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USE OF LEGUMINOUS COVER CROPS AS A SUSTAINABLE STRATEGY ON RAINFED OLIVE ORCHARDS: EFFECTS ON PHYSIOLOGY, YIELD AND FRUIT COMPOSITION

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Abstract: Olive tree is one of the most important crops in the Mediterranean basin with a huge social and economic impact. Considering the predicted scenarios of climate change, there is a growing need for the adaptation of agronomic practices, in order to mitigate the negative effects of those changes on plant physiology, yield, and olive fruit and oil quality. However, in Portuguese rainfed orchards the most frequently used soil management practice is the conventional tillage, which significantly contributes to the decline of soil health and fertility, with serious consequences to plants and environment. In this way, cover cropping has emerged as a sustainable practice of soil management, able to provide numerous ecosystem services, which contribute to crop productivity and quality.
The objective of this study was to compare the effects of a cover crop of self-reseeding annual legumes of short growing cycle (LC) with the conventional tillage (T) on physiology, yield and fruit composition of twenty-seven-year-old olive trees (*Olea europaea* L. cv. Cobrançosa) grown under rainfed conditions. The experiment was carried out during 2018 and 2019 in Trás-os-Montes region, northeast of Portugal.
The physiological performance was significantly improved on LC plants, considering the rise of net photosynthesis, transpiration rate and stomatal conductance. Moreover, LC trees registered consistently higher yields, accompanied by a significant increase on fruit weight, length and maturation index. Regarding fruit biochemistry, results were more evident on the first year, showing a decrease of total phenols, ortho-diphenols and total antioxidant activity of LC fruits, probably associated with their higher ripening state. The fruit fatty acid profile,

obtained on a Trace GC-FID (gas chromatograph with flame ionized detector), showed that in 2018 LC fruits presented higher concentration of oleic acid (C18:1) and a lower content of palmitic (C16:0) and linoleic acids (C18:2). These results give evidence that leguminous cover crops provided several benefits comparing with the conventional tillage technique. Therefore, this is a very promising strategy of sustainable soil management to implement in olive orchards under drought conditions.

Key words: Climate change, Conventional tillage, Leguminous cover crops, Olive tree, Sustainable soil management

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