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Study of the degradation of mulch materials in vegetable crops for organic farming

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Mulching is the most common technique used worldwide by vegetable growers in protected cultivation. For this purpose, several plastic materials have been used, with polyethylene (PE) being the most widespread. However, PE is produced from petroleum derivatives, it is not degradable, and thus pollutes the environment for periods much longer than the crop duration (Martín-Closas and Pelacho, 2011), which are very important negative aspects especially for organic farmers. A large portion of plastic films is left on the field or burnt uncontrollably by the farmers, with the associated negative consequences to the environment (Moreno and Moreno, 2008). Therefore, the best solution is to find a material with a lifetime similar to the crop duration time that can be later incorporated by the agricultural system through a biodegradation process (Martín-Closas and Pelacho, 2011). In this context, various biodegradable materials have been considered as alternatives in the last few years, including oxo-biodegradable films, biopolymer mulches, different types of papers, and crop residues (Kasirajan and Ngouajio, 2012).
In this work we evaluate the evolution of different properties related to mulch degradation in both the buried and the superficial (exposed) part of mulch materials of different composition (standard black PE, papers and black biodegradable plastics) in summer vegetable crops under organic management in Castilla-La Mancha (Central Spain).
As results, it is remarkable the early deterioration suffered by the buried part of the papers, disappearing completely in the soil at the end of the crop cycles and therefore indicating the total incorporation of these materials to the soil once the crop has finished. In the case of the degradation of the exposed mulch, small differences between crops were observed. In general, all the materials were less degraded under the plants than when receiving directly the solar radiation.
As conclusion, biodegradable mulches degrade early but once they have fulfilled their functions, appearing as a good alternative to PE, especially in organic farming.

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References:
Kasirajan, S.; Ngouajio, M. 2012. Polyethylene and biodegradable mulches for agricultural applications: a review. Agron. Sustain. Dev. 32: 501–529.
Martín-Closas, L.; Pelacho, A.M. 2011. Agronomic potential of biopolymer films. p. 277-299. In: Biopolymers. New materials for sustainable films and coating. John Wiley & Sons, New York.
Moreno, M.M.; Moreno A. 2008. Effect of different biodegradable and polyethylene mulches on productivity and soil thermal and biological properties in a tomato crop. Sci. Hort. 116(3): 256-263.