

## Auxin hormone analysis for clones of immaturity rubber plant

<sup>1</sup>Try Koryati , <sup>2</sup>Luthfi A.M. Siregar

<sup>1</sup>Agricultural Faculty, Amir Hamzah University, Medan 20337, Indonesia;

<sup>2</sup>Department of Agro-ecology, North Sumatra University, Medan 20155, Indonesia.

Corresponding Author : atikmarno@yahoo.co.id

**Abstract.** One of the problems of immature rubber plants are non-productive period is too long which is about 5-6 years old. Various efforts have been made to speed up non-productive period, including the application of exogenous growth regulators. This is related to biological natural hormones found in plant during immature rubber. One of the hormones that affects the auxin hormone. This study aims to analyze content auxin hormone found in some clones and plant age during immature rubber. This research was conducted descriptive / review directly to the field by taking leaf samples at the clones PB 260, PB 340 and RRIM 712 which have been determined. To determine the levels of hormones contained in rubber leaf, leaf samples were analyzed at the Research Center for Biology Indonesian Institute of Sciences in Bogor. Observation auxin hormone levels. The results showed that the type clones and different plant age have different content auxin. The highest content of auxin there at the age of 2 years is the plant on clones PB 260 (116.5 ppm) and RRIM 712 (114.0 ppm).

**Key words:** Immature rubber plants, clones and auxin hormone

### Introduction

Rubber is an export commodity that is able to contribute in the efforts to improve Indonesia's foreign exchange. Indonesian rubber exports over the last 20 years continue to show an increase of 1.0 million tons in 1985 to 1.3 million tons in 1995 and 1.9 million tons in 2004 (Anwar, 2006). Increased production of rubber plant expansion and for rejuvenation is still considered as closely related to capital investment. In order to fulfill the will of investors who want to get the money back that he planted as soon as possible, attempts were made to shorten the period of planting non-productive or immature. Because the rubber was still immature to reach about 5-6 years (Pakianathan, 1975, and Anwar, 2006) and when compared to other plantation crops such as oil palm and cocoa only non-productive age 2.5 to 3.0 years, the life long non-productive rubber (Adiwiganda et al., 1995).

The length of non-productive (immature) is very closely related to the size of the girth. Because the real girth to do with the initial volume of latex flow, total volume of latex, or plugging index (IP). This is an important criterion girth instructions on tapping rubber trees (Hamzah and Gomez, 1982). Standard provisions in rubber tapping (exploitation) is 70% in the initial location of the area has reached a mature plant produces tapping or by size criteria girth measured at 45 cm and a height of 130 cm above the grafting linkage (Paardekooper, 1989 and Anwar, 2006)

In rubber growing substance use can affect the cambium, because rubber is a dicotyledonous plant that has a file with the xylem and phloem vessels open (Barlow, 1978). Wilson (1970) states that the cambium activity is also dependent on factors such as substance in growth, and subsequent. Fahn (1991) states reaktivitasi cambium stimulation

for a given combination of growth substances. Aloni (1987; 2007) and Fahn (1991) states that there are two groups of agents to grow the gibberellins and auxin, which is shown to affect the activities of the cambium. Aloni (1987) and Wilson (1970), that the provision of direct auxin in stem diameter can increase the size of woody plants. Increase to the maximum extent appropriate with increasing doses given auxin

Based on the statement above about the study authors wanted to examine the content of a natural hormone found in some types of rubber clones and plant age on immature plants , so that the application can be determined exogenously how appropriate concentrations given for accelerate girth increment so that plants tapped rubber faster.

This study aims to assess the auxin hormone content contained in multiple clones and rubber plant age during immature plants. The results of this research can be used as an input for the rubber plantation rubber plants have not produced.

### **Materials and Methods**

This research is diskriptip / direct observation in the field and sampling sites PTPN III Kebun Bangun Siantar. Implementation began in February 2011.

