

EGU2020-4614, updated on 22 Jan 2021

<https://doi.org/10.5194/egusphere-egu2020-4614>

EGU General Assembly 2020

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## Interactions between agricultural mulching plastic debris and pesticides

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In semi-arid regions, the use of plastic mulch and pesticides in conventional agriculture is nearly ubiquitous. The use of plastics and pesticides lead both to the release of residues in the soils. The degradation of plastic and pesticide residues in the soil have been previously studied, but not together despite the fact that pesticides may be sorbed to plastics and that the sorption may change the degradation rate. In fact, the sorption of pesticides on Low Density Polyethylene (LDPE) has been previously studied, but no data is available for other plastics such as Pro-oxidant Additive Containing (PAC) plastics or “biodegradable” (Bio) plastics. The aim of this research was to measure the sorption pattern of active substances from 38 pesticides on LDPE, PAC and Bio plastic mulches and to compare the decay of the active substances in the presence and absence of plastic debris. For this purpose, 38 active substances from 17 insecticides, 15 fungicides and 6 herbicides commonly applied with plastic mulching in South-east Spain were incubated at 35°C for 15 days with a 3×3 cm<sup>2</sup> square of plastic mulch (LDPE, PAC and Bio). The QuEChERS (Quick Easy Cheap Effective Rugged Safe) approach was adapted to extract the pesticides. The sorption behaviour depended on both, the pesticide and the plastic mulch type. On average, the sorption percentage was ~23% on LDPE and PAC, and ~50% on Bio. The decay of active substances in the presence of plastic was, on average, 30% lower than the decay of active substances in solution alone. Therefore, efficacy, transport, degradability and/or eco-toxicity of active substances from pesticides may be affected by sorption on plastics. Additionally the sorption of pesticides on plastic debris may affect the plastic degradability due to the toxicity of pesticides to some soil organisms.