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Castelló de la Plana

Cover cropping effects on olive physiology in rainfed orchards

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Olive orchards are often cultivated under rainfed conditions, although the irrigated areas are currently increasing. In Trás-os-Montes region, only 5% of the total area harvested is irrigated, and this picture will not change in the near future, due to natural limitation on water resources. Therefore, despite the importance of some high-density and super-high-density orchards that have been planted in the South of Portugal, it is still crucial for the olive sector, and in particular for many inland regions, that the rainfed orchards are managed in a profitable and environmentally sustainable way. In the experimental design cover cropping effects were investigated on a 14-year-old olive orchard (*Olea europaea* L., cv. Cobrançosa) with 240 trees ha⁻¹, grown in rainfed conditions. The commercial orchard was located in Mirandela, in the northeast of Portugal (41° 31' N; 7° 12' W). Four different soil management systems were compared: (i) development of natural vegetation, (ii) subterranean clover cover crop; (iii) white lupine cover crop; (iv) conventional tillage, included as the control treatment. The results showed that clover cover crop improve photosynthesis, the quantum effective efficiency of PSII, the photochemical quenching and the apparent electron transport rate of olive trees. Moreover, these trees presented the best water status and the leaf mass per area values. Trees with clover cover crop were less susceptible to oxidative damage, exhibiting leaves with lower contents of ThioBarbituric Acid Reactive Substances compared to the other treatments. Total leaf soluble protein content in the leaves increased in trees with clover cover crop that may represent increased activity of antioxidant enzymes. In conclusion, the clover cover crop may be a promising strategy contributing to the sustainable management of olive orchards under rainfed conditions.