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Growth Response of *Toona sureni* to Providing Goat Manure Compost on Planting Media ex Gold Mine

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Abstract

Mining activities affect the balance of the soil surface ecosystem, decreasing soil productivity which causes the chemical, biological, and physical properties of the soil to be disturbed, as well as environmental quality. The purpose of this study was to determine the effect and the best composition of a mixture of compost and former gold mine soil in the growth of suren seedlings. This study consisted of 4 (four) treatments and 5 (five) replications resulting in 20 experimental units. The treatment of compost fertilizer in this study can be seen as follows: D1 = no compost/control, D2 = 25% compost + 75% ex-gold mine soil, D3 = 50% compost + 50% ex-gold mine soil, D4 = 75% compost + 25% ex-gold mine soil. The observation parameters are the percentage of life, height increase, plant dry weight and seedling quality index (IMB). The results showed that the application of goat manure compost had a significant effect on the growth of suren seedlings. Treatment composition D4 (75% compost fertilizer + 25% gold mine waste soil) showed the best growth with 100% survival rate, 21.27 cm height increase, 10.57 g plant dry weight and 0.99 IMB

Keywords: *Former gold mine; Goat manure compost; Growth, Toona sureni; Mining*

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INTRODUCTION

Mining is one of the human activities that has the potential to increase community income for an area, but has a negative impact on forests that cause the chemical, biological and physical properties of the soil to be disturbed (Karmaita & Taufiq, 2019; Darlis et al., 2024). In addition to damaging forests, improper management of mining waste also adversely affects the ecosystem. According to Karmaita & Taufiq (2019),

tailings are waste from mining management in the form of sand and high clay content, so that it can cause a decrease in the condition of ex-mining land in the form of loss of soil layer profile, low pH, pollution by heavy metals on ex-gold mining land, has a low Cation Exchange Capacity (CEC) and nutrients. Processing former mining land and revegetation efforts are ways to restore soil conditions to their original state. Repairing land damaged by mining activities can be done using vegetative techniques known as revegetation activities.

Suren (*Toona sureni*) is a plant species that can survive at an altitude of 350 to 2,500 meters above sea level, suren plants are classified as fast growing speciesand can survive in a land with low pH values, suitable for planting on critical land because of their ability to adapt to the physical characteristics of marginal soils (Latifah et al., 2020). Suren has many root branches with taproot type so that it can grow in various conditions, does not require a good drainage system and can grow in slightly acidic and slightly alkaline soils with a pH value of 5 to 8 (Alim, 2019). The use of organic matter is one way to improve soil quality through fertilization to overcome low nutrients and improve soil structure in the former gold mine planting media. Organic materials can spur growth (Ningsih et al., 2024), a good source of nutrients (Darlis, et al., 2024), increase the adaptability of plants (Darlis et al., 2023). Organic materials are useful for improving soil properties, both physical chemical and biological properties of the soil (Pebriandi et al., 2021). Organic fertiliser can be sourced from waste (Hamzah et al., 2020). Like household waste that can be processed (Nadira et al., 2023). Good seedlings will increase the percentage of life in the field (Mardhiansyah et al., 2024). Good seedlings will make the forest grow and grow back and restore its benefits as a carbon sink (Pebriandi et al., 2024), animal habitat (Angraini et al., 2024) and ecotourism (Pajri et al., 2023).

The fertilizer used in adding nutrients to the tailings is goat manure compost. Goat manure compost has higher organic matter and N compared to other organic fertilizers. According to Firokhman (2016), goat manure compost has a C/N ratio of 21.12 % which contains N 0.60 %, P 0.30 %, K 0.17 %, and H2O 85 %. The content of nutrients contained in goat manure compost is thought to be very suitable for increasing fertility in the former gold mine planting media. The addition of compost to the former gold mine soil is expected to improve soil quality to produce good plant revegetation. This study aims to determine the effect of compost application and the best compost composition to spur the growth of suren plant seedlings on the former gold mine planting media.

