about the nutritional value and benefits or impact of providing feed ingredients on livestock growth, but this local knowledge needs to be verified so that it is enriched with knowledge according to experts regarding nutrition, feeding methods and the impact on livestock. This research was conducted to dig deeper into local knowledge of breeders in feeding, as well as perspectives on the nutritional aspects of the origin of cabbage and its use among traditional breeders on Moa Island.

The Moa District area covers an area of 959.68 km, with a population of 14,215 people with an agricultural land area of 330.5 ha, consisting of an area of 163.5 ha of food crops and an area of 167 ha of plantation crops. From the data above, we can see how important fodder is to provide adequate nutrition for livestock on Moa Island. The potential of colli fruit, if used properly, can be used as animal feed which has high economic value and can support livestock activities on Moa Island, Southwest Maluku Regency, but so far research on the use of coli fruit as animal feed is still rare and has never even been carried out.

METHOD

Materials and Tools

- High Resolution Satellite Imagery (CSRT).
- Tally sheet, GPS, Camera, Measuring Rope, Compass, Clinometer/Haga meter.
- List of questions (questioner) and writing tools

The materials

Respondents, standing cabbage, coli fruit and mesocarp fluid.

Procedure

The research was carried out on Moa Island, Southwest Maluku Regency. This study used a survey method. The determination of sample villages was carried out using the Purposive Sampling method (based on the population with the highest number of koli trees). Respondents were taken simple random sampling. Data collection on breeder characteristics was carried out through farmer interviews and direct observation at the research location. Data collection on coli tree vegetation was carried out using a combination of information from the interpretation of sentinel imagery, results of field observations accompanied by the local community (ground cheek) and standing inventory. Field activities begin with observations and then taking coordinate data to be correlated with satellite image maps. Next, the coli stand delineation was carried out using the coordinate data obtained as well as the results of joint observations. Once the location of the coliform plants is known, the area is calculated and then the number of observation samples is determined. In this research, observations were carried out using the line sampling method (Ardiansyah, 2016).

Analysis/measurement of the area of standing koli trees using remote sensing methods using Sentinel Satellite Imagery with band combinations (B8-B4)/ (B8+B4) to determine the Vegetation index. Sources of data are divided into 2 parts, namely primary data, data obtained directly from respondents through interviews and filling out a list of questions and field observations while secondary data obtained from related agencies. Line sampling is taking samples in a line (path) that has been previously determined. On each route, every coli plant found was recorded.

Data analysis

The data obtained was tabulated, then the results were analyzed using descriptive statistical analysis by calculating the production of coli fruit and mesocarp fluid in one production, the area of land spread and the number of koli tree populations.

DISCUSSION RESULT

Respondent Identity

Age and Gender

Age and gender as well as the number of respondents in this study can be seen in Table 1.

Table 1. Age and Gender of Respondents

Age	Amount (n)	Percentage (%)
23-64	30	100
>64	0	0
Total	30	100
Gender	Amount (n)	Percentage (%)
Man	30	100
Woman	0	0
Total	30	100

Data: 2023

The results show that the age of respondents in the research location is dominated by those aged 23-64 years and male with a frequency of 100%. This shows that respondents in this age range have the ability to work well in farming and utilize coli plants as feed. cattle. This is in line with the opinion of Wahid, (2012) in Nainggolan, (2017), namely that 15-64 years is a productive age. In general, a more active or active ability is a younger age in business which will produce maximum production.

Anatomy and Morphology of the Koli tree

The results of measuring the physical components of coli fruit in this study which used 5 coli fruit as samples can be seen in Table 2.

Table 2. Description of the Physical Morphology of the Koli Fruit and the Distribution.

