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TABLE OF CONTENT

COVER PAGE		
TITLE PAGE		
STATEMENT OF DISCLAIMER		
CONTENTS		
BIO SCIENCE		
1	Density Test of Sembung Rambat (<i>Mikania micrantha</i>) Leaf Extract to <i>Crocidolomia</i> Immature Zett in the Laboratory. <i>Aldy Waridha</i>	1 - 7
2	The Field Study of Pisang Barangan Resistance to Fusarium Wilt by Using Arbuscular Mycorrhizal Fungi and Brassicaceae. <i>Suswati, Asmah Indrawati, Rahmasari Siregar</i>	8 - 12
3	The potential of <i>Jatropha curcas</i> seed crude extract in protecting rice grain stored in woven plastic bag against <i>Sitophilus zeamais</i> Motschulsky. <i>Asmanizar, A. Djamin, A.R. Idris</i>	13 - 17
4	Character Analysis of Lodging Some Genotype of Wheat in Karo Highland North Sumatra. <i>Dafni Mawar Tarigan, Sri Utami</i>	18 - 22
5	Comparative Clinical Efficacy Between Electro Desiccation with Curettage and Apply of 30% Phenol Solution in Treatment of Common Warts. <i>Dina Arwina Dalimunthe, Roswinda Siregar, Chairiyah Tanjung</i>	23 - 27
6	Study of Thermophilic Cellulolytic Bacterium and <i>Trichoderma harzianum</i> Fungi Isolates to the Quality of Compost from Various Balance of Paddy Hay (<i>Oryza sativa</i>) and Materials Beans. <i>Dini Mufriah and Rini Sulistiani</i>	28 - 31
7	Epidemiology of Stunting (A Review of Stunting Studies in North Sumatera). <i>Donal Nababan, Vera Chitra Dewi Saragih</i>	32 - 37
8	The Influence of Beliefs and Need of the Community of Girsang Sipangan Bolon Subdistrict on Utilization of Parapat District General Hospital. <i>Rosa Zorayatamin Jumaril</i>	38 - 44
9	Residual Effect of Organic Fertilizer and Addition Anorganik Fertilizer to Physical Characteristics of Soil at Rainfed Wetland. <i>Elli Afrida, Abdul Rauf, Hamidah Hanum, Didik Harnowo</i>	45 - 48
10	Warrow Mesenchymal Stem Cell (MMSC) Transplantation for the Improvement of Reproductive Function in Rat Testis Degeneration. <i>Erma Safitri, Suzanita Utama, Thomas V. Widiyatno</i>	49 - 54
11	Environmental Assessment Rice Cultivation in Organic and Conventional in Deli Serdang, North Sumatra. <i>Ernitha Panjaitan, Didik Indradewa, Edhi Martono, Junun Samsudin</i>	55 - 59
12	The Effect of Giving Mixed of White Rice and Purple Cassava on Body Weight Change. <i>Evawany Aritonang, Evi Naria, Ainun Rohana</i>	60 - 64
13	Model of Sugar Industrial Waste Management Based on Cleaner Production (Case Study: Deli Serdang Plantation and Sugar Mill). <i>Siti Mardiana, Retno Widhiastuti, Eugman Erningpraja</i>	65 - 70
14	The Soil Characteristic Under Palm Oil which Infected <i>Ganoderma</i> . <i>Hamidah Hanum, Lisawati, Ahmad Rafiqi Tantawi</i>	71 - 74
15	Response the Growth of Paddy Local Ramos Due to Irradiasi Gamma Rays in the Sandbed. <i>Sri Utami and Rosmayati</i>	75 - 77
16	The Growth and Yield of Two Soybean Varieties with Two Cropping Systems Under 16 Years Old Oil Palm Trees. <i>Lisa Mawarni, T. Chairun Nisa, J.A. Napitupulu, Karyadi</i>	78 - 80
17	The Effect of Buas Buas (<i>Premna pubescens</i> Blumue.) Leaves Extract to The Red Blood Cell Total and Kidney Histology Description of White White rat (<i>White rattus norvegicus</i> L.). <i>Martina Restuati, Syafruddin Ilyas, Salomo Hutahaean, Herbert Spohatar</i>	81 - 84