The plant material used in this study is a clone PB 260 age 1 years, 2 years and 3 years, PB 340 3-years and RRIM 712 2 year, ice cubes, chemicals such as methanol, sulfuric acid, acetonitrile.

Equipment to be used is the staircase, eigrek, place plastic samples, ice box, and other lab equipment such as digital scales, blenders, filter paper, HPLC equipment, ultra violet detector, pipettes, tissue paper and stationery required.

The research was carried out in descriptive / review directly to the field by taking leaf samples that have been determined and further data will be analyzed to determine the content of the hormone auxin contained in rubber during immature.

Sample data is as follows:

1. A 1 = clone PB 260 = 1 years
2. A 2 = Clone PB 260 = 2 years
3. A3 = Clone PB 260 = 3 years
4. A4 = Clone PB 340 = 3 years
5. A5 = Clone RRIM 712 = 2 years

Clones of each sample so that the sample taken 2 totaling 10 samples.

### **Implementation research**

Looking for plants sampled in the field in accordance with the clones and the age of the plant to be studied. Having plants in the sample can then wrap the girth is measured at a height of 130 cm above the grafting engagement and taken the young leaves emerging, namely the leaf into three . Then the leaves are incorporated into plastics that have been labeled according to the samples taken and subsequently incorporated into the icebox that leaves the plant remains in a fresh state. Subsequently the leaves were taken to the laboratory for analysis of auxin hormones contained in the rubber plant.

Analysis is done by bringing the leaf samples in a fresh state (icebox) to the Research Center for Biology Indonesian Institute of Sciences in Bogor to find out how many of hormones contained in the leaves of the rubber plant.

## Results and Discussion

Observational data the average age of the plant auxin analysis contained in Table 1. Of Table 1 shows that the highest auxin contained on plant age 2 years compared with plant age 1 and 3 years on rubber clones PB 260, PB 340 and RRIM 712 during immature. Contained the highest content of auxin in (A2), followed by (A5) ..

To measure girth plant is also very influential, in which the largest girth size on plant age 3 years in clones PB 260 (41 cm), followed by clones PB 340 3 years (39 cm) compared with plant age 2 and 1 year during immature (Table 1).

Average observational data analysis auxin and girth size in clone of plants contained in Table 1. Of Table 1 shows that the highest plant clones produce auxin is clone PB 260 (A2) compared to clone RRIM 712 (A5). For the largest girth size is also found in clone PB 260 (A3) compared with clones PB 340 (A4) and followed by the clone RRIM 712 (A5). For more details can be seen in Figure 1 and 2.

From Figure 1 shows that the types of clones, plant age and girth size were observed apparently contained different auxin kandunga chewing on the leaves during TBM. Biggest girth size found in clone PB 260 3-year-old (A3) 41 cm, followed Clones PB 340 3 years (A4) 39 cm compared with clones PB 260 and 2 years (A2) 24 cm,. clone RRIM 712 2 years (A5) clone PB 22 cm and 260 age 1 year (A1) .10,75 cm

Of Figure 2. seen that the highest auxin content of the analysis contained in clone PB 260 2 years (A2) 116.5 ppm, followed clone RRIM 712 2 years (A5) 114.0 ppm compared with clones PB 260 3 years (A3) 108, 5 ppm, clone PB 340 3 years (A4) 93.0 ppm and clone PB 260 age 1 year (A1) 78.5 ppm

Table 1. The average of auxin content and girth for clones and rubber plant of different age

No	Type	Girth (cm)	$\bar{x}$	Auxin (ppm)	$\bar{x}$
1.	A1= Clone PB 260 1 years	10,75	$\pm 0,25$	78,5	$\pm 0,5$
2	A2 = Klon PB 260 2 years	24	$\pm 0$	116,5	$\pm 0,5$
3	A3 = Klon PB 260 3 years	41	$\pm 1$	108,5	$\pm 2,5$
4	A4 = Klon PB 340 3 years	39	$\pm 0$	93, 0	$\pm 1$
5	A5 = Klon RRIM 712 2 years	22	$\pm 2$	114,0	$\pm 1$

