

## INTISARI

Penerapan teknik SILIN dengan sistim silvikultur THPB dapat mempengaruhi sifat fisik kimia tanah yang selanjutnya dapat mempengaruhi pertumbuhan dan produktivitas tegakan. Faktor biotik seperti serangan hama juga menjadi penting akibat dampak penanaman monokultur. Tujuan penelitian ini adalah (1) menganalisis pertumbuhan dan produktivitas tegakan *E. pellita* serta hubungannya dengan sifat tanah, (2) keanekaragaman rayap di tegakan *E. pellita* dan (3) dampak silvikultur intensif terhadap serangan rayap. Penelitian ini dilakukan di hutan tanaman industri *E. pellita* milik PT. Arara Abadi, Riau. Dua lokasi berdekatan dipilih berdasarkan perbedaan rotasi (rotasi ke-4 dan rotasi ke-5) dan umur tegakan (umur 1, 2, 3 dan 4 tahun). Pemilihan plot ditentukan secara *stratified random sampling* sebesar 0,24%. Setiap umur tegakan dibuat plot ukuran 100 x 20 m sebanyak 3 ulangan sehingga jumlah plot yang diukur sebanyak 24 plot. Setiap plot yang dipilih memiliki kesamaan klon yaitu EP077AA pada kelas tanah yang sama.

Pertumbuhan dan produktivitas *E. pellita* meningkat dari umur 1 sd 4 tahun, tetapi menurun dari rotasi ke-4 ke rotasi ke-5. Rata-rata diameter di rotasi ke-4 sebesar 14,3 cm, tinggi 19,17 m dan volume tegakan per ha sebesar 128,35 m<sup>3</sup>/ha, sedangkan di rotasi ke-5 rata-rata diameter sebesar 13,11 cm, tinggi 17,54 m dan volume tegakan per ha sebesar 110,27 m<sup>3</sup>/ha. Penurunan pertumbuhan dan produktivitas dari rotasi ke-4 ke rotasi ke-5 yaitu rata-rata diameter sebesar 1,19 cm, rata-rata tinggi sebesar 1,63 m dan volume tegakan sebesar 18,08 m<sup>3</sup>/ha. Sifat kimia tanah yang menurun adalah pH, C-organik, N-total dan KPK. Sifat kimia tanah yang naik adalah rasio C/N, P-tersedia, Ca-dd, Mg-dd, K-dd, Na-dd dan Al-dd. Sifat fisik tanah meningkat dari rotasi ke-4 ke rotasi ke-5 yaitu *bulk density*. Kenaikan umur tegakan tidak secara jelas mempengaruhi sifat fisik dan kimia tanah. Produktivitas tegakan dipengaruhi oleh umur, rotasi, pH, Al-dd, KPK, N total, P tersedia, Ca-dd, Mg-dd dan Na-dd. Penurunan N total menunjukkan bahwa telah terjadi kehilangan hara di dalam tanah, sedangkan peningkatan P tersedia, Ca-dd, Mg-dd, K-dd dan Na-dd menunjukkan bahwa penyerapan unsur hara belum maksimal. Peningkatan kepadatan tanah (*bulk density*) juga berdampak terhadap penyerapan hara oleh akar tanaman.

Delapan jenis rayap ditemukan di hutan tanaman *E. pellita* yang terbagi dalam empat grup rayap yaitu rayap pemakan kayu dan seresah, rayap pemakan kayu dan sampah kayu, rayap pemakan tanah atau bahan organik yang dikenali dan rayap pemakan tanah atau humus. Hasil analisis PCA menunjukkan bahwa faktor pertama (F1) yang mempunyai hubungan kedekatan dengan keanekaragaman rayap adalah umur (0,910), biomassa tegakan (0,889) dan seresah (0,568). Faktor kedua (F2) keanekaragaman rayap memiliki hubungan kedekatan dengan faktor lingkungan yaitu suhu (-0,650) dan kelembaban (0,801), serta faktor tanah yaitu C organik (-0,704) dan N total. (0,655). Kenaikan rotasi menurunkan keanekaragaman rayap, sedangkan kenaikan umur meningkatkan keanekaragaman rayap. Penurunan keanekaragaman rayap disebabkan oleh perubahan habitat rayap pemakan tanah yaitu menurunnya suhu dan meningkatnya kelembaban akibat kegiatan penebangan dan persiapan lahan. Penurunan bahan organik menurunkan

sumber makanan rayap pemakan tanah. Meningkatnya rayap pemakan kayu karena adanya peningkatan sumber makanan berupa peningkatan seresah dan biomassa tegakan. Peningkatan umur tegakan meningkatkan kondisi lingkungan mikro yang semakin stabil mendukung habitat rayap.

