

Assessment of different N treatments in Hedgerow Almond Orchards by means of LiDAR point clouds

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Monitoring of canopy status in fruit tree orchards allows better decisions in the canopy management, such as pruning or fertirrigation. LiDAR is an effective tool to acquire accurate 3D geometric and structural data, such as height, width, volume or canopy porosity, among others. In the present work, a super-intensive almond orchard (*Prunus Dulcis*) with 8 different N treatments (N50, N100, N150, NStop: N100 only in Fase I and with and without DMPSA nitrification inhibitor in 24 rows and 3 blocks, was scanned during three years (2019-21) in two different vegetative stages (after spring pruning and before harvesting) by means of a terrestrial LiDAR scanner. Canopy parameters such maximum height and width, cross section and porosity were summarized from the LiDAR 3D point cloud every 0.5 m along the almond tree hedgerows. A repeated measure mixed statistical model was applied to each parameter in order to assess the effect of the N treatments. The adjusted R^2 ranged from 0.73 of the canopy width to 0.83 of the porosity. Canopy parameters and their main interactions with the different treatments were significantly differentiated. The N100+DMPSA treatment was the one favoring higher canopy development (higher cross sections and widths, and less porosity), while the NStop+DMPSA treatment was related to lower canopy development and higher porosity.