METHOD

Location and Time of Research

This research was conducted in the Experimental Garden of the Faculty of Agriculture and Forestry Laboratory of the Faculty of Agriculture, Riau University. The implementation of this research was carried out for 2 months, namely in October to December 2023.

Tools and Materials

The materials used in this study were suren seedlings, ex-gold mining soil, goat manure compost, and 1 kg polybags. The tools used were stationery, labels, rulers, calipers, scissors, hoes, analytical scales, buckets, camera and SPSS software version 26.

Research Methods

This research was conducted using an experimental method using a non-factorial completely randomized design (RAL) consisting of 4 (four) treatments with 5 (five) replications, resulting in 20 experimental units. Each experimental unit used 5 (five) seedlings, so the total number of seedlings needed was 100 seedlings. The application of goat manure compost fertilizer on the growth of suren seedlings can be seen as follows,

D1 = No goat manure compost (control)
D2 = 25% goat manure compost + 75% gold mine waste soil
D3 = 50% goat manure compost + 50% gold mine waste soil
D4 = 75% goat manure compost + 25% gold mine waste soil

Research Procedure

Determination of Sampling Location

The parameters measured to see the growth of suren seedlings with various doses of goat manure compost fertilizer are the percentage of seedling survival, height and diameter increase, seedling sturdiness, plant dry weight, root crown ratio, and seedling quality index (IMB).

a. Calculation of seedling survival percentage was conducted at the end of the study. The percentage of live seedlings is the number of seedlings that survive until the end of the study from the total number of seedlings planted expressed in percent (%).
b. Height measurement was conducted using a ruler with centimeter (cm) unit. Seedling height observations were measured in a straight line from the base of the stem to the tip of the highest leaf.
c. Plant dry weight measurement was conducted at the end of the study by taking 3 seedlings from each treatment. Each sample was cleaned and each sample was cut consisting of the crown and roots and dried for 2 hours. Then each part was put into a different envelope and baked at 103°C for 24 hours and then weighed the dry weight, then baked again at 103°C for 2 hours to get a constant dry weight.
d. Seedling quality index was conducted at the end of observation, using the formulas of (Sudomo & Santosa, 2011), namely:

$$\text{IMB} = \frac{\text{BKT (g)}}{\text{KS + RPA}}$$

Description,
IMB = Seedling quality index
BKT = Plant dry weight

KS = Seedling sturdiness
RPA = Root shoot ratio

Data Analysis

Data obtained from the study were statistically analyzed using SPSS version 26. If the results of the analysis of variance are significantly different, it is continued with Duncan's multiple range test at the 5 % level.

RESULT AND DISCUSSION

Seedling Survival Percentage

The results of the research on the percentage of seedling life after being analyzed using variance analysis proved that the application of goat manure compost fertilizer on the former gold mine planting media had a significant effect on the percentage of living suren seedlings. The observation results of seedling survival percentage can be seen in Table 1.

Table 1. Percentage survival of four month old *Toona sureni* seedlings

Treatment	Percent alive (%)
D4 (75% goat manure compost + 25% gold mine waste soil)	100[a]
D3 (50% goat manure compost + 50% gold mine waste soil)	100[a]
D2 (25% goat manure compost + 75% gold mine waste soil)	92[a]
D1 (no goat manure compost/control)	80[b]

Description: Numbers followed by small letters in each row in the same column are significantly different according to the DNMRT test at the 5% level

Based on the research conducted, it can be seen that treatment D4 is not significantly different from D3 and D2, but significantly different from treatment D1. The percentage of living suren seedlings in this study showed that the D1 treatment of 80% was classified as good and the D2 to D4 treatments of 92 - 100 % were classified as the best. This is in line with the opinion of Awaliah et al., (2019), which states that the percentage value of life falls into four categories, namely, 91 – 100 % is classified as the best, 76 - 90 % is classified as good, 55 - 75 % is classified as moderate, and less than 55 % is classified as poor.

