

Study of Seeding Amount of Vegetation Pellets

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Vegetation pellets are spheroids made of a mixture of seeds, soil, fertilizers and growth material, which can be dropped by unmanned aerial vehicles (UAV) into unreachable places where engineering machinery is difficult to reach. If a small vegetation pellet contains too many seeds, excessive seeding can cause high plant density, problems such as intraspecific competition or pests and diseases, which will reduce revegetation effects and increase cast costs. In contrast, a vegetation pellet contains too few seeds, the plant density on the slope will be too low to effectively protect the slope. To achieve the best revegetation effects, there must be an optimal seeding amount. Therefore, the present study aimed to identify the optimal seeding amount with which the germination and survival of seeds in vegetation pellets can be maximized. The seed materials were two common plants for vegetation engineering, including Tall Fescue (*Festuca arundinacea* Schreb.) and Taiwan Acacia (*Acacia confusa* Merr.). The seeding amount used for hydroseeding was set as 100%. The other five seeding amounts included 120%, 100%, 80%, 60%, 40%, and 20%. For germination tests, these pellets were then placed on three kinds of soils (laterite, colluvial soil, and mudstone) commonly found in landslide areas of Taiwan. During the tests, the temperature inside the plant growth chamber was set to 25°C, the humidity was 70%, and the sunshine duration was 12 hours. And provided a fixed amount of water to reduce environmental differences for a period of 50 days. For Taiwan Acacia, although the germination rate varied considerably seeding amounts and soil environments, less than 25% of seedlings survived at the end of tests due to high seedling mortality rates. Taiwan Acacia is not suitable for the revegetation of mudstone areas, because the survival rates of this tree species on mudstone were zero at the end of tests regardless of seeding amount. Regardless of soil types, it was found that the germination rate of Tall Fescue was highest if the seeding amount was 20%. When the seeding amount was controlled, the germination rate of Tall Fescue was the highest on laterite soil, followed by colluvial and mudstone. However, in terms of cost efficiency (to achieve the same plant stem density with the minimum material cost of pellets) for Tall Fescus, the seeding amount should be 100% or even more. Further studies should examine whether seeding amount higher than 120% can even increase cost efficiency.

Keywords: Seed ball, Aerial vegetation engineering, Seed treatment