

The error of speed and path deviations during proportional spray application in vineyard. Analysis and consequences

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Introduction

Need to improve the quality on spray application process based on environmental, social and economic aspects have launched the use of new technologies in spray application in vineyard. In 2003 a new prototype for variable application rate in vineyard was developed (Gil et al., 2007; Llorens et al., 2010). The system allows to adjust the volume rate according canopy dimensions using ultrasonic sensors for determine the crop width and furthermore the tree row volume. Those measures were taken assuming a constant forward speed and a parallel path right in the middle of the row line. Possible errors in both parameters can affect considerably to the final result in canopy characterization. Those same problems and mistakes were observed and measured during the field test in citrus and vineyard (Zaman et al., 2007; Salyani and Wei, 2005) using ultrasonic sensors and LIDAR (Light Detection and Ranging).

Methodology

Variations on real forward speed and path direction of the tractor in the centre line have been measured by using a DGPS receiver placed on the tractor. An AgGPS 332 model (Trimble) was installed on the top of the tractor cabin, using the differential correction supplied by EGNOS satellites system. A Compact Field Point for acquisition and data management has been also installed in the prototype, using Labview 8.5. Field tests have been carried out in Castell del Remei (Lleida) in two different wine varieties, Merlot and Cabernet Sauvignon in spring and summer 2010.

Results

Obtained results indicate differences among theoretical and real forward speed, measured with DGPS (figure 1). Also differences between theoretical position of the tractor in the centre line and real path measured with DGPS have been quantified (figure 2). Those errors have been used to determine the difference between intended applied volume and real application, with interesting differences.

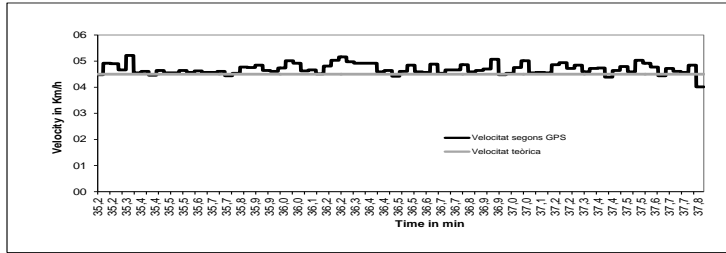


Figure 1. Forward speed variation compared with theoretical used during spraying.

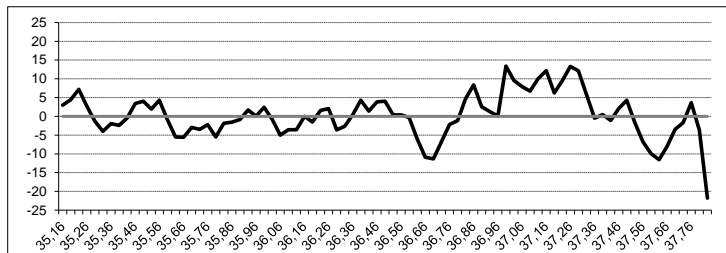


Figure 2. Path deviation respects the center line.

Once established the procedure and the methodology to determine the real values of forward speed and tractor position, the new development of the prototype will include those measurements to quantify the accurate volume according canopy characteristics.

References

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