Based on these qualifications, in this study the composition of the former gold mine planting media with goat manure compost showed that suren seedlings were able to grow and adapt well because they had a live percentage value above 80 %. According to Efendi et al., (2019) stated that the level of plant adaptation increases along with the percentage of growth. The planting media in the D2, D3 and D4 treatments were better than the D1 treatment, which had a survival percentage of 80 %. This is thought to be due to the proper application of goat manure compost that can improve the structure of the former gold mine planting media. According to Bima et al., (2020) stated that the ability of plants to adapt to their environment and the availability of nutrients from planting media, fertilizers, and sufficient water all contribute to the percentage of life.

Seedlings in the D1 treatment experienced death in the second week by showing symptoms such as wilting, yellowing, drying and falling leaves. This is thought to be due to the fact that in the D1 treatment, the planting media used lacked nutrients, coarse texture, and low water binding capacity, so that growth is not optimal. According to Faizin et al., (2015) stated that a number of factors, such as the availability of sufficient water and nutrients and the absence of pests and diseases, affect the ability of seedlings to survive.

The percentage of seedling survival is a benchmark used in determining the success of planting. The percentage of seedling survival can be influenced by planting media and environmental factors. Good planting media can provide sufficient nutrients to plants, so as to encourage good plant growth, increase plant production and quality. According to Hamdie et al., (2021) environmental support with the provision of nutrients, sufficient air and protection from pests and diseases are factors that affect the ability of plants to live.

Height Mining

Observations of height gain were made once a week for eight weeks. The results of height gain observations are shown in Table 2.

Table 2. Average height gain of four months old *Toona sureni* seedlings

Treatment	Height mining (cm)
D4 (75% goat manure compost + 25% gold mine waste soil)	21.27[a]
D3 (50% goat manure compost + 50% gold mine waste soil)	13.02[b]
D2 (25% goat manure compost + 75% gold mine waste soil)	6.26[c]
D1 (no goat manure compost/control)	2.73[d]

Description: Numbers followed by small letters in each row in the same column are significantly different according to the DNMRT test at the 5% level

Treatment D4 is the best treatment among other treatments. The height gain in D4 with an average of 21.27 cm, while the low height gain was seen in treatment D1 with an average of 2.73 cm. This is thought to occur because in the D1 treatment, the former gold mine soil used as a planting medium generally has a low content of macronutrients in plant growth such as nitrogen (N), phosphorus (P) and potassium (K), high heavy metal content, minimal soil quality of organic matter so that it can cause low soil fertility levels (Mensah et al., 2015). According to Walunguru et al., (2018) planting media is one of the factors that can affect plant growth and development.

The average height gain of Suren seedlings during 8 weeks of observation has a variety of values. The graph of the height increase of suren seedlings can be seen in Figure 1. The effect of planting media mixture on the height gain of suren seedlings during the 8 (eight) weeks of observation increased every week. The height increase was seen in the fifth week of the study, this is because the compost absorbed by the plants takes a long time to break down into the soil as shown in Figure 1.