Rata-rata persentase serangan antara 0,3 sampai 22,4% (kategori ringan sd sedang), sedangkan rata-rata intensitas serangan antara 0-18,3% (kategori ringan) dengan volume tegakan yang terserang 0,04 m<sup>3</sup>/ha sampai 7,54 m<sup>3</sup>/ha. Faktor pertama (F1) yang mempunyai kedekatan hubungan dengan persentase serangan dan intensitas serangan adalah faktor umur (0,759), biomassa tegakan (0,743), seresah (0,791) dan topografi (0,559). Faktor kedua (F2) yang memiliki kedekatan hubungan dengan serangan rayap adalah faktor lingkungan yaitu suhu (-0,623) dan kelembaban (0,843). Serangan rayap meningkat karena kenaikan umur tegakan akan meningkatkan sumber makanan rayap (biomassa tegakan dan seresah) terutama pada lokasi dengan topografi miring. Lokasi dengan pemeliharaan yang kurang intensif sangat rentan terhadap serangan rayap karena kelembaban tinggi dan suhu rendah menciptakan kondisi yang disukai rayap.

Penerapan teknik silvikultur intensif di tegakan *E. pellita* menghasilkan volume tegakan per ha yang dapat dikategorikan produktif. Namun demikian, terjadi penurunan produktivitas tegakan *E. pellita* dari rotasi ke-4 ke rotasi ke-5. Penurunan pertumbuhan dan produktivitas hutan tanaman dapat diatasi dengan perbaikan praktik silvikultur (1). Persiapan lahan. Pengapuran untuk meningkatkan pH tanah sekaligus menambah unsur hara Ca dan Mg. (2) Perbaikan pengolahan tanah dengan mengurangi dampak penggunaan alat berat dan penambahan bahan organik untuk meningkatkan sifat fisik kimia tanah (3). Percobaan penambahan unsur hara melalui pemupukan baik melalui penambahan pupuk anorganik (N) maupun pupuk organik (4). Pemeliharaan tanaman secara intensif dan periodik dari gulma, liana atau tanaman pengganggu dan serangan hama penyakit. (5). Pengelolaan seresah dan sisa kayu tebang (6) Pengendalian hama terpadu melalui pencegahan, monitoring dan pengendalian.

**Kata Kunci:** Hutan Tanaman Industri, Silvikultur Intensif, Rayap

## ABSTRACT

*The implementation of the intensive silviculture technique (SILIN) with the clear cutting with regeneration (THPB) can affect the physical and chemical properties of the soil, which in turn can affect the growth and productivity of stands. Biotic factors such as pest attack also become important due to the impact of monoculture planting. This study aims to: 1. analyze the growth and productivity of E. pellita stands and their relationship to soil properties, 2. analyze the diversity of termites in E. pellita stands and 3. analyze the impact of intensive silviculture on termite attack. This research was conducted in the industrial plantation forest of E. pellita belonging to PT. Arara Abadi in Riau. Two adjacent sites were selected based on differences in rotation (4<sup>th</sup> rotation and 5<sup>th</sup> rotation) and stand age (1, 2, 3 and 4 years). The plot selection was determined using stratified random sampling of 0.24%. For each age of the stand, a plot of 100 x 20 m was made with 3 replications so that the number of plots measured was 24 plots in total. Each selected plot has the same clone, namely EP077AA in the same soil class.*

