RINGKASAN

Tanaman serai wangi (*Cymbopogon nardus L.*) merupakan tanaman yang banyak dibudidayakan di Asia Tenggara dan dikenal sebagai bahan baku produksi minyak atsiri. Serai wangi termasuk ke dalam tanaman yang mudah tumbuh meskipun ditanam di daerah yang miskin unsur hara seperti pada lahan marginal. Lahan marginal dapat dioptimalkan menjadi lahan pertanian dengan cara pemberian pupuk dan air irigasi. Salah satu jenis irigasi yang dapat diterapkan yaitu irigasi otomatis berbasis waktu. Untuk melihat keefektifan dari pemberian pupuk dan irigasi maka diperlukan analisis neraca air, sehingga nilai kesetimbangan air pada lahan marginal yang selama ini belum banyak dikaji dapat diketahui. Penelitian ini bertujuan untuk 1) Mengetahui nilai neraca air dalam budidaya serai wangi dengan irigasi otomatis berbasis waktu dan dosis pupuk organik pada lahan marginal, 2) Mengetahui jadwal irigasi dan dosis pupuk organik yang optimal untuk budidaya serai wangi berbasis neraca air, dan 3) Mengetahui nilai *water productivity* dalam budidaya serai wangi dengan irigasi otomatis berbasis waktu dan dosis pupuk organik pada lahan marginal.

Penelitian ini dilaksanakan di lahan Laboratorium Agronomi Fakultas Pertanian Universitas Jenderal Soedirman yang terletak di Kecamatan Patikraja Kabupaten Banyumas pada bulan September 2022–Maret 2023. Alat dan bahan yang digunakan yaitu: alat sistem irigasi tetes (pipa, pompa air, *emitter*, *driper stick*, dan *timer*), alat budidaya, alat pengamatan iklim mikro (termometer bola basah-bola kering, ombrometer, *lux* meter, anemometer), *software CROPWAT* 8.0, dan *double ring infiltrometer*. Rancangan penelitian ini terdiri atas 2 faktor dengan 3 taraf, yaitu 1) *Schedule* Irigasi per 3 hari (SI3), *Schedule* Irigasi per 5 hari (SI5), dan *Schedule* Irigasi per 7 hari (SI7), 2) Dosis pupuk organik 1 (PO1) sebanyak 500 g/tanaman, dosis pupuk organik 2 (PO2) sebanyak 1000 g/tanaman, dan dosis pupuk organik 3 (PO3) sebanyak 1500 g/tanaman. Masing-masing kombinasi perlakuan diulang 4 kali sehingga diperoleh 12 unit percobaan dengan total 36 tanaman serai wangi. Analisis data pada penelitian ini menggunakan persamaan umum neraca air dan dilanjutkan perhitungan *water productivity*.

Hasil perhitungan neraca air selama rentang waktu 178 hari setelah tanam (HST) menunjukkan air masukan yang berasal dari curah hujan dan air irigasi serta air keluaran berupa evapotranspirasi aktual (ETc) dan infiltrasi yang menghasilkan jumlah hari defisit lebih dominan. Perubahan simpanan air (Δs) tertinggi pada tiap-tiap perlakuan terjadi pada 127 HST sebesar 44,25 mm, sedangkan perubahan simpanan air terendah yaitu sebesar -12,10 mm pada 160 HST untuk perlakuan SI3, serta pada 160 HST dan 173 HST untuk perlakuan SI5 dan SI7. Kemudian, berdasarkan nilai total neraca air SI7-PO2 merupakan perlakuan paling optimal. Selanjutnya, perhitungan nilai *water productivity* menunjukkan hasil tertinggi pada perlakuan SI5-PO1 yaitu sebesar 0,099 kg/liter dengan total bobot panen 13,838 kg dan total suplai air dari irigasi 100,78 liter.

SUMMARY

Lemongrass (Cymbopogon nardus L.) is a plant that is widely cultivated in Southeast Asia and is known as a raw material for essential oil production. Lemongrass is a plant that is easy to grow even though it is planted in nutrient-poor areas such as marginal lands. Marginal land can be optimized into agricultural land by applying fertilizer and irrigation water. One type of irrigation that can be applied is time-based automatic irrigation. To see the effectiveness of fertilizer and irrigation, water balance analysis is needed, so the value of water balance on marginal land which has not been widely studied can be known. This research aims to 1) Knowing the value of water balance in lemongrass cultivation with time-based automatic irrigation and organic fertilizer doses on marginal land, 2) Knowing the optimal irrigation schedule and dose of organic fertilizer for lemongrass cultivation based on water balance, and 3) Knowing the value of water productivity in lemongrass cultivation with automatic irrigation based on time and dose of organic fertilizer on marginal land.

This research was conducted at the Agronomy Laboratory of the Faculty of Agriculture, Jenderal Soedirman University, located in Patikraja District, Banyumas Regency in September 2022–March 2023. The tools and materials used included: drip irrigation system tools (pipe, water pump, PE hose, emitter, driper stick, and irrigation timer), cultivation tools, microclimate observation tools (wet ball-dry ball thermometer, ombrometer, lux meter, anemometer), software CROPWAT 8.0, and double ring infiltrometer. The research design consisted of 2 factors with 3 levels, namely 1) Irrigation Schedule every 3 days (SI3), Irrigation Schedule every 5 days (SI5), and Irrigation Schedule every 7 days (SI7), 2) Dose of organic fertilizer 1 (PO1) of 500 g/plant, dose of organic fertilizer 2 (PO2) of 1000 g/plant, and dose of organic fertilizer 3 (PO3) of 1500 g/plant. Each treatment combination was repeated 4 times to obtain 12 experimental units with a total of 36 lemongrass plants. Data analysis in this study used the general equation of water balance and continued with the calculation of water productivity.

The results of water balance calculations during the span of 178 days after planting (DAP) show input water from rainfall and irrigation water and output water from actual evapotranspiration (ETc) and infiltration resulted in a more dominant number of deficit days. The highest change in water storage (Δs) in each treatment occurred at 127 DAP at 44,25 mm, while the lowest change in water storage was -12,10 mm at 160 DAP for SI3 treatment, as well as at 160 DAP and 173 DAP for SI5 and SI7 treatments. Then, based on the total water balance value SI7-PO2 is the most optimal treatment. Furthermore, the calculation of water productivity value showed the highest result in SI5-PO1 which was 0,099 kg/liter with a total harvest weight of 13,838 kg and total water supply from irrigation of 100,78 liters.