POSTER

42	Production Technology of Forest Honey Sialang Tree Generated by <i>Apis dorsata</i> Bees as Potential a Local Wisdom People Nearby the Forest of Riau Province. <i>Hapsah, Geomawati, Nazaruddin</i>	312 - 315
43	Screening and Tolerance of Rice Gogo Drought Stress. <i>Mhd. Yusuf Dibisono and Fauzi Balatif</i>	316 - 322
44	Effect of Yaramila NPK Fertilizer and Liquid Supplement Indogreen to Growth and Production of Sweet Corn (<i>Zea mays saccharata</i> , Sturt.). <i>Lanna Reni Gustianty</i>	323 - 330

48	Spencer Competency-Based Performance Appraisal Design on the Special Hospital Around Medan City. Gerry Silaban, Arfah Mardiana Lubis, Umi Salmah	198 - 203
49	Correlation Between Child-Pugh Score and Portal Hypertensive Gastropathy in Liver Cirrhotic Patients. Faisal Parlindungan, Mabel Sihombing	204 - 209
49	Construction of <i>Bacillus subtilis</i> Spizizenii W23 Mutant Transposon for Biohydrogen Production. Mariana Wahjudi, Margareth Sidarta, Yusnita Liasari, Xavier Daniel	210 - 215
49	Usefulness of Reticulocyte Hemoglobin Equivalent in Management of Regular Hemodialysis Patients with Iron Deficiency Anemia. Naomi Niari Dalimunthe, Abdurrahim Rasyid Lubis	216 - 221
49	Influence of the Body Image on Eating Behavior Nutritional and Status of Female Teenagers at SMAN 1 Medan. Diana	222 - 226
49	The Effect of Ethanollic Extract of Bangunbangun (<i>Plectranthus amboinicus</i> Lour) Leaf on Hemoglobine, Size And Liver Histology of White Rats With Antigen SRBC. Melba Silitonga, Syafruddin Ilyas, Salomo Hutahaean, Herbert Sipahutar	227 - 231
49	Biodiversity and Distribution Lichenes at the Corticoleus of Mahoni (<i>Swietenia macrophylla</i>) as Walke in Field on Medan. Ashar Hasairin, Nursahara Pasaribu, Dindar I. Sadirman, Retno Widhiastuti	232 - 237
47	Effect of Exogenous Ascorbic Acid on Morphological Characteristic of Some Varieties of Rice to Safinity Stress in Paluh Merbau, Deli Serdang District, North Sumatra, Indonesia. Wan Arfiani Barus, Abdul Rauf, B. Sengli J. Damanik and Rosmayati	238 - 241
49	Study of Sea Water Intrusion in Ground Water Aquifers in the District of Medan Belawan and Medan Labuhan. Delima Panjaitan, Johannes Tarigan, Abdul Rauf, Esther Sorta Mauli Nababan	242 - 247
49	Deep Tropical Agricultural Cities in the Sumatran Humid Tropics. Mohd Peter Davis, N. Tuganbrun	248 - 252
49	Diabetes and Vascular Diseases Journey into the Riddle of Antioxidants by Targeting NADPH Oxidase. Piruthivi Sukumar	253 - 257
49	Study on Calcium Phosphate (Ca:P) and Growth Performance in Tilapia (<i>Oreochromis mossambicus</i>). N. Eriyusni	258 - 262
49	Use of Bee-Honey as Topical Antiviral on Herpes Simplex. R. Heru Prasetyo	263 - 267
49	Growth Responses and Yield of two Malaysian Rice cultivars by Paclobutrazol (PBZ) treatment. Bambang Surya Adji Syahputra, Uma Rani Sinniah, Mohd Razl Ismail	268 - 274
49	Analysis of Protein Content - Based Feed Cassapro. Indrawaty Sitepu	275 - 270
49	Potential of Phosphate Fungi Solvent Sourced Andisol from Sinabung Eruption collected to Improving P-Available on Some Resources Fosfat and Andisol Soil. Mariani Sembiring, Deni Elfiati, T.Sabrina	271 - 274
49	The Response of Rubber Plant Clone to Iaa Hormone and Kinetin for to Shorten the Immaturity Period. Try Koryati, J.A. Napitupulu, Luthfi A.M. Siregar, T. Chairun Nisa	275 - 279
47	Isolation and Identification of Cellulolytic Bacteria Degrading As Dekompuser Components of Organic. Eri Samah, Jamsari, Wizna, Eti Farda Husin	280 - 287
49	Improved Water Use Efficiency, And Quality of Tomato Fruit by Operation of Partial Root Zone Drying. M. Idris	288 - 294
49	Land Use in the Catchment Area of Lake Toba Based on Agroecological Zones. Muzali, Zulkifli Nasution, Rahmawaty	295 - 298
49	Study Income of lift Net Fishermen in Kenyamukan Beach of South Sengata District of East Kutai Regency. Rosdianto	299 - 305
49	Modification Effect of Lighting and IBA Concentration on the Growth <i>Chrysanthemum (Dendranthema Grandiflora</i> Tzelev Syn) by In -Vitro. Nurhayati, Siti Fudila	306 - 311

