RINGKASAN

Pengolahan tanah menggunakan traktor roda dua dapat dikerjakan secara lebih cepat dan efisien. Namun, penggunaan traktor roda dua pada lahan juga dapat menimbulkan pemadatan tanah yang terdampak negatif terhadap sifat fisik tanah. Salah satu cara untuk mengurangi pemadatan tanah yaitu dengan penggunaan mulsa organik. Namun demikian, kajian tentang pengaruh penggunaan mulsa organik terhadap sifat fisik tanah dalam kaitannya dengan dampak pemadatan tanah akibat perlintasan traktor roda dua khususnya pada saat 12 bulan setelah perlintasan traktor masih belum banyak dilakukan. Selain itu, penelitian sebelumnya lebih berfokus pada kedalaman 0 – 30 cm saja. Oleh karena itu, penelitian ini dilakukan dengan tujuan: (1) mempelajari pengaruh pemberian jenis mulsa organik terhadap pemadatan tanah pada kedalaman 0 – 50 cm saat 12 bulan setelah perlintasan traktor roda dua, dan (2) mempelajari hubungan antar variabel sifat fisik tanah terkait dengan pengaruh pemberian jenis mulsa organik terhadap pemadatan tanah pada kedalaman 0 – 50 cm saat 12 bulan setelah perlintasan traktor roda dua.

Penelitian dilakukan di lahan pertanian Desa Karangduren, Kecamatan Sokaraja, Kabupaten Banyumas, dan pengukuran sifat fisik tanah di Laboratorium Terpadu 1 IAB, Universitas Jenderal Soedirman. Alat dan bahan yang digunakan meliputi: traktor roda dua, *head core ring sampler, soil ring sampler* ukuran 100 cm^3 (diameter 5 cm dan tinggi 5 cm), oven, jangka sorong, timbangan digital, *falling head meter*, *stopwatch*, mulsa jerami padi, mulsa sekam padi, mulsa serasah daun bambu, dan 4 plot penelitian masing-masing berukuran 1 m x 2 m. Penelitian menggunakan Rancangan Acak Lengkap (RAL) dengan 4 taraf perlakuan, yaitu: tanpa mulsa organik (M_0), mulsa jerami padi (M_j), mulsa sekam padi (M_s), dan mulsa serasah daun bambu (M_d). Pengambilan sampel tanah tidak terganggu dilakukan pada kedalaman tanah 0 – 10, 10 – 20, 20 – 30, 30 – 40, dan 40 – 50 cm dengan jumlah ulangan sebanyak 5 kali untuk setiap kedalaman sehingga total sampel tanah yang diambil adalah 100. Variabel yang diukur adalah *dry bulk density*, konduktivitas hidrolik jenuh, porositas, dan kadar air tanah. Analisis data menggunakan analisis regresi serta *Analysis of Variance* (ANOVA) dengan uji lanjut menggunakan uji *Duncan's Multiple Range Test* (DMRT) 5%.

Hasil penelitian menunjukkan bahwa penggunaan ketiga jenis mulsa organik (M_j, M_s, dan M_d) cenderung menyebabkan penurunan *dry bulk density* yang sejalan dengan peningkatan nilai konduktivitas hidrolik jenuh, porositas, dan kadar air tanah dibandingkan tanpa mulsa organik (M_0). Jenis mulsa paling efektif dalam mengurangi dampak pemadatan tanah adalah mulsa jerami padi (M_j). Peningkatan tingkat kedalaman tanah cenderung menurunkan *dry bulk density*, serta meningkatkan nilai konduktivitas hidrolik jenuh, porositas, dan kadar air tanah. Hasil analisis regresi menunjukkan bahwa *dry bulk density* berhubungan linier negatif dengan konduktivitas hidrolik jenuh (R^2 =0,4006). Sedangkan porositas berhubungan linier positif dengan konduktivitas hidrolik jenuh (R^2 =0,4006), dan kadar air berhubungan linier positif dengan konduktivitas hidrolik jenuh (R^2 = 0,4517). Hasil 12 bulan pengamatan menghasilkan nilai *dry bulk density* lebih

tinggi, sementara nilai porositas, kadar air dan konduktivitas hidrolik jenuh lebih rendah dibandingkan 6 dan 0 bulan pengamatan setelah perlintasan trakor roda dua.

SUMMARY

Soil tillage using a two-wheeled tractor can be carried out more quickly and efficiently. However, the use of a two-wheeled tractor in the field can also cause soil compaction which negatively affects the physical properties of the soil. One way to reduce soil compaction is by using organic mulch. Nevertheless, studies on the effect of using organic mulch on soil physical properties in relation to soil compaction due to two-wheeled tractor traffic, especially 12 months after the tractor passes, are still limited. In addition, previous research focused more on the 0–30 cm depth only. Therefore, this study was conducted with the objectives of: (1) studying the effect of organic mulch type application on soil compaction at a depth of 0 –50 cm at 12 months after two-wheeled tractor traffic, and (2) studying the relationship among soil physical property variables related to the effect of organic mulch type application on soil compaction at a depth of 0–50 cm at 12 months after two-wheeled tractor traffic.

The research was conducted on agricultural land in Karangduren Village, Sokaraja District, Banyumas Regency, and the measurement of soil physical properties was carried out at Integrated Laboratory 1 IAB, Jenderal Soedirman University. The tools and materials used included: a two-wheeled tractor, head core ring sampler, soil ring sampler sized 100 cm³ (5 cm diameter and 5 cm height), oven, caliper, digital scale, falling head meter, stopwatch, rice straw mulch, rice husk mulch, bamboo leaf litter mulch, and 4 research plots each measuring 1 m × 2 m. The study used a Completely Randomized Design (CRD) with 4 levels of treatment, namely: without organic mulch (M_0), rice straw mulch (M_j), rice husk mulch (M_s), and bamboo leaf litter mulch (M_d). Undisturbed soil sampling was conducted at soil depths of 0 –10, 10 –20, 20 –30, 30 –40, and 40 –50 cm with five replications for each depth, resulting in a total of 100 samples. The measured variables were dry bulk density, saturated hydraulic conductivity, porosity, and soil water content. Data analysis used regression analysis and Analysis of Variance (ANOVA) followed by Duncan's Multiple Range Test (DMRT) at 5%.

The results of the study showed that the use of the three types of organic mulch (M_j, M_s, and M_d) tended to decrease dry bulk density in line with the increase in saturated hydraulic conductivity, porosity, and soil water content compared to without organic mulch (M_0). The most effective mulch type in reducing the impact of soil compaction was rice straw mulch (M_j). Increasing soil depth tended to reduce dry bulk density and increase saturated hydraulic conductivity, porosity, and soil water content. The regression analysis results showed that dry bulk density had a negative linear relationship with saturated hydraulic conductivity ($R^2 = 0.4006$). Meanwhile, porosity had a positive linear relationship with saturated hydraulic conductivity ($R^2 = 0.4006$), and water content had a positive linear relationship with saturated hydraulic conductivity ($R^2 = 0.4517$). The results at 12 months of observation showed higher dry bulk density values, while porosity, water content, and saturated hydraulic conductivity values were lower compared to observations at 6 and 0 months after two-wheeled tractor traffic.