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Research project: Hydromulches for weed control and water saving in a circular bioeconomy framework

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Weeds currently represent the most important factor limiting agricultural production, causing crop yield reductions estimated at 34% globally [1]. At present, herbicides and tillage are the most common weed control methods, and also plastic mulches for horticultural crops. However, the use of these techniques can cause negative effects: intensive tillage increases soil erosion, leading to a loss of fertility [2]; the use of herbicides pollutes the soil, water, food and air [3], and can cause phytotoxicities in young woody saplings or leave residues in aromatic or horticultural crops [4]; plastic mulches are difficult to recycle and have a negative impact on the environment because of its long degradation period [5]. In this context, and with the aim of avoiding these negative effects, hydromulches can be a more environmentally-friendly alternative, considering as such own made pasty mulches that dry out after application.

In this work, we present the coordinated research project “Hydromulches in woody, horticultural crops and urban environments for weed control and water saving which contribute to circular bioeconomy” (HMulchCircle) (ref. PID2020-113865RR), developed in Spain by different research teams from different institutions. The project complements a previous one (ref. RTA-2015-00047-C5), focused on the use of some hydromulches based on by-products derived from the agricultural sector, mixed with a binder and recycled paper paste and applied liquidly on the ground with subsequent solidification, and has the following objectives: 1) Evaluation of mechanized application of the two hydromulch blends that have shown the longest duration and potential in the previous project in different crops. Optimization of the mechanical application, monitoring and study of the effect on weed control. 2) Elaboration of new blends including own-made paper slurry and other lignocellulosic materials that contribute to the circular bioeconomy of each crop and agrifood industry, and characterization of the new blends (on bare soil). 3) Study of the life span of the new hydromulch materials and the weed control capacity in different crops (oak trees, aromatic plants, vegetables, saffron, vineyards, almond trees, fruit trees, forest tree nurseries, public gardens). 4) Effect of the new materials on the growth, productivity and quality of

the different crops, and their interaction with the soil properties. 5) Economic, environmental and social assessments of the hydromulch use.

The multidisciplinary nature of the project and its developing in different edapho-climatic conditions and crops will allow solid conclusions to be drawn about the usefulness of the resulting hydromulches within the framework of the circular bioeconomy and a sustainable agriculture.

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