18	The Effectiveness of Detritus Balls on Cockle (<i>Anadara granosa</i>) Growth. Mohd Faizil Shukhaimi bin Ramli, Mohd Nasir bin Saadon, Mohd Kushairi bin Mohd Rajaf, Ainil Hawa bt Abd Hamid, Faiza Riza bin Abu Hassan	85 - 92
19	Application Extract of Sweet Potato (<i>Ipomoea batatas</i> L.) and BAP on the Growth of Stem Plantlet on Chrysanthemum Cuttings (<i>Dendranthema grandiflora</i> Tzelev Syn) on Media MS in vitro. Murni Sari Rahayu	93 - 95
20	Balanced Diet Among Rural Students: Do Gender Matter. Noorashid Bin Din	96 - 100
21	Problem Solving on Rabbit Feed Cost and Cacao Plantation in North Sumatera Province by Utilizing Cacao Waste as a Substitution on Rice Bran for Rabbit Ration. Nurainah Glinting, Yunika, Magdalena	101 - 104
22	Monitoring <i>Mycuspersicae</i> (Sulzer) on Potatoes Intercropping inKaro Highland. Lamris Sidauruk,Darma Bakti, RetnaAstuti Kuswardani	105 - 109
23	A Contribution of Medicinal Plant Resources of Kampung Bukit Sapi: A Case Study of Lembah Lenggong, World Heritage Site. Radiyah Ahmad, Siti HajarAbd Aziz, Zuraini Zakaria	110 - 114
24	Growth Response of Sweet Corn (<i>zea mays l. Saccharata</i>) Granting of Organic Fertilizer and Inorganic Fertilizers. Rahmi Dwi Handayani Rambe	114 - 119
25	Potential Use of <i>Nephrolepisbiserrataas</i> Cover Crop Under Mature Oil Palm Plantation. Mira Ariyand, SudirmanYahya, KukuhMurtalaksono, Suwarto, Hasril H. Siregar	120 - 123
26	The Potency of <i>Asystasia gangetica</i> (L.) T. Anderson as Cover Crop Under Mature Oil Palm Plantation. Yenni Asbur, Sudirman Yahya, Kukuh Murtalaksono, Sudradjat, Raj S. Sartata	124 - 128
27	Stressors Faced by Students Upon the Academic Stage of Medical Course. Rosyadi Aziz Rahmat, Retno Widowati Soebaryo, Indah Suci Widyahening	129 - 133
28	Application of Fertilizer and Growing Media on Plant Gelugur Acid (<i>Garcinia arowicida</i>). Ruth Riah Ate Tarigan and Marahadl Siregar	134 - 137
29	Amelioration of Volcano Sand, Zeolite and Sea Water on Growth of Two Rice Varieties at Toba Highland Peat. Sarifuddin, Zulkifli Nasution, A. Rauf, B. Mulyanto	142 - 145
30	Ethnobotanical Properties of the Shoot and Fruit of <i>Ficus hispida</i> and its Indigenous Use Amongst the Local Community in Lembah Lenggong, Hulu Perak. Siti Hajar Abd Aziz, Zuraini Zakaria	146 - 149
31	Utilization of Papaya Fruit Peel on Protein Efficiency Ratio and Net Protein Utilization of Quail. Sri Setyaningrum, Dini Julia Sari Siregar	150 - 152
32	Diversity of Entomopathogenic Fungi on Vegetables Crops Land Berastagi. Sularno	153 - 157
33	Peroxidase Enzyme Activities in Pisang Kepok Seedling Inoculated With Arbuscular Mycorrhizal Fungi (AMF) Glomus Type-I. Suswati, Asmah Indrawati, Friadi	158 - 163
34	Identification Endophytic Fungi of Rubber (<i>Hevea brasilliensis</i> Muell.Arg). Syamsulfi	164 - 173
35	Utilization of Fish Waste of Gabus Pasir in Effort to Producing The Economical Ducks Duck. T. Vidiana Sari, Tri Hesti W., Armyrn H. Daulay, Hasnudi, Laras H	174 - 177
36	Structure and Composition of Plant Agroforestry Toba Lake Catchment Area Tigaras Village Simalungun District. Tioner Purba	178 - 181
37	Sucrose, Inorganic Phosphate and Latex Thiol in Clones PB 260 and BPM 1. Yayuk Purwaningrum, JA.Napitupulu, Chairani Hanum, and THS. Siregar	182 - 184
38	Comparative Advantage of Small Ruminant Farming in Palm oil Plantation in Deli Serdang Regency. Sarim Sembiring	185 - 191
39	Comparisons of Biochar Properties from Rice Hull and Sugarcane Waste. Zemriyetti, Sri Kamila, Syarifa Mayly	192 - 197

