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REFORESTING FROM AIR: SEEDS GERMINATION AND WATER ROCKET PROTOTYPE DEVELOPMENT AS PART OF A SOLUTION TO FOREST FIRES IN GUANACASTE CONSERVATION AREA IN COSTA RICA

Abstract

This article presents part of the results of a reforestation initiative to help recover the Guanacaste Conservation Area (ACG) of Costa Rica's biodiversity after forest fires. An experiment was designed to analyze germination in three selected forest species: Madero Negro (Gliricidia sepium), Cortez Amarillo (Handroanthus ochraceus) and Cortez Negro (Handroanthus impetiginosus). These germination test results include temperature, humidity, and water control. Viability tests that include the germination percentage, and the germination speed per species under different treatments are the next step. As part of this upcoming stage, dispersion tests are designed to be carried out in a pilot plot to later determine the percentage of seeds' survival out of laboratory conditions. The seeds are released from a bio-inspired water rocket prototype, intended to be a safe, fast, and practical solution to disperse seeds in areas that are difficult to access or destroyed by fires. Our mentor is the Cardamine hirsuta plant, which releases its seeds in seconds after a little explosion. In addition, a launch pad has been developed to facilitate the execution of the rocket launch. This rocket is replicable so that, together with personnel from the Horizontes Experimental Station of the Guanacaste Conservation Area, it can be later applied by the forest rangers themselves. Part of our mission is to make their work more practical. This project aims to become an innovative mechanism for the reforestation of affected areas by forest fires and the sustainable use of aerospace research to support the restoration of ecosystems. This paper is the continuation of a preliminary theoretical initiative presented by the lead author and her collaborators (Leiton et al., 2023) at the IAF Global Space Conference on Climate Change (GLOC).