

Article



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Short- and long-term effects on soil microorganisms of two potato pesticide spraying sequences with either glufosinate or dinoseb as defoliant

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Abstract Pesticides applied to potatoes in Swiss integrated farming were evaluated with respect to their cumulative effects on soil microorganisms in a study performed under controlled conditions. Potatoes were treated with a series of herbicides, fungicides and insecticides and were finally defoliated either by hand in the untreated control or with the total herbicides Basta (active ingredient glufosinate) or Super Kabrol (active ingredient dinoseb). Twenty-one and 135 days after the last pesticide application soil samples were collected and analysed for microbial biomass, activity and community level substrate utilisation (CLSU). In the short-term, cumulative pesticide side-effects on microbial biomass and microbial activities averaged 19% for the spraying sequence with glufosinate and 45% for the one with dinoseb. After 135 days these values merely returned to normal. Remarkably, only the CLSU patterns based on Biolog ecoplates showed a lasting effect. We consider this an indication of change in microbial catabolic capabilities that may be due either to induced pesticide degradation capabilities or to a change within the microbial community. Even though this method has drawbacks in comparison to molecular methods of microbial community analysis—in particular because of its culture dependence—it gives a first indication that changes in the microbial community may have occurred. The microbial community structure may then be analysed in more detail with molecular tools. As an additional tool to conventional testing of agrochemicals, microbial community analysis may help in the interpretation of pesticide side-effects and open up new possibilities for their observation.

Keywords Potato - Pesticides - Soil microbial biomass - Soil respiration - Community level substrate utilization

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