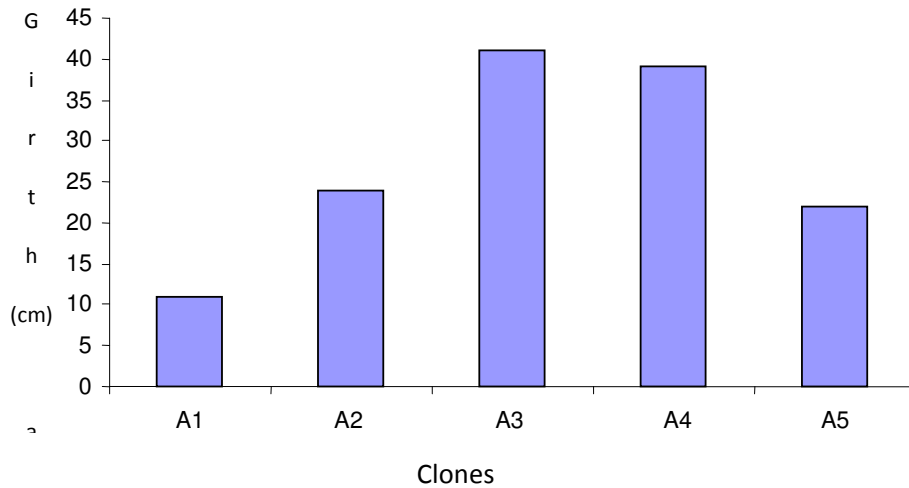


Figure 1. The average girth size for clones and rubber plant of different age

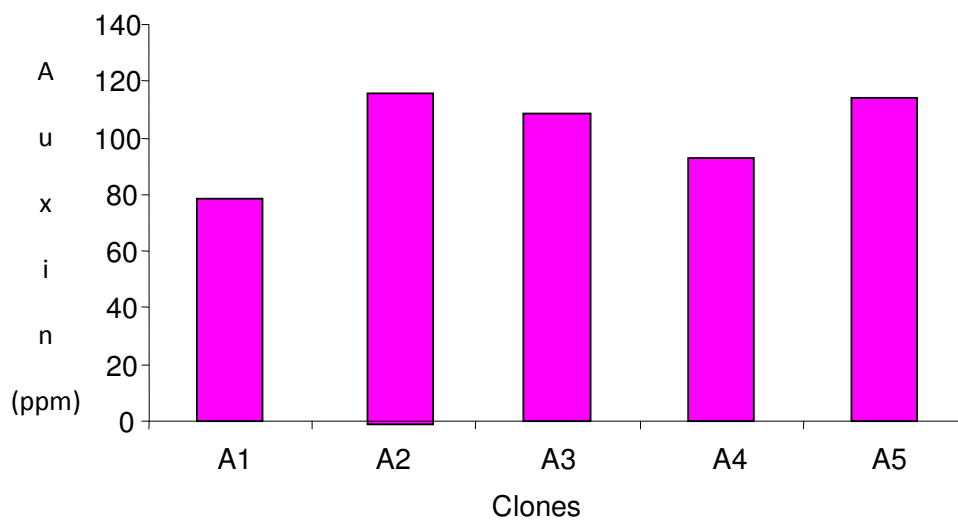


Figure 2. The average of auxin content for clones and rubber plant of different age

### Conclusions

From the analysis of the hormone auxin content in leaves of rubber clones PB 260, PB 340 and RRIM 712 plants with different age produces a different amount of auxin content. Auxin content of plants is highest at the age of 2 years, which is the clone RRIM 260 and PB. By knowing the amount of hormones auxin naturally (endogenous) can be used as guidelines for the application of exogenous growth regulators and can be considered how the right

dosage used and the age of the plant growth regulators applied the exact number who want to be tested more quickly tapped TBM future.

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