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**Agronomic Potential and Industrial Value of Madder (*Rubia tinctorum* L.) as a
Dye Crop**

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Abstract: Madder (*Rubia tinctorum* L.) is a valuable dye crop due to its roots, which are rich in anthraquinone pigments, one of them being alizarin. This study aimed to evaluate the agronomic potential and industrial value of madder plants under rainfed conditions in Southwest Anatolia, Turkey. Three different propagation materials (seeds, seedlings and root cuttings), and 5 different propagation methods (autumn root transplanting, spring root transplanting, autumn seed sowing, spring seed sowing, and spring seedling transplanting) were used in the study. At the end of the 3-year growing period, fresh root yield varied from 1640.1 kg ha⁻¹ (in the spring root transplanting) to 4813.2 kg ha⁻¹ (in the spring seedling transplanting). As a result, compared to the other methods, spring seedling transplanting had the best performance, producing higher root and dye yields. Of the fresh roots 34.0%-37.5% was dry matter, represented by dry root yields. Although there was no statistical difference between the propagation methods, the roots from the seedlings gave the highest dye content (2.20%). There was a remarkable variability between 1.98% and 3.70% in the dye content of the roots depending on root positions on the main root and growing stages within a year. It was determined that August was the optimum harvest time for obtaining the highest dry matter and dye matter accumulation. Dye matter was accumulated 2.3 times more in the cortex than in the stele, and the highest dye content and cortex ratio were found in the roots in the tertiary position.

Key Words: Madder, *Rubia tinctorum* L., propagation methods, dyeing analysis

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