



Technology at the service of forest

Renewal mapping with drone and GPS to stake out the stand

Introduction

In the context of climate change, planting appears to be a major tool for guaranteeing the adaptation and sustainability of forests. In recent years, planting has undergone a major boom with the introduction of the French recovery plan. Most of the work carried out to renew forest stands is conducted manually, and the work site preparation phase has not benefited from any major technological advances, allowing the areas to be planted to be mapped while taking into account the constraints of the terrain. Foresters have expressed a strong interest in improving the staking stage, which accounts for 35% of the time spent during the planting process and is traditionally carried out using a compass and a decametre. As part of the PIF project, the ONF and the FCBA have developed a new mapping and staking method, based on the use of a drone and a centimetre-accurate GPS.

Methodology and results

The first stage of this method involves flying over the area to be planted using a drone capable of providing photos with optimum resolution (1 to 2 cm/pixel) and geo-referenced using RTK (Real Time Kinematic) to around 1 cm. It takes ten minutes of flying time to cover 15 hectares. If the drone is not RTK-compatible, it is possible to add positions taken from a mobile GPS, as long as these points have been marked out on the ground beforehand. The photos taken during the flight are then assembled using software and the GPS coordinates recorded, to produce an orthophotograph.

The orthophotograph produced will be used to define the future planting scheme. It will make it possible to identify the contours of the plot and the traffic routes, as well as to calculate the area to be planted and to position the future planting lines. This is a longer stage, depending on the complexity of the plot. The information gathered will enable a more accurate assessment to be made of the quantity of plants required and the time needed to complete the work properly. Following computer processing, a map will be generated incorporating the planting scheme. The data will then be transmitted automatically to a GPS via a server, and can be used directly by operators in the field to position the planting lines.

The use of the drone combined with the use of a centimetre-precision GPS by the worker has made it possible to optimize the installation of the planting lines, with productivity three times higher than with the traditional method, and to improve its ergonomics.

Lessons learned

The use of a drone, combined with the use of a centimetre-precision GPS by the worker, has made it possible to optimize the installation of the planting lines, with productivity three times higher than with the traditional method, and to improve ergonomics. Nevertheless, the use of drones remains costly and requires staff trained in their use. Flights require significant material and financial investment, as well as special administrative arrangements. This new mapping and staking method is currently being tested in the Grand Est region by several ONF work agencies. Work is also underway to develop these tools and integrate them into machines for mechanized preparation before planting, plantation maintenance or even to keep track of the location of partitioning networks on a plot of land.



Figure 1. Field materials used to optimize the installation of the planting lines.

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Further information

<https://renfor.hub.inrae.fr/projets/pif#:~:text=Le%20projet%20%C2%AB%20Plantations%20Innovantes%20en,exprim%C3%A9es%20par%20les%20diff%C3%A9rents%20acteurs.>



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