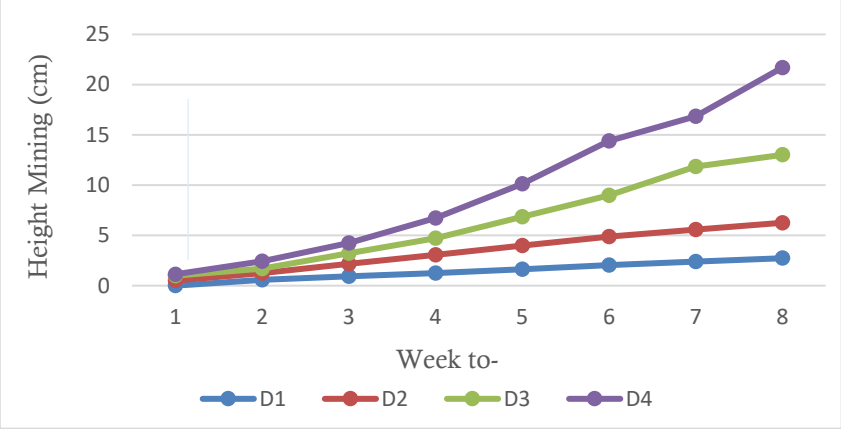

Figure 1. Graph of height gain of four months old *Toona sureni* seedlings

The composition of the soil without the addition of compost/control did not experience a significant increase in height. The low growth in this treatment is caused by the lack of nutrients needed by the seedlings, so that their growth is slower. Nutrients can function to stimulate rooting, multiply leaves, increase stem size, multiply tillers, and improve seedling quality (Ernawati, 2016). The rate of increase in seedling height can be accelerated if plants receive adequate nutrition (Balgis et al., 2021).

Dry Weight of Plants

Table 3 shows that the application of compost fertilizer with various doses has a significant effect on the dry weight of *T. sureni* plants. The results of analysis of variance can be seen in Table 3.

Table 3. Dry weight of *Toona sureni* seedlings aged four months

Treatment	Dry Weight (g)
D4 (75% goat manure compost + 25% gold mine waste soil)	10.57[a]
D3 (50% goat manure compost + 50% gold mine waste soil)	5.47[b]
D2 (25% goat manure compost + 75% gold mine waste soil)	5.07[b]
D1 (no goat manure compost/control)	1.17[c]

Description: Numbers followed by small letters in each row in the same column are significantly different according to the DNMRT test at the 5% level

Plant dry weight in the D4 treatment has a better value than the other treatments. This is probably because the provision of nutrients in the planting media is sufficient, so that vegetative growth such as height and diameter in plants is good which can affect the high dry weight of plants. According to Andri & Wawan (2016) that the provision of nutrients such as N, P, and K in plants can increase vegetative growth and development, thus having an impact on plant dry weight.

The value of plant dry weight is related to the increase in height and diameter in plants, because the better the increase in plant height and diameter, the number of leaves

and stem size will be greater. According to Bima et al., (2020) high growth in stems, leaves and roots can cause an increase in plant dry weight. The excellent photosynthesis mechanism of plants is the cause of the high dry weight value. Plants need nutrients for the photosynthesis process, therefore the more nutrients absorbed by plants, the greater the photosynthesis results. This is in accordance with the statement of Firdaus et al., (2013) the high value of plant dry weight indicates that the plant will also absorb nutrients from the soil in high amounts. The application of compost fertilizer into the soil of the former gold mine can increase the availability of nutrients that can encourage the photosynthesis process properly.

Seedling Quality Index (IMB)

The results of observations of compost fertilizer application on the former gold mine planting media had a significant effect on the quality index of suren seedlings. The results of analysis of variance can be seen in Table 4.

Table 4. Quality Index of four months old *Toona sureni* seedlings

Treatment	Seedling Quality Index
D4 (75% goat manure compost + 25% gold mine waste soil)	0.99[a]
D3 (50% goat manure compost + 50% gold mine waste soil)	0.58[b]
D2 (25% goat manure compost + 75% gold mine waste soil)	0.50[b]
D1 (no goat manure compost/control)	0.12[c]

Description: Numbers followed by small letters in each row in the same column are significantly different according to the DNMRT test at the 5% level

The IMB value can be influenced by several factors, including planting media, nutrients, and sufficient water availability. The best treatment in this study was the D4 treatment with an IMB of 0.99. According to Irawan & Hidayah (2017), the seedling quality index value greater than 0.09 is included in the high quality category because the growth rate is higher when transferred to the field.

The seedling quality index is a picture that can be seen in the resilience of seedlings when they are moved and planted in the field (Orpa et al., 2019). Morphologically, D1 has a small height and diameter growth, resulting in a small IMB value. This is influenced by the inaccuracy in giving media composition to plants. The D4 treatment is the best dose of IMB which can provide water and nutrients in sufficient quantities when absorbed by plants, so it has a high IMB value. According to the results of research by Rajagukguk et al., (2019), if the IMB value is high, the quality of the seedlings produced is better in a nursery, and quickly adapts to the land, the seedlings will develop more effectively. The Seed Quality Index (IMB) value of a plant shows the physical quality of the seeds that will be planted in the field.

