

The Effect of Teak Stand Density and Fertilizer Dosage on Morphophysiological Adaptation and Plant Production on Agroforestry Land at KHDTK Wanagama I Gunungkidul Yogyakarta

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ABSTRACT

Turmeric and curcuma are plants that can be developed under teak stands. The presence of trees causes a reduction in the capture of sunlight by turmeric and curcuma, thus affecting the plant's response both in morphology and physiology. Plant responses are also influenced by the nutrients contained in the soil. This research aims to determine the effect of differences in teak stand density and fertilizer doses given turmeric and curcuma on morphophysiological adaptation, the production, and potential production of teak stands. This was done because there has not been much research regarding the interaction of undergrowth and mature teak stands.

This research was carried out on 18 years old teak stands in Plot 13 KHDTK Wanagama I Gunungkidul from April to September 2022. The design used was Factorial RCBD with treatment of teak stand density (dense and sparse stands) and fertilizer doses given to turmeric and curcuma (0 kg, 1 kg, and 2 kg fertilizer). In this research, 18 plots measuring 12 m x 6 m were created, each of which contained 3 sub plots measuring 1 m x 1 m for observing the undergrowth.

The results showed that sparse stands (T1) with a relative light intensity (ICR) of $26.94 \pm 1.36\%$ and a fertilizer dose of 2 kg had a significant effect on the morphological adaptation of turmeric and curcuma, in the form of increasing plant height, stem length and leaf area. Stand density did not have a significant effect on the physiological adaptation of turmeric and curcuma, while fertilizer dosage had a significant effect on one of the physiological adaptation parameters. Furthermore, stand density did not have a significant effect on the production of turmeric and curcuma plants, while fertilizer dosage had a significant effect. The best turmeric production was produced in the treatment without manure application, namely an average of 153.81 ± 12.55 gr/stem or $4,298.56 \pm 584.75$ kg/ha. Meanwhile, the best production of curcuma was produced by applying 2 kg of manure, namely an average of 211.29 ± 21.12 gr/stem or $5,927.41 \pm 684.39$ kg/ha. Sparse stands (484 trees/ha) have the potential to produce greater diameter and volume growth than dense stands (833 trees/ha). The interaction between sparse stands with a fertilizer dose of 0 kg resulted in the most optimal growth in diameter, volume per tree, and stand volume during three years of turmeric and curcuma planting, namely 7.78 cm; 0.31 m³; and 178.99 m³/ha.

Key words: stand density, fertilizer dose, adaptation, morphophysiology, production, growth, clonal teak, turmeric, curcuma

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Pengaruh Kerapatan Tegakan Jati dan Dosis Pupuk terhadap Adaptasi Morfofisiologi dan Produksi Tanaman pada Lahan Agroforestri di KHDTK Wanagama I Gunungkidul Yogyakarta

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INTISARI

Kunyit dan temulawak merupakan tanaman empon – empon yang dapat dikembangkan di bawah tegakan jati pada umur tegakan tertentu. Keberadaan pohon menyebabkan berkurangnya tangkapan cahaya matahari oleh tanaman empon – empon sehingga mempengaruhi respon tanaman baik morfologi maupun fisiologi. Respon tanaman juga dipengaruhi oleh nutrisi yang terkandung dalam tanah. Penelitian ini bertujuan untuk mengetahui pengaruh perbedaan kerapatan tegakan jati dan dosis pupuk yang diberikan kepada tanaman empon – empon terhadap adaptasi morfofisiologi, produksi empon – empon, dan potensi produksi tegakan jati. Hal tersebut dilakukan karena belum banyak penelitian mengenai interaksi tanaman empon – empon dan tegakan jati yang cukup dewasa.

Penelitian ini dilaksanakan pada tegakan jati umur 18 tahun di Petak 13 KHDTK Wanagama I Gunungkidul pada bulan April hingga September 2022. Rancangan yang digunakan yaitu RCBD Faktorial dengan perlakuan kerapatan tegakan jati (tegakan rapat dan jarang) dan dosis pupuk yang diberikan pada tanaman empon – empon (pupuk 0 kg, 1 kg, dan 2 kg). Pada penelitian ini dibuat 18 plot berukuran 12 m x 6 m yang masing – masing di dalamnya terdapat 3 buah sub plot berukuran 1 m x 1 m untuk pengamatan tanaman empon – empon.

Hasil penelitian menunjukkan bahwa tegakan jarang (T1) dengan intensitas cahaya relatif (ICR) $26,94 \pm 1,36$ % dan dosis pupuk 2 kg berpengaruh signifikan terhadap adaptasi morfologi kunyit dan temulawak, berupa penambahan tinggi tanaman, panjang batang, dan luas daun. Kerapatan tegakan tidak berpengaruh signifikan terhadap adaptasi fisiologi kunyit dan temulawak, sedangkan dosis pupuk berpengaruh signifikan terhadap salah satu parameter adaptasi fisiologi. Selanjutnya, kerapatan tegakan tidak berpengaruh signifikan terhadap produksi tanaman kunyit dan temulawak, sedangkan dosis pupuk berpengaruh signifikan. Produksi kunyit paling baik dihasilkan pada perlakuan tanpa pemberian pupuk kandang, yaitu rata-rata $153,81 \pm 12,55$ gr/batang atau $4.298,56 \pm 584,75$ kg/ha. Sementara, produksi temulawak paling baik dihasilkan pada pemberian pupuk kandang sebanyak 2 kg yaitu rata-rata $211,29 \pm 21,12$ gr/batang atau $5.927,41 \pm 684,39$ kg/ha. Tegakan jarang (484 pohon/ha) berpotensi menghasilkan pertumbuhan diameter dan volume lebih besar daripada tegakan rapat (833 pohon/ha). Interaksi antara tegakan jarang dengan dosis pupuk 0 kg menghasilkan pertumbuhan diameter, volume per pohon, dan volume tegakan paling optimal selama tiga tahun penanaman empon – empon, yaitu 7,78 cm; $0,31 \text{ m}^3$; dan $178,99 \text{ m}^3/\text{ha}$.

Kata kunci: kerapatan tegakan, dosis pupuk, adaptasi, morfofisiologi, produksi, pertumbuhan, jati klon, kunyit, temulawak

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