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INCREASE IN AVERAGE CROP AND LEANNESS OF EUCALYPTUS (EUCALYPTUS PELITA) AT PT ITCI HUTANI MANUNGGAL, KUTAI KARTANEGARA REGENCY

Legowo KAMARUBAYANA[1], Zuhdi YAHYA[2], Hasanuddin[3]

University of 17 Augustus 1945 Samarinda, Faculty of Agriculture

[2] Politeknik Pertanian Negeri Samarinda

[1] Faculty of Agriculture , University of 17 Augustus 1945 Samarinda , Juanda 80 Samarinda Kalimantan Timur, 75123, Indonesia.
[2] Faculty of Agriculture , University of 17 Augustus 1945 Samarinda , Juanda 80 Samarinda Kalimantan Timur, 75123, Indonesia.
[3] Faculty of Agriculture, Politeknik Pertanian Negeri Samarinda , Sungai Keledang,, Kalimantan Timur 75242, Indonesia
Corresponding author: 1. Smith e-mail: legowo68@gmail.com

Abstract. The purpose of this study was to determine the slenderness and current annual increment) both in diameter and height of the area. The expected results of this study can provide information about plant leanness and plant growth in Ekaliptus (Eucalyptus pelita) at PT ITCI Hutani Manunggal Kutai Kartanegara Regency. Also, as a consideration in determining the type of plant that is suitable for or better for growth than plants Ekaliptus (Eucalyptus pelita), both at the planting site used for this research and at other locations.
The sample used in this study was 40 trees in a purposive way. Height measurement tools use the Haglof vertex, while diameter measurement tools use the phi band. The results of measuring the dimensions of 40 Eucalyptus plants at PT. ITCI Manunggal Hutani Kutai Kertanegara Regency shows that the average height is 13.38 m with a coefficient of variation of 16.37%, while the average diameter measurement is 10.04 cm with a coefficient of variation of 24.37%. The average increase in height is 4.48 m, and the average increase in diameter is 3.35 cm. Plant Ekaliptus (Eucalyptus pelita) growth between diameter and height has unstable slenderness
.
Keywords: Eucalyptus, Increment, Diameter, Height. Degree of stability

INTRODUCTION

By looking at natural substances from animals, microbes, marine organisms, and plants, scientists have found a number of medicines that fight disease. These medications may be natural compounds in and of themselves or semisynthetic analogs developed from an active natural component. Moreover, they can be totally manufactured compounds modelled after natural substances. [1]

Eucalyptus spp. is a forest species with the potential to be developed in industrial forest plantations due to its rapid growth (HTI). This variety of forest plants does not have strict needs for its growing environment. This species of Eucalyptus can grow in soil that is shallow, rocky, in a valley, or that is wet and marshy. The soil fertility can range from having few nutrients to having a lot of nutrients. (Anonim 1994),

Eucalyptus invested in its root system to gain access to water [2] Natural substances have also been utilized as direct pesticides. In addition, they serve as a model for the creation of novel insecticides with possible commercial applications. [3]. The establishment of Eucalyptus in mixed forest communities would enhance the ecological function of Eucalyptus plantations [4]

In keeping with the advancement of science and technology, eucalyptus varieties such as the Pelita Eucalyptus are now accessible. So, in a short amount of time, a very promising production value can be reached. (Ciesla et al., 1996). In forestry planning, the diameter, and very important meaning. The study of diameter and height provides information on the growth of eucalyptus plants. Diameter and height arealso related in the inventory and can then be used as materials for work plans.[5]

Although there are numerous plant species, only around 10 percent generate essential or volatile oils, which are combinations of odorous and volatile chemicals [6], The goal of this study is to give the reader the most up-to-date information about the chemical makeup and biological activities of EOs from different Eucalyptus species. This is because EOs from different Eucalyptus species have different bioactivities and are important in different industries.[7].