Sucrose, Inorganic Phosphate and Latex Thiol in Clones PB 260 and BPM 1

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Abstract. The content of various metabolites (sucrose, inorganic phosphate, thiol) in the latex can be used as a guide in order to achieve optimum crop production. This study aims to determine the metabolite content and production in clones BPM 1 and PB 260. Research conducted by PT. Plantation Nusantara III (Persero). In the area of plant clone PB260 and BPM1 planting year 1999 (plant age 15 years). This study was prepared using t - test, and repeated three times using ten trees of each experimental unit. Results of correlation analysis showed that sucrose with inorganic phosphate correlate quite real. Rubber production ($g^{-1}t^{-1}$) is the highest in January at BPM1 clones is equal 29.70 ($g^{-1}t^{-1}$) and the clone PB260 23.20 ($g^{-1}t^{-1}$) and the lowest in April that is equal to 9.40 ($g^{-1}t^{-1}$) in clones BPM1 and 10.08 ($g^{-1}t^{-1}$) in clones PB260. Required further observations over a longer period of time to determine the production of rubber on each kon BPM1 and PB260.

Keywords: *Hevea brasiliensis*, clone PB260, BPM 1, sucrose, inorganic phosphate, thiol.

Introduction

Rubber (*Hevea brasiliensis*) is one of the agricultural commodities that can contribute to non-revenue 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 and anatomy into one variable observation in view of the production. Some physiological characters associated with the production is the concentration of sucrose, the levels of Pi and thiol levels. (Milford *et al.*, 1969). The big difference in the characteristics of physiology and anatomy of latex clones, is one in considering the proper exploitation of the system to increase the production of optimal (Sumarmadji, 2000). This study aims to determine the metabolite content and production in clones BPM1 and PB260. Based on these results, it is necessary to study on the content of various metabolites on BPM1 clones and clones PB260.

Materials and Methods

Research conducted by PT. Plantation Nusantara 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 of Ultisol. The study lasted for four months (March - June 2014). The treatments were tested by 2 clones are clones that represent a low metabolism (BPM1) and clones that represent a high metabolism (PB26) with a system of tapping I / 2Sd3. This study was prepared using t - test. Each repeated three times using ten trees of each experimental unit. Parameters observed in this study include plant physiological diagnosis of Latex (sucrose, inorganic thiol, inorganic phosphate), productivity ($g^{-1}t^{-1}$ and $kg^{-1} ha^{-1}y$), and precipitation.

Results and Discussion

Plant physiology

The decline in plant physiological conditions can be determined by observing the diagnosis of latex and dry rubber content (KKK). In the event of severe exploitation stress, it can be seen from the condition fisiologis latex (DL) decreased significantly (Sainoi and Sdoode, 2012).

Table 2. Results of the analysis of the DL in each clone BPM 1 and PB 260

Clone	Tapping System	mM		
		Sucrose	Fa	Tiol
BPM1	QS263	15.87	9.59 a	0.39
PB260	QS263	20.75	7.35 b	0.57

Values in the same column followed by the same letters are not significantly different at the $P=0.05$ level according to t-test.

Sucrose is the main ingredient in the formation of latex. Based on the observation of latex sucrose content in clones BPM1 15.87 mM, whereas latex sucrose content in clones PB260 20.75 mM. Sucrose levels in clones PB260 clone BPM higher than 1, because the clone PB260 known as Quick Starter (QS) Sumarmadji *et al.* (2006) found that clones with high metabolism describes the process of forming poliisoprene (latex) is faster. Clones Slow Starter (SS) describes the rate of formation poliisoprene (latex) of the basic ingredients of photosynthesis carbohydrates such as sucrose is slow to moderate. This same Kuswanhadi opinion, (2009) said that low levels of sucrose showed that low metabolism, whereas high levels indicate a high metabolism.

