

Controlling *Scaphoideus titanus* using drones: a review of three years of trials

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Introduction

Flavescence dorée is a grapevine yellowing disease transmitted by the leafhopper *Scaphoideus titanus* and causing a huge burden to the grape production. In Switzerland, the control of the vector of this quarantine disease relies on natural pyrethrins. One to two treatments are carried out in mandatory control areas whereupon numerous plots are difficult to access and the operation of drones could consequently be a major relief. To study the effectiveness of drone-applied pyrethrin treatments, trials were set up from 2023 to 2025 in Charrat (VS) in collaboration with the canton of Valais and the company Digital Roots. In addition, visual surveys were carried out in collaboration with the canton of Vaud in Villeneuve (VD), where a few plots were treated by drones tentatively in 2024.

Material and methods

In the Pinot noir plot of Charrat the following three treatments were tested (1) Untreated control, (2) Atomizer (2 applications of Pyrethrum FS ® at 0.8 l/ha) and (3) Drone (2 applications of Pyrethrum FS ® at 0.8 l/ha) and the efficacy was assessed by a by visual counting of *S. titanus* nymphs 6 to 7 days after spraying. Insecticide applications were conducted by DJI-Agras T30 and DJI-Agras T50 drone models in 2023 and 2024, respectively, and in 2025 the two models were even compared with each other. In Villeneuve, a DJI-Agras T30 drone was used in 2024 and efficacy was assessed by the use of yellow sticky traps set up in plots treated by ground or drone application.

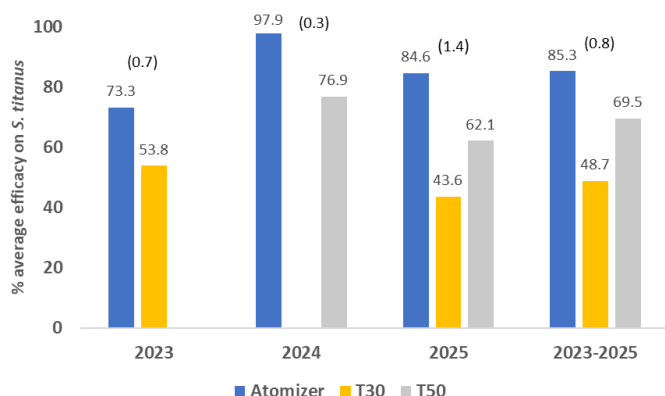


Figure 1: Average efficacy of natural pyrethrins in trials conducted in Charrat from 2023 to 2025. The values in parentheses represent the average insect densities prior to the first treatment.

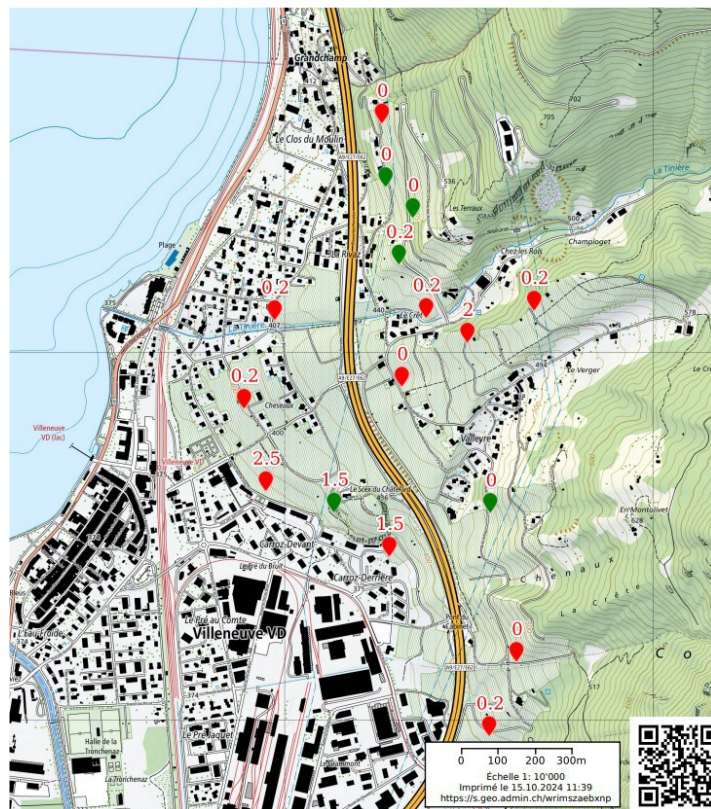


Figure 2: Plots monitored in 2024 in Villeneuve (VD) and average adult catches of *S. titanus* per trap. Red = ground treatment; Green = drone treatment.

Results and discussion

In Charrat, drone treatments using the T30 model showed an average efficacy of 48.7%, compared to 69.5% for the T50 and 85.3% for the atomizer (Fig. 1). The trials showed that on low insect populations efficacy was generally better for both the ground-treated and drone-treated variants. In Villeneuve (Fig. 2), the average number of captured *S. titanus* adults in plots treated on the ground (0.55) and by drone (0.35) did not differ significantly (p -value: 0.569). The tests carried out until today show that drones could play an interesting role in heroic vineyards difficult to access, although they are less effective than ground treatments.

Abstract

The drone was tested from 2023 to 2025 to control *Scaphoideus titanus* with natural pyrethrins. These trials have demonstrated the value of drones in controlling the primary vector of flavescence dorée in grapevines, particularly in hard-to-reach plots and where insect populations are low to moderate.