Concentrated gymnosperms are enormous. The tallest angiosperms near the Pacific coast of the United States are eucalypts (Eucalyptusspp)[8], In forest planning, knowledge of diameter and height is very important. The study of diameter and height provides information on the growth of eucalyptus plants. Diameter and height are also related to inventory activities and can then be used as materials for preparing work plans.

The exploitation of this eucalyptus plant should also pay attention to the principles of sustainability, especially the sustainability of the results. To be able to achieve this goal, information about the growth of eucalyptus plants is very necessary Stems that are too slender as a result of the imbalance between diameter growth and height growth will cause the plant or tree to easily fall when there is heavy rain accompanied by strong winds. In other words, if a forest stand has an unbalanced growth between diameter growth and plant or tree height growth, the stand can be said to be unstable or a problem with tree slenderness.[4]

Forest stands are said to be stable if a balance is reached between height growth and tree diameter growth. The slenderness of the tree is an important factor to determine the level of stand stability (Erma 2018)(Ruchaemi, 1990).The purpose of this study was to determine the increment (average annual increment) and leanness of eucalyptus (Eucalyptus pelita) plants. The results of this study are expected to provide information about tree slenderness and plant growth of eucalyptus (Eucalyptus pelita) and as a consideration in the development of plant species

MATERIALS AND METHODS

Location and Time of Research

This research was conducted in the PT. ITCI Hutani Manunggal Kutai Kertanegara Regency for 3 months, including field orientation, licensing, and data collection, both primary and secondary, as well as writing research reports.

Tools and materials

The tools in this research are machetes, Haglof vertex, Phiband, plastic labels, stationery, and camera/HP. While the material used is a 3-year-old eucalyptus plant (Eucalyptus pelita) as many as 40 trees

Research procedure

The procedure for this research has the following sequence of work:

a. Field orientation
b. Prepare the tools to be used
c. Sampling
   Sampling is done intentionally (purposive)
d. Perform tree marking and numbering
e. Data retrieval
   1. Diameter data collection is carried out at a height of 130 cm above ground level.
   2. Height data retrieval, a tool for measuring height using vertices and measuring the height in question is total height.
   3. The increment referred to in this study is the average annual increment

Data processing

1. Calculating the average value

$$\bar{x} = \frac{\sum x}{n}$$

Information:

$\bar{x}$ = mean value
$\sum x$ = sum of individual values
n = number of samples

2. Calculating the value of standard deviation (SB)

$$SB = \sqrt{\frac{\sum x^2 - \frac{(\sum x)^2}{n}}{n-1}}$$

Information:

SB = standard deviation
$\sum x$ = sum of individual values
$\sum x^2$ = sum of values squared

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3. Coefficientient Of Variation

$$CV = \frac{Sd}{\bar{x}} x100\%$$

Information:

CV = Coefficient of Variation
Sd = Standar of Deviation
$\bar{x}$ = Average (diameter/height)

4. Plant Lean

The leanness (degree of stability) of eucalyptus (Eucalyptus pellita) was calculated using the following formula (Ruchaemi 2002).

KT = ħ/d x 100%

Information:

KT = Stand Stability Degree
d = Average diameter
ħ = Average height

A. Stand Stability Interpretation
To interpret the calculation results:
The degree of stand stability is determined by the size of the slenderness of the tree according to Ruchaemi (2002), which is as follows:
h/d <100 ⟶ stable tree
h/d >100 ⟶ unstable tree

B. Increase in Diameter to Chest High
The increase in diameter to the chest height of eucalyptus (Eucalyptus pellita) is calculated in the following formula (Ruchaemi, 2002)

$$id = \frac{d_t}{t}$$

where:
id = Average annual increase in diameter at chest height (cm/plant/year)
dt = Plant diameter at chest height at the time of measurement (cm)
t = Age of the plant at the time of measurement (years)

C. Increase in Total Plant Height

The increment in the total height of eucalyptus (Eucalyptus pellita) plants was calculated using the following formula (Ruchaemi, 2002).