CONCLUSION

The conclusion of this research is the application of goat manure compost fertilizer has a significant effect on the growth of Toona sureni seedlings on the former gold mine planting media. The composition of the D4 treatment (75 % goat manure compost + 25 % gold mine waste soil) is the best treatment for the growth of Toona sureni seedlings with 100% survival percentage, 21.27 cm height gain, 10.57 g plant dry weight and seedling quality index (IMB) 0.99.

REFERENCES

Alim, A. A. (2019). Perbandingan Persentase Perkecambahan Benih Suren (*Toona sureni*) pada Berbagai Media Tabur. Skripsi Fakultas Pertanian. *Universitas Muhammadiyah Makassar* https://digilibadmin.unismuh.ac.id/upload/6997-Full_Text.pdf. Accessed on 1st June 2024.

Andri, R., & Wawan. (2016). Pengaruh Pemberian Beberapa Dosis Pupuk Kompos (Greenbotane) Terhadap Pertumbuhan Bibit Kelapa Sawit (*Elaeis quieneensis* Jacq.) Di Pembibitan Utama. *JOM Faperta*, *4*(2), 1–23.

Angraini, R., Yoza, D., & Pebriandi, P. (2024). Diversity of Soil Surface Arthropods Species in Taman Hutan Raya Sultan Syarif Hasyim, Riau Province. *Jurnal Pembelajaran Dan Biologi Nukleus*, *10*(1), 190–206. https://doi.org/10.36987/jpbn.v10i1.5346

Awaliah, Payung, D., & Fitriani, A. (2019). Pengaruh Pemberian Pupuk Organik Cair Merek NASA Terhadap Pertumbuhan Bibit Trembesi (*Samanea saman*) di Shadehouse Fakultas Kehutanan Universitas Lambung Mangkurat. *Jurnal Sylva Scienteae*, *2*(6), 1149–1160.

Balgis, K., Siahaya, L., & Tetelay, F. F. (2021). Pemanfaatan Limbah Kulit Pisang sebagai Pupuk Organik Cair untuk Pertumbuhan Semai Pala (*Myristica fragrans* Houtt). *Jurnal Hutan Pulau-Pulau Kecil: Jurnal Ilmu-Ilmu Kehutanan dan Pertanian, 5*(2), 213–224. https://doi.org/10.30598/jhppk.2021.5.2.213

Bima, M. V., Seran, W., & Mau, A. E. (2020). Pengaruh Berbagai Konsentrasi Pupuk Organik Cair (POC) Urin Sapi Terhadap Pertumbuhan Semai Kayu Putih (*Melaleuca leucadendra*). *Jurnal Wana Lestari*, *2*(02), 201–211.

Darlis, V. V., Anggraini, F. Z., Mardhiansyah, M., & Pebriandi, P. (2024). Increased Growth of RED Jabon (*Anthocephalus macrophyllus*) Seedlings using Various Doses of Compost Fertiliser on Used Gold Mine Planting Media. *Jurnal Agronomi Tanaman Tropika (JUATIKA)*, *6*(3), 789–800. https://doi.org/10.36378/juatika.v6i3.3722

Darlis, V. V., Ni'mah Putriani, C., Yoza, D., & Pebriandi, P. (2023). Potensi dan pertumbuhan beberapa jenis tanaman dalam penyerapan logam berat timbal (Pb) pada media tanah bekas tambang timah Desa Siabu Kecamatan Salo Kabupaten

Kampar. *Journal of Tropical Silviculture*, *14*(3), 191–194. https://doi.org/https://doi.org/10.29244/j-siltrop.14.03.191-194

Darlis, V. V., Siahaan, H., Mardhiansyah, M., & Pebriandi, P. (2024). Pengaruh pupuk organik cair bonggol pisang terhadap pertumbuhan tanaman Tembesu (*Fagraea fragrans*). *Jurnal Education and Development*, *12*(1), 333–337. https://doi.org/10.37081/ed.v12i1.5750

Efendi, D., Rosdayanti, A., Afandi Ahmad, D. (2019). Identifikasi Potensi Jabon Merah (*Anthocephalus Marcophyllus*) di Kecamatan Bua Kabupaten Luwu. *Jurnal Penelitian Kehutanan Bonita*, *1*(2), 23–30.

