A Novel Invention of Aerial Delivery of Planting Material for Burnt Forest Restoration Inspired by the Structure of Kadsura coccinea Fruit

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Wildfires are a crucial problem that greatly affects many living things, especially the loss of many plants and animal species. Over the years, there have been more frequent wildfires. Self-restoration of forests cannot occur fast enough. Traditional restoration methods involve the difficult transportation of the saplings to the inner part of the forest. This work presents an innovation to restore the burnt forest by producing planting material with added nutrients, delivered to remote damaged forest areas by drones. Firstly, clay was used as the main material, combined with coconut flakes (C) and rice husk ash (R) to provide nutrients for the saplings and protect the seeds from being damaged. Our prototype configuration was inspired by the structure of the Kadsura coccinea fruit which contained many seed compartments within one fruit. We molded our planting material with 24 carpels in each unit. For optimization, different ratios of the mixture were investigated. The results showed that the C3R1 formula gave the best performance in molding and durability with 10.37±0.11g per carpel. After that, the aerial planting material was tested and released at different heights. The dropping height of 40 m was most suitable for releasing planting material from a drone, with up to 89.17±2.28% dispersion. Planting materials with nutrients can be completely dissolved in the soil with more than 3.5% organic matter. Thirty days after planting all types of plants were able to grow with more than 90% survival rate after release from 40 meters height both in the experimental area and in the field. The simulation showed more than 70% dispersion of the planting material on the inclined ground.

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