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Differences in planting methods on growth rates of *Calliandra calothyrsus* in ex-limestone mining areas

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Abstract

Ex-mining areas must undergo reclamation activities to improve environmental quality. The faster the species of plants grow and develop in the ex-mining area, the faster the process of restoring and improving the ecosystem of the ex-mining area. Differences in planting methods such as Direct-Seedling and the use of Planting Stock can cause differences in growth rates. Therefore, it is necessary to investigate the effect of different planting methods on growth rates in ex-mining areas. The research was carried out in a former limestone mining area with the species of *Calliandra calothyrsus*. The planting method used is Direct-Seedling and Planting Stock with 20 seeds each. Seedlings with planting stock are planted after 1 month from the nursery process (germination). The first measurement was carried out after 3 months of planting. The results showed that the mean height for Direct seedling was 15.9 cm with the minimum and maximum heights being 11.0 cm and 34.0 cm respectively. Meanwhile, the mean height of Planting Stock is 20.5 cm with the minimum and maximum heights being 13.0 cm and 32.0 cm respectively. The mean diameter for Planting Stock also shows a higher mean value when compared to Direct-Seedling, namely 0.45 mm compared to 0.25 mm respectively. The results of statistical analysis using the t-test showed significant differences in results between the two planting methods for both height ($p = 0.007$) and diameter ($p = 0.000$). Apart from that, the results of soil analysis show that the pH value tends to be high, namely an average pH = 8.14 as a result of limestone dust resulting from the crushing process. Planting *Calliandra calothyrsus* species using the planting stock method can be used for ex-mining reclamation activities compared to Direct Seedling. This also reduces the risk of seeds not germinating and being damaged/eaten by animals.

Keywords: *Calliandra calothyrsus*, direct seedling, mine reclamation, planting stock