*Growth and productivity of E. pellita increased from the age of 1 to 4 years but decreased from the 4<sup>th</sup> rotation to the 5<sup>th</sup> rotation. The average diameter in the 4<sup>th</sup> rotation was 14.3 cm with a height of 19.17 m and a stand volume per ha of 128.35 m<sup>3</sup>/ha. Meanwhile, in the 5<sup>th</sup> rotation, the average diameter was 13.11 cm with a height of 17.54 m and a stand volume per ha of 110.27 m<sup>3</sup>/ha. The decrease in growth and productivity from the 4<sup>th</sup> rotation to the 5<sup>th</sup> rotation included an average diameter of 1.19 cm, an average height of 1.63 m and a stand volume of 18.08 m<sup>3</sup>/ha. The chemical properties of the soil that decreased were pH, C-organic, N-total and KPK. The chemical properties of the soil that increased were the ratio of C/N, P-available, Ca-dd, Mg-dd, K-dd, Na-dd and Al-dd. The physical properties of the soil that increased from the 4<sup>th</sup> rotation to the 5<sup>th</sup> rotation were bulk density. The increase in stand age did not affect the physical and chemical properties of the soil. Stand productivity was influenced by age, rotation, pH, Al-dd, KPK, total N, P-available, Ca-dd, Mg-dd and Na-dd. The decrease in total N indicated that there had been a loss of nutrients in the soil, while the increase in P-available, Ca-dd, Mg-dd, K-dd and Na-dd indicated that the absorption of nutrients had not been maximized. Increased bulk density also had an impact on nutrient absorption by plant roots.*

*Eight species of termites were found in the forest of E. pellita plants which were divided into four groups of termites, wood and litter feeders (1), wood and residue feeders (2), soil feeders with partly decompose of organic matter (3) and soil feeders with perfectly decompose of organic matter or humus feeders (4). The results of PCA analysis showed that the first factor (F1) that had a relationship with termite diversity was age (0.910), stand biomass (0.889) and litter (0.568). The second factor (F2) of termite diversity had a close relationship with environmental factors, namely temperature (-0.650) and humidity (0.801), and soil factors, namely organic C (-0.704) and total N. (0.655). The increase in rotation decreased the diversity of termites. Logging and land preparation had increased temperature and reduced air humidity, resulting in the loss of habitat for subterranean termites (termites which eat soil) and a decrease in organic matter which also reduced food sources for subterranean termites. As the age and rotation increase, the presence*

*of wood-eating termites increases because the amount of food they eat is also increasing. The increasing age of the stands increases the microenvironmental conditions (increase in air temperature and decrease in air humidity) which are more stable to support termite habitats.*

*The average percentage of attack was between 0.3 to 22.4% (low up to moderate), while the average attack intensity was between 0-18.3% (low) with the volume of stands affected by 0.04 m<sup>3</sup> /ha to 7.54 m<sup>3</sup>/ha. The first group of factors (F1) which had a relationship with the percentage of attack and intensity of attack includes the following factors namely age (0.759), stand biomass (0.743), plant litter (0.791) and topography (0.559). The second group of factors (F2) which had a relationship with termite attack are the environmental factor namely temperature (-0.623) and humidity (0.843). Termite attack increased due to the increasing age of the stands, which would increase the food source for termites (stand biomass and litter) especially in locations with sloping topography. Locations with less intensive maintenance are very susceptible to termite attack because high humidity and low temperatures create conditions that are favored by termites.*

*The implementation of intensive silvicultural techniques in E. pellita stands resulted in stand (volume per ha) which could be categorized as productive. However, there was a decrease in stand productivity of E. pellita from the 4th rotation to the 5th rotation. The decrease in growth and productivity of plantation forests can be overcome by improving silvicultural practice which consist of: 1. land preparation preceded by liming to increase soil pH as well as to add Ca and Mg nutrients, 2 improvement of soil management by reducing the impact of using heavy equipment and adding organic matter to improve the physical and chemical properties of the soil, 3. experiments of adding nutrients through fertilization either by adding inorganic fertilizers (N) or organic fertilizers, 4. intensive and periodical plant maintenance from weeds, lianas or pests and diseases, 5. management of plant litter and remaining felled wood and 6. integrated pest control; prevention, monitoring and control.*

**Keywords:** *Industrial Plantation Forest, Intensive Silviculture, Termites*