

Sucrose, Inorganic Phosphate and Latex Thiol in Clones PB260 and BPM1.doc

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Sucrose, Inorganic Phosphate and Latex Thiol in Clones PB260 and BPM1

Purwaningrum.Y¹, Napitupulu. JA.², Hanum.C³, Siregar. THS.⁴

Abstract

The content of various metabolites (sucrose, inorganic phosphate, thiol) in the latex can be used as a guide in order to achieve optimal crop production. This study aims to determine the content of metabolites and production in clones BPM1 and PB260. Research conducted by PT. PTPN III (Persero), at March - July 2014 in the area of plant clones PB260 and BPM1 planting year 1999 (plant age 15 years). The treatments tested as many as 2 clones that clones representing low metabolism (BPM1) and clones that represent a high metabolism (PB26) with a system of tapping 1/2Sd3. This study was prepared using a randomized block design (RAK). Each repeated three times by using ten trees each unit of experiment results of correlation analysis showed that sucrose with inorganic phosphate correlate quite real. Rubber production ($g^{-1}t^{-1}$), the highest in January at BPM1 clones is equal to 29.70 ($g^{-1}t^{-1}$) and the clone PB260 23.25 ($g^{-1}t^{-1}$) and lowest in April that is equal to 9.40 ($g^{-1}t^{-1}$) in clones BPM1 and 10.08 ($g^{-1}t^{-1}$) on the clone PB260. Required further observations over a longer time to determine the production of rubber on each con BPM1 and PB260.

Keywords: Hevea brasiliensis, clone PB260, BPM1, sucrose, inorganic phosphate, thiol

Introduction

Rubber (*Hevea brasiliensis*) is one of the agricultural commodities that can contribute to state revenues from non-oil sector. In addition, the rubber is also a source of income for many farmers live. Indonesian rubber production increased from 2.990 million tons in 2011 to 3.040 million tons in 2012 (Ditjenbun, 2012).

Character physiology, anatomy and histology become one of the observation variables in seeing the production. Some physiological characters associated with the production is sucrose levels, the levels of Pi and thiol levels (Milford *et al.*, 1969). The existence of differences in the physiology of latex and anatomical characteristics of different types of clones will facilitate the selection of clones character (Jacob *et al.*, 1989). Based on these results, it is necessary to study the content of various metabolites on BPM1 clones and clones PB260.

Materials and methods

Research conducted by PT. PTPN III (Persero) in the area of plant clones PB260 and BPM1 planting year 1999 (plant age 15 years) located in Deli Serdang - Sumatra with a height of 25 m above sea level and type Ultisol. The study lasted for four months (March - July 2014). The study is based on randomized block design (RBD) with a spacing of 2.5 x 5 m (early population of each clone 800 t ha⁻¹). Clones were used according to the treatment that represents the metabolic rate of metabolism high latex (PB 260), and low metabolism (BPM1). Each treatment was repeated three times using ten trees each experimental unit. Parameters

¹ Mahasiswa Pascasarjana USU

² Staf Pengajar USU (Promotor)

³ Staf Pengajar USU (Co Promotor)

⁴ Pembimbing Puslit Karet Medan (Co Promotor)

1 observed in this study include girth, thick skin, plant productivity ($\text{g}^{-1}\text{t}^{-1}\text{t}$) and plant physiological diagnosis Latex (concentration of sucrose, inorganic phosphate and thiol).

Results and discussions

1. Parameter Physiology

The system exploits the physiological pressure on plants, 1 plant physiological parameters through observation DL system is intended to determine the effect of exploitation on the health condition of plants and susceptibility to Dry Tapping Grooves.

Table 1. Results of the analysis on the DL each clone BPM1 and PB260

Clones	Tapping System	Sucrose	Fa	Tiol
	 mM		
BPM1	S/2d3	11.02 - 20.87	9.08 - 10.17	0.34 - 0.50
PB260	S/2d3	19.20 - 23.48	6.83 - 7.92	0.56 - 0.59

Source: Results of analysis of Sungai Putih Research Center in 2014.

Sucrose is the main ingredient in the formation of latex. Based on the observation of latex sucrose content in clones BPM1 ranged from 11:02 - 20.87 mM, whereas sucrose levels in clones PB260 latex ranges from 19.0 to 23.48. Sucrose levels in clones PB260 clone BPM higher than 1, because the clone PB260 known high metabolic *Quick Starter (QS)* Sumarmadji *et al* (2006). Stating that clones with high metabolism describe the process of forming poliisoprene (latex) is faster. *Slow Starter* clones (*SS*) describes the rate of formation poliisoprene (latex) of the basic ingredients of photosynthesis of carbohydrates in the form of sucrose is slow to moderate.

It Kuswanhadi *et al.* (2009) same opinion, stating that the low levels of sucrose showed that 1 low metabolism, whereas high levels indicate a high metabolism. Kuswanhandi *et al.* (2009) stated that high levels of Fa indicating high metabolic activity and vice versa, crop production is generally higher with higher levels of Fa in latex. According to Traore *et al.*, (2011), Fa maximum levels for healthy plant is 25 mM, when Fa levels exceed the threshold then it indicates a plant's response to stress or disease. The results showed that the levels of each clone Fa 1 is still below the threshold of clones BPM1 range of 9.08 - 10.17 mM and PB260 19.20 - 23.48 mM.