Kuswanhadi *et al.* (2009) stated that high levels of Fa showed high metabolic activity and productivity. According to Traore *et al.*, (2011), the maximum Fa levels for healthy plant is 25 mM, when the 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 is still below the threshold at 9.59 BPM1 mM clones and clones PB260 7.35 mM. Thiol levels is an important indication of the rubber plant associated with the incidence of Brownt Bast (Rajagopal *et al.*, 2004). The results showed generally low levels of 0.39 mM thiol on clones and clone PB260 BPM1 of 0.57mM (Table 2).

Relationship between sucrose with inorganic phosphate in PB 260 and BPM 1 Clones.

Results of regression analysis-correlation (R^2) between the levels of sucrose, on levels of inorganic phosphate in a row was 0.54 in clones PB260, and BPM1 0.41.

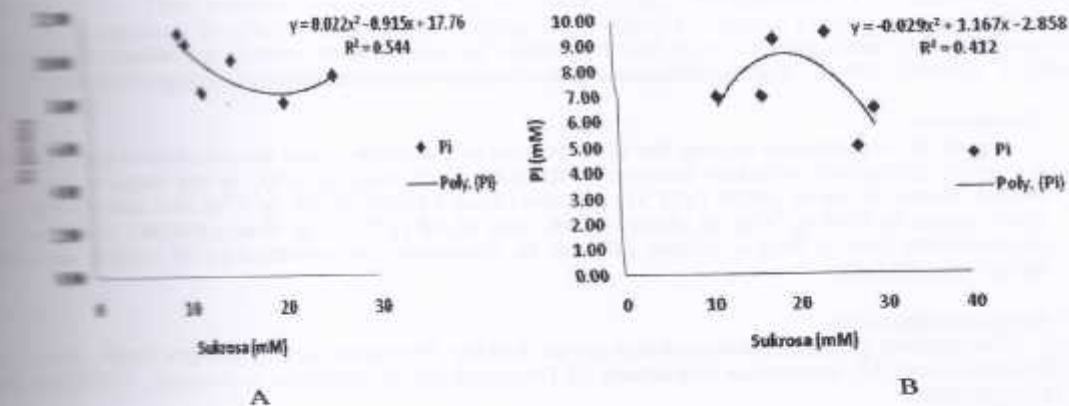


Figure 1. A. Relationship Sucrose (mM) with inorganic phosphate (mM) in clones BPM1
B. Relationship Sucrose (mM) with inorganic phosphate (mM) in clones B260.

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 levels will be higher rubber to a certain extent. But if it continues to occur increased levels of inorganic phosphate decreased levels of sucrose in the rubber.

Rainfall in Production

The results of the analysis menunjukkan low rainfall caused tranloksi nutrients required for the growth of lower leaves and vice versa. Along with declining rainfall will shed leaves (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 January, the 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 conditions are in a period of aging canopy of leaves, the plant will increase production (Figure 2). Rubber production ($g^{-1}t^{-1}$) is the highest in January at BPM1 clones is equal 29.70 ($g^{-1}t^{-1}$) and the clone PB260 23.25 ($g^{-1}t^{-1}$) and the lowest in April that is equal to 9.40 ($g^{-1}t^{-1}$) in clones BPM1 and 10.08 ($g^{-1}t^{-1}$) in clones PB260.

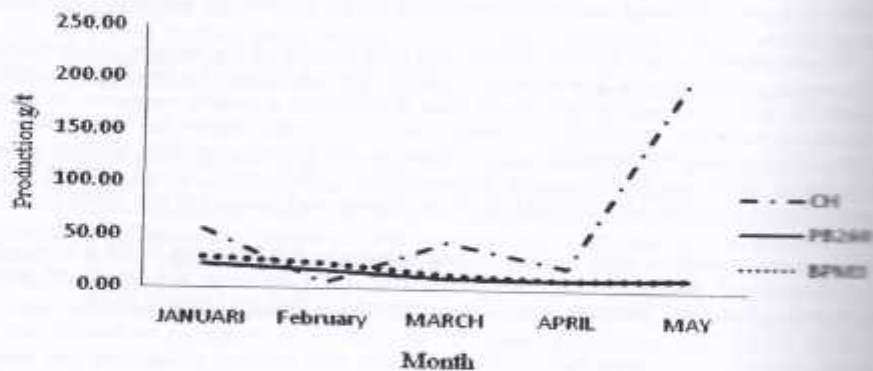


Figure 2. Rainfall (mm / month) with Production (g / p)

Conclusion

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

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