Ernawati, E. (2016). Pengaruh Pemberian Kompos Batang Pisang Kepok (*Musa acuminata*) Terhadap Pertumbuhan Tanaman Terung Ungu (*Solanun melongena* L) dan Sumbangsihnya pada Materi Pertumbuhan dan Perkembangan di SMA/MA Kelas XII. *Skripsi Fakultas Ilmu Tarbiyah Dan Keguruan Universitas Negeri Islam Raden Fatah Palembang*, 1–97. Accessed on 1St June 2024.

Faizin, N., Mardhiansyah, M., & Yoza, D. (2015). Respon Pemberian Beberapa Dosis Pupuk Fosfor Terhadap Pertumbuhan Semai Akasia (*Acacia mangium* Willd.) Dan Ketersediaan Fosfor Di Tanah. *JOM Faperta*, *2*(2), 1-10.

Firdaus, L., Wulandari, S., & Mulyeni, G. (2013). Pertumbuhan Akar Tumbuhan Karet pada Tanah Bekas Tambang Bauksit dengan Aplikasi Bahan Organik. *Biogenesis*, *10*(1), 53–64.

Firokhman, A. (2016). Kajian umur Kepras dan dosis pupuk kendang Kambing terhadap pertumbuhan vegetative tanaman Tebu (*Saccharum officinarum* L). *Jurnal Produksi Tanaman*, *4*(6), 494–502.

Hamdie, N., Effendy, M. M., & Yamani, A. (2021). Pengaruh pemberian pupuk organic cair urun Sapi fermentasi terhadap pertumbuhan bibit Sengon (*Paraserianthes falcataria* L). *Jurnal Sylva Scienteae*, *4*(1), 127-135. https://doi.org/10.20527/jss.v4i1.3101

Hamzah, A., Yunandra, Y., & Pebriandi, P. (2020). Pemanfaatan Limbah Masyarakat dalam Pembuatan Pupuk Kompos di Desa Kuok Utilization of community waste in making compost in Kuok Village. *JCSPA: Journal Of Community Services Public Affairs*, *1*(1), 7–10. https://doi.org/https://doi.org/10.46730/jcspa.v1i1.5

Irawan, A., & Hidayah, H. (2017). Pengaruh Naungan Terhadap Pertumbuhan dan Mutu Bibit Cempaka Wasian (*Magnolia tsiampaca* (Miq.) Dandy) Di Persemaian. *Jurnal WASIAN*, *4*(1), 6–18.

Karmaita, Y., & Taufiq, H. (2019). Rehabilitasi Tanah Bekas Tambang Emas Dengan Pemberian Fungi Mikoriza Arbuskular (FMA) Terhadap Pertumbuhan Bibit Tanaman Naga Di Kabupaten Sijunjung. *Jurnal Agrium*, *16*(2), 65–69.

Latifah, S., Sima, H., & Purwoko, A. (2020). Kajian Maanfaat dan Kelayakan Ekonomi Budidaya Suren Pada Masyarakat Desa Sipolha Horison, Kabupaten Simalungun, Provinsi Sumatera Utara. *Jurnal Penelitian Hutan Tanaman*, *17*(2), 87–99.