Thiol levels is an important indication of the rubber plant associated with the incidence of brownt bast (BB) (Rajagopal *et al.*, 2004). The higher the intensity of exploitation, the lower levels of the thiol (Krishnakumar *et al.*, 2003). The results showed generally low thiol levels from 0.35 - 0.50 mM in BPM1 clones and clone PB260 at 0.56 - 0.59 mM (Table 1).

2. Plant productivity

Based on observations during the four months (March - July 2014) note that the clones BPM1 highest production was obtained in January (29.70 ($\text{g}^{-1}\text{t}^{-1}$) while the lowest production in April at 9.40 ($\text{g}^{-1}\text{t}^{-1}$). whereas in clones PB260 highest production was obtained in January (23.25 ($\text{g}^{-1}\text{t}^{-1}$), the lowest production in April at 10.08 ($\text{g}^{-1}\text{t}^{-1}$) . (Table 2).

Table 2. Production of rubber ($\text{g}^{-1}\text{t}^{-1}$) on each of the Clones BPM1 and PB260

Clones	Month	Rubber Production ($\text{g}^{-1}\text{t}^{-1}$)
BPM1	January	29.70
	February	24.30
	March	13.40
	April	9.40
	May	11.80
Average		15.04
PB260	January	23.25
	February	17.77
	March	10.80
	April	10.08
	May	12.04
Average		14.79

Source: PTPN 3 Sungai Putih 2014

Low rainfall causes tranloksi nutrients required for the growth of lower leaves and vice versa. Along with declining rainfall then leaves will experience hair loss (Siregar 2001). In April of low rainfall conditions in the natural canopy leaf fall period so that production in April decreased both in clones BPM1 and PB260. Period of leaf fall in rubber trees in North Sumatra generally occurs from February to March or April (BPP Tanjung Morawa, 2001). In general, in January, production was higher than in April. Increased production of rubber in January caused naturally as improving the condition of the canopy after leaf fall period so that the crown is in the condition of the aging period, the leaves of the plant will increase production (Table 2).

1 **Sucrose content of inorganic phosphate in conjunction with clone PB260 and BPM1.** Results of regression analysis-correlation (R^2) between the levels of sucrose, the inorganic phosphate levels are respectively 0.54 on BPM1 dan clone PB260 0.41.

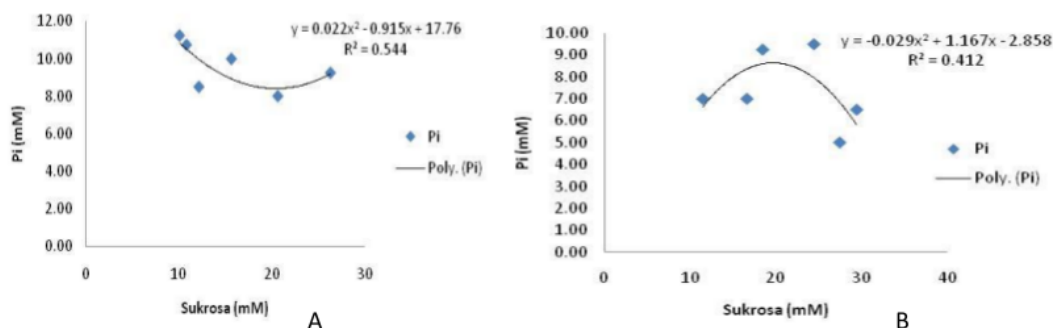


Figure 1 . A. Relationship Sucrose (mM) with inorganic phosphate (mM) in clones BPM1
B. Relationship Sucrose (mM) with inorganic phosphate (mM) in clones PB260

1 The relationship between the levels of sucrose and inorganic phosphate levels closely. In normal conditions of exploitation intensity, the higher the sucrose content of the inorganic phosphate content of the rubber will be higher to some extent. But if it continues to occur increased levels of inorganic phosphate decreased levels of sucrose in the rubber. The relationship between levels of sucrose to levels of inorganic phosphate in the form of clone PB260 quadratic equation, which means that increasing the sucrose content of the inorganic phosphate levels lower. Similarly, levels of inorganic phosphate on BPM1 clones showed a close relationship with sucrose produced.

Conclusions and Recommendations

From the observation during the four months of the study it can be concluded that sucrose with inorganic phosphate correlate quite real. Rubber production ($g^{-1}t^{-1}$), the highest in January at BPM1 clones is equal to $29.70 (g^{-1}t^{-1})$ and the clone PB260 $23.25 (g^{-1}t^{-1})$ and lowest in April that is equal to $9.40 (g^{-1}t^{-1})$ in clones BPM1 and $10.08 (g^{-1}t^{-1})$ on the clone PB260. Required further observations over a longer time to determine the production of rubber on each con BPM1 and PB260.

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