$$ih = \frac{d_h}{t}$$

where:
ih = Average annual total height increment (m/plant/year)
ht = total plant height at the time of measurement (m)
t = Age of the plant at the time of measurement

RESULTS AND DISCUSSIONS

Measurements were made on plant dimensions, including plant diameter and height for eucalyptus plants. The number of plants measured for eucalyptus was 40 trees. From the measurement results in Appendix 1, it can be seen that the description of the values of the plant dimensions is shown in the following table:

Table 1. Calculation results of mean, standard deviation, coefficient of variation for diameter and height of eucalyptus plants

No.	Variable	N	D - Max	D- Min	Average	SB	CV
1	Height	40	16.8	9.20	13.38	2.19	16.37
2	Diameter	40	14.6	6.00	10.04	2.48	24.73

Table 4. Calculation results of mean, standard deviation, coefficient of variation for diameter increment and height increment on eucalyptus plants

No.	Variable	N	D - Max	D- Min	Average	SB
1	High Increment	40	5.60	3.07	4.46	0.73
2	Increment Diameter	40	4.87	2.00	3.35	0.83

Table 5. Calculation results of the average diameter, height and degree of stability of Eucalyptus plants

No.	Variable	N	D - Max	D- Min	Average	Stand Slenderness
1	Height	40	5.60	3.07	4.46	0.73
2	Diameter	40	4.87	2.00	3.35	0.83

From the calculation of the average height and diameter of Eucalyptus plants, it is known that the variation in the distribution is more uniform than the diameter distribution. This can be seen in the coefficient of variation. The coefficient of high variation is 16.37% while the diameter variation is 24.73%. By paying attention to the coefficient of variation, it can be seen that the variation in height is more uniform than the variation in diameter.

The variation in height, which lies between 10-20%, is moderate, while the diameter has a large variation because it is located between 20-30%, according to [10] opinion. In silvicultural treatment, a value of the coefficient of variation can be used as an indicator.

Eucalyptus plants in the HTI area of PT. IHM is a plant that is 3 years old and is included in the vegetative growth phase. According to [2] , physiologically, plants in the vegetative phase will carry out a process of adaptation and acclimatization to the environment of the planting area. For Eucalyptus to grow in a good, healthy, and even way until the end of the cycle, there are a few technical steps that need to be taken during the vegetative phase. These steps are called "plant maintenance.

Rip Height and Increment Diameter

This phenomenon greatly affects the increment in height and diameter of the Eucalyptus plant. Based on the calculation of the annual increment of Eucalyptus plants in IHM from 40 plants, it is known that

The average height increment is

4.46 m and a standard deviation of 0.73 m, while the average diameter increment is 3.35 cm with a standard deviation of 0.83 cm. For more details, it can be seen in Table 4.

Responding to the phenomenon mentioned above, eucalyptus has faster growth, although this growth in the future cannot be predicted.

Stand Stability of Eucalyptus

The results of the calculation of the slenderness of Eucalyptus (Eucalyptus pellita) trees can be seen in Table 5. The slenderness of the tree is 133.27%. Ruchaemi (2002) says that the size of slenderness can be used to tell that Eucalyptus plants have unstable leanness.

CONCLUSIONS

1. The average plant height of Eucalyptus (Eucalyptus pellita) is 13.38 m with a coefficient of variation of 16.37%, while the average diameter is 10.04 cm with a coefficient of variation of 24.73%.

2. The average increase in height of Eucalyptus (Eucalyptus pellita) is 4.48 m with a standard deviation of 0.73 m, while the average increase in diameter is 3.35 cm with a standard deviation of 0.83 cm.

3. Eucalyptus (Eucalyptus pellita) has unstable slenderness with a degree of stability of 133.27%.

Author Contributions:

A. Legowo Kamarubayana : Conceived, and designed the analysis, Collected the data
B. Zuhdi Yahya : Collected the data and analysis
C. Hasanuddin : Contributed data or analysis tools, Performed the analysis

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Conflicts of Interest

The authors disclose that there are no competing interests.

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