

RINGKASAN

Tanaman seraiwangi (*Cymbopogon Nardus*) merupakan tanaman rumput yang dapat menghasilkan minyak atsiri. Minyak atsiri diperoleh melalui proses penyulingan pada bagian daun yang dikenal sebagai *Citronella Oil* dan Indonesia merupakan salah satu negara pengekspor minyak atsiri. Lahan marginal memiliki kesuburan yang rendah. Lahan tersebut sangat luas di Indonesia dan hanya sedikit yang sudah digunakan, maka perlu dilakukan peningkatan kualitas dengan cara pemupukan serta sistem irigasi yang tepat. Penelitian sebelumnya yang dilakukan oleh Wijaya *et al.* (2021) telah melaksanakan penelitian pada lahan marginal dan menggunakan variasi dosis pupuk 15 ton/ha, 25 ton/ha, dan 35 ton/ha, serta menggunakan jadwal irigasi tetes. kemudian dilakukan penelitian lebih lanjut menggunakan variasi dosis pupuk lebih besar dan menggunakan sistem irigasi tetes otomatis berbasis kelembaban tanah. Penelitian ini bertujuan untuk: 1) Mengetahui pengaruh irigasi tetes otomatis berbasis sensor kelembaban tanah terhadap karakteristik sifat fisik tanah marginal. 2) Mengetahui pengaruh variasi dosis pupuk organik terhadap karakteristik sifat fisik tanah marginal. 3) Mengetahui irigasi tetes otomatis berbasis sensor kelembaban tanah dan variasi dosis pupuk organik yang paling optimal terhadap karakteristik sifat fisik tanah marginal.

Penelitian ini dilaksanakan menggunakan lahan marginal jenis tanah ultisol di Laboratorium Agronomi Fakultas Pertanian Universitas Jenderal Soedirman. Rancangan percobaan yang digunakan adalah Rancangan Acak Lengkap (RAL) dengan enam variasi perlakuan yang berbeda. Faktor yang dipertimbangkan dalam penelitian ini adalah variasi dosis pupuk organik (PO) dengan tiga tingkat (PO1 = 500g.m^{-2} , PO2 = 1000g.m^{-2} , PO3 = 1500g.m^{-2}) dan irigasi tetes otomatis berbasis sensor kelembaban tanah (*Setting Point*) dengan dua tingkat (SP1 = 24%-28%, SP2 = 28%-32%). Variabel yang diamati meliputi permeabilitas tanah, kadar air tanah, dan kepadatan tanah. Data yang dihasilkan kemudian dianalisis menggunakan beberapa uji statistik. Hasil data kemudian dilakukan analisis menggunakan uji *Analysis of Variance* (ANOVA), Uji Kruskal-wallis, dan Uji *Duncan Multiple Range Test* (DMRT) 5 %.

Hasil penelitian ini menunjukkan bahwa perlakuan sistem irigasi tetes berbasis sensor kelembaban tanah berpengaruh nyata terhadap perbaikan sifat fisik tanah marginal, dengan perlakuan *Setting Point* 1 (SP1) sebagai perlakuan terbaik terhadap permeabilitas, kepadatan, dan kadar air tanah. Pada perlakuan dosis pupuk dan kombinasi perlakuan tidak berpengaruh nyata terhadap permeabilitas, kepadatan, dan kadar air tanah, tetapi memiliki nilai yang berbeda-beda saat uji coba. Variasi dosis pupuk yang paling optimal terdapat pada variasi dosis pupuk 1000g.m^{-2} (PO2), untuk kombinasi perlakuan paling optimal terdapat pada perlakuan SP1PO2 yang memiliki nilai terbaik dari kombinasi perlakuan yang lain.

SUMMARY

Lemongrass (Cymbopogon Nardus) is a grass plant that can produce essential oil. The essential oil is obtained through distillation process from the leaves, known as Citronella Oil, and Indonesia is one of the exporting countries of essential oil. Marginal land has low fertility. These lands are extensive in Indonesia and only a small portion has been utilized. Therefore, it is imperative to enhance their quality through fertilization and the implementation of suitable irrigation systems. Previous research conducted by Wijaya et al. (2021) has studied marginal land using fertilizer doses of 15 tons/ha, 25 tons/ha, and 35 tons/ha, along with drip irrigation schedules. Further research was conducted using larger fertilizer doses and an automatic drip irrigation system based on soil moisture. This study aims to: 1) Determine the effect of automatic drip irrigation based on soil moisture sensor on the physical characteristics of marginal land. 2) Determine the effect of various doses of organic fertilizer on the physical characteristics of marginal land. 3) Determine the most optimal combination of automatic drip irrigation based on soil moisture sensor and various doses of organic fertilizer on the physical characteristics of marginal land.

his research was conducted using ultisol soil on marginal land at the Agronomy Laboratory of the Faculty of Agriculture, Jenderal Soedirman University. The experimental design employed was a Completely Randomized Design (RAL) with 6 different treatment variations. Factors considered in this study included variations in organic fertilizer dosage (PO) with three levels (PO1 = 500g, PO2 = 1000g, PO3 = 1500g) and automatic drip irrigation based on soil moisture sensors (Setting Point) with two levels (SP1 = 24%-28%, SP2 = 28%-32%). Observed variables included soil permeability, soil moisture content, and soil density. The data generated were then analyzed using several statistical tests. The data analysis included Analysis of Variance (ANOVA), Kruskal-Wallis test, and Duncan Multiple Range Test (DMRT) at 5% significance level.

The results of this research indicate that the treatment of sensor-based drip irrigation systems significantly affects the improvement of the physical properties of marginal land soil, with Setting Point 1 (SP1) treatment showing the best performance in terms of permeability, density, and soil moisture content. The dosage of fertilizer treatment and the combination of treatments did not significantly affect permeability, density, and soil moisture content, but they showed varying values during the experiment. The most optimal fertilizer dosage variation was found at a dosage of 1000 g/m² (PO2), while the most optimal combination treatment was found in the SP1PO2 treatment, which had the best value among the other combination treatments.