Description fruit coli	Size
Whole fruit	
a. Fruit weight (g)	680.0-2210.0
b. Long (cm)	12-16
c. Diameter (cm)	10-15
d. Petals	6 keping
Mesocarp	
a. Color	Orange
b. Heavy (g)	260-446
Population	
a. Tree height (m)	20-50
b. Tree diameter (cm)	25-65
c. Production land area/plot (m ²)	50 m × 20/1.000 m ² /0,1 Ha
d. Area of production land/line (m ²)	4.000 m ² /0,4 Ha
e. Area of production land/village (m ²)	16.000m ² /1.6 Ha
f. Number of individual koli trees: plot/lane/village	8/32/128 pohon koli

Benefits of Koli Fruit

The use of coli plants is also still very limited, people use coli fruits as drinks, food, food wrappers, household appliances, energy sources (firewood), building materials. This research is supported by Jihad (2012) which states that, in the old siwalan stems it has the characteristics of being woody (lignosus) containing lignin, its hard nature the shape of the stems is round perpendicular to the straight up direction, both seen from the parts of the plant that are used, the type of product produced and the technology applied. Various studies have shown that there are still quite a lot of possibilities for developing parts of the coli plant as raw materials that can be traded as well as a need for the local population, because the coli plant does not only have the potential to be a commodity sweetener, but can be much more than that. Koli tree leaves can produce aesthetic and economic values that can be cultivated for the necessities of life. So far, the use of koli leaves by local residents as a folk craft material is still limited due to a lack of information and training given to them, the crafts being carried out are still traditional, such as making mats, baskets, nyiru, amanisang (fish traps) hats and so on. Young koli fruit can be consumed by humans and the sap from the koli fruit can be processed into a typical traditional drink (sopi) and brown sugar. Old fruit is not widely used. Based on observations during the study, ruminants and semi-ruminants, namely cows, buffaloes, horses and pigs, use mesocarp (fiber) as animal feed. The results of research from Fox, (1996) in Marlistiyati et al, (2016) suggest that overall lontar can be used as firewood, leaves as a material for making matting, as well as for roofs, sap can be processed into liquid sugar, granulated sugar (brown sugar), alcoholic drinks or directly, while the fruit can be eaten directly (young fruit) or can be processed into other food ingredients. Why is it necessary to develop coli fruit because so far the fruit is abundant and the price is very cheap and not very popular with local people, and the nutritional content is also high, and the benefits are varied.

Therefore, through this research, the use of coli fruit can be disseminated so that it becomes more known to the public. From the research results, the koli fruit is never traded or sold, sometimes it is simply ignored and the koli fruit is even left to dry on its own on the koli tree until the koli fruit falls off by itself. Until now there is a lack of breakthroughs to utilize this fruit into innovative food and animal feed products that have high selling prices. Koli fruits are similar to coconuts, smaller and larger in size than palms, the fruit skin is black and at the base of the fruit there are 6 fruit petals. The mesocarp of koli fruit is similar to coconut fruit which has fine and coarse fibers. As it ages, the mesocarp of koli fruit changes color to reddish yellow (orange) and the texture is not as hard as young fruit, while the mesocarp of coconut fruit does not change color. The mesocarp of coli is what resembles the color of the mesocarp of oil palm fruit. The core of the

fruit in cauliflower consists of 1 to 4 seeds, while in coconut and oil palm fruit it only consists of one core. The core of the coli fruit changes when it reaches old age, the clear white flesh, which was previously soft and tough, becomes hard and no longer contains water. This is in accordance with the statement from Eny Indayati et al, (2014) that the mesocarp of palm fruit is similar to coconut fruit with fine and rough fibers, but with increasing age the mesocarp of palm fruit changes color and the texture is not as hard as that of young fruit.