Mardhiansyah, M., Imanto, T., Pebriandi, P., Sribudiani, E., Somadona, S., & Suhada, N. (2024). Evaluating The Physical Quality of Trembesi Seedlings (*Samanea saman*) in The Permanent Nursery of BPDAS Indragiri Rokan, Pekanbaru City, Riau Province. *Jurnal Agronomi Tanaman Tropika (JUATIKA)*, *6*(3). https://doi.org/10.36378/juatika.v6i3.3721

Mensah, A. K., Mahiri, I. O., Owusu, O., Mireku, O. D., Wireko, I., & Kissi, E. A. (2015). Environmental Impacts of Mining : A Study of Mining Communities in Ghana. *Applied Ecology and Environmental Sciences*, *3*(3), 81–94. https://doi.org/10.12691/aees-3-3-3

Nadira, S., Isnaeini, P. N., Salsabila, N., Anggraini, H., & Pebriandi, P. (2023). Pengadaan Tempat Sampah Sebagai Wujud Implementasi Untuk Mengurangi Lingkungan Yang Kotor. *Jpmnt : Jurnal Pengabdian Masyarakat Nian Tana*, *1*(4), 15–21. https://doi.org/https://doi.org/10.59603/jpmnt.v1i4.110

Ningsih, W. A., Mardhiansyah, M., & Pebriandi, P. (2024). Response in Growth Geronggang (*Cratoxylon arborescens* Vahl. Blume) Seddling by Giving Chicken Manure. *Jurnal Pembelajaran Dan Biologi Nukleus*, *10*(1), 132–142. https://doi.org/10.36987/jpbn.v10i1.5479

Orpa, Umar, A., Gusmiaty, & Prayudyaningsih, R. (2019). Respon pertumbuhan semai sengon buto (*Enterolobium cyclocarpum*) dengan aplikasi pot media semai berbahan dasar sampah organik. *Jurnal Eboni*, *1*(1), 1–20.

Pajri, I., Sribudiani, E., & Pebriandi, P. (2023). Karakteristik pengunjung ekowisata Hutan Pinus Bukit Candika Bangkinang, Kabupaten Kampar, Provinsi Riau. *Innovative: Journal of Social Science Research*, *3*(6), 8041–8051. https://doi.org/https://doi.org/10.31004/innovative.v3i6.6086

Pebriandi, P., Rusdiana, O., & Buce Saleh, M. (2021). Karakteristik sifat fisik dan kimia tanah di kawasan hutan lindung Sentajo Kabupaten Kuantan Singingi, Provinsi Riau. *Jurnal Ilmu-Ilmu Kehutanan*, *5*(1). https://doi.org/http://dx.doi.org/10.31258/jiik.5.1.1-6

Pebriandi, P., Yoza, D., Sukmantoro, W., Darlis, V. V., Qomar, N., Mardhiansyah, M., Oktorini, Y., Sribudiani, E., Somadona, S., & Muslih, A. M. (2024). Estimation of aboveground carbon stock in PT KOJO's forest in Riau, Indonesia. *BIO Web of Conferences*, *99*(03), 1–7. https://doi.org/10.1051/bioconf/20249903002

Rajagukguk, J. A., Setiadi, Y., Hilwan, I., & Mardatin, N. F. (2019). Respon Pertumbuhan Bibit *Gmelina Arborea* Roxb. Terhadap Perlakuan Media Tanam dan Biostimulan di Persemaian Permanen IPB. *Journal of Tropical Silviculture*, *10*(1), 15–20. https://doi.org/10.29244/j-siltrop.10.1.15-20

Sudomo, A., & Santosa, H. B. (2011). Pengaruh media organic dan tanah mineral terhadap pertumbuhan dan indeks mutu bibit Mindi (*Melia azedarach* L). *Jurnal Pendidikan Hutan Dan Konservasi Alam*, *8*(3), 263–271.

Walunguru, L., Kaka Mone, M., & Abdullah, J. (2018). Respon Pertumbuhan Dan Hasil Tanaman Sawi Terhadap Aplikasi Poc Limbah Buah-Buahan Pada Beberapa Konsentrasi. *Partner*, *23*(2), 758. https://doi.org/10.35726/jp.v23i2.318

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