During observations and interviews in the field, the average coliform tree once harvested is 400 per tree with a total production of 2 times production in one year, where one production time produces 20 bunches, in the bunch there are mayang and 1 mayang produces 15 to 20 coli. . The high production of koli fruit is due to the fact that this endemic plant lives and develops according to its habitat even though the land in this area looks barren and dry, even so far coli fruit has not been used by the local community for life and has never even been cultivated so that production is abundant and in this study it was also found that Koli fruit production is much higher compared to the results of research from Marlisyati et al, (2016) which states that in 1 coli tree there are 4 fruit bunches with 12 fruit from each bunch so that when calculated 1 palm tree produces 48 fruit ($4 \times 12 \times 3$) which will be harvested twice a year. Koli fruits that are old and fall from trees are consumed by ruminants and semi-ruminants (cattle, cows, horses and pigs). The part of the coli fruit that is old is fibrous which contains a viscous orange liquid that tastes sweet (mesocarp). Based on field observations, livestock consume sweet fiber, some of the fiber is swallowed and the rest is discarded. According to Kader, (1993) changes in fruits from green to yellow to red (orange) are caused by the breakdown of chlorophyll and the formation of carotenoids. The taste of old koli fruit mesocarp also becomes sweet compared to young mesocarp which has no taste at all, this is due to carbohydrate changes that occur during the fruit ripening and ripening process. In young fruit carbohydrates are still a lot in the form of starch (polysaccharides) so that the taste of the fruit is not sweet.

The results of weighing the average volume of mesocarp fluid in large coliforms were 446 grams and 260 grams for small fruits. The estimated volume of mesocarp fluid for large koli fruit for 1 tree is 178,400 grams or 178.4 kg while for small fruit it is 104,000 grams or 104 kg of mesocarp fluid. From the results above, the volume of mesocarp fluid ranges from 104 to 178 kg per tree, so that in 1 year the production of mesocarp fluid ranges from 208 to 356 kg/tree/year. Based on the results of research from Retno Dewati, (2010) stated that the nutritional composition of the liquid mesocarp (fiber) is as follows: Cellulose 89.2%, Water 5.4%, Carbohydrates 3.1%, Ash 2.3%, Energy 20, 54%.

Production of Fruit and Liquid Mesocarp of Koli Fruit

Interview results show that the average number of cauliflower fruit in one harvest is 20 bunches x 20 pieces = 400 pieces per tree with a total production of 2 times production in 1 year. This result is higher than the results of Tambunan's (2010) research, each koli tree produces 6 to 12 bunches of fruit or around 200 to 300 fruits every year. From the results of calculating the koli fruit at the research location, if multiplied by the number of koli trees from each village used as research sample villages, the production of koli fruit in each village is $400 \times 128 = 51,200$ pieces per village which will be produced twice a year so that the results of the production of koli fruit/village/year is $51,200 \times 2 = 102,400$ fruits.

The average volume of coli fruit mesocarp fluid in large fruits is 446 grams and 260 grams for small fruits. The estimated volume of mesocarp liquid for large koli fruit for 1 village is $446 \text{ grams} \times 102,400 \text{ koli fruit} = 45,670,400 \text{ grams}/45,670.4 \text{ Kg}/45.7 \text{ tons}$, while for small fruit it is $260 \text{ grams} \times 102,400 \text{ koli fruit} = 26,624,000 \text{ gram}/26,624 \text{ Kg}/26.62 \text{ tons}$ of coli fruit mesocarp fluid from 1 village/year. From the results above, the volume of mesocarp liquid from koli fruit ranges between 26.62 – 45.7 tonnes per 1 village/year, so that in 1 year the production of mesocarp liquid from koli fruit from the 3 research sample villages ranges from 79.86 – 137 tonnes/year . The volume of coli fruit mesocarp fluid for each respondent was adjusted according to the number of trees they had

CONCLUSION

1. The area of coli trees per village is 16,000 square meters and the population of coli trees per village is 128 trees.
2. Coli fruit production per village/year of 102,400 to be used as a source of animal feed is estimated from the volume of coli fruit mesocarp fluid ranging from 26.62 – 45.7 tons per village, so that in 1 year the production of coli fruit mesocarp fluid from 3 sample villages ranges between 79.87 – 137 tons/year

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