
Master thesis:**The impact of pesticides on soil life, plant symbionts and ecosystem functioning**

Context

Pesticides display a corner stone of modern agriculture and are applied in large quantities to agroecosystems across the world ⁽¹⁾. Depending on their application, only a minor fraction of pesticides applied reaches its targets ^(2, 3), leading to a vast amount of potential persistent and toxic residues in the environment that might harm non-targeted organisms and affect human health ^(4, 5). While the impact of pesticides on human health is increasingly being addressed, their persistence and impact on soil health remains poorly explored. This is concerning as agricultural production relies largely on an intact agroecosystem and healthy soils capable of providing ecosystem services ⁽⁶⁾. So far, it is not clear, how the exposure to pesticides residues act as potential stressor for soil ecosystem functioning. However it has been shown that pesticides constitute a threat to soil microorganisms ^(7, 8), which drive pivotal soil processes such as carbon and nutrient cycling. Thus, the exposure to pesticide potentially threatens crucial soil ecosystem services and consequently soil fertility ⁽⁹⁻¹²⁾.

Objectives

In this project, you will conduct greenhouse experiments and perform laboratory work, in the fields of ecology, microbiology and analytical chemistry. Plants will be grown in different soils and pesticides will be applied, in order to assess the impact of pesticides on the abundance as well as the activity of soil microbes (including beneficial soil microbes such as mycorrhizal fungi and nitrogen fixing bacteria). In addition, the effects of pesticides on specific soil ecosystem functions (e.g. carbon and nitrogen cycling) will be investigated. The result of this work will help to gain a better understanding about the behaviour and bioavailability of modern pesticides in soils, and provide insight about whether they pose a threat to soil organisms, beneficial soil life, soil functioning and thus are of long-term concern for healthy and productive agroecosystems. The student will obtain experience in ecology, microbiology, statistical analysis and scientific writing. The results have relevance for policy and legislation.

Dates and application

- Starting date: flexible
- Duration: 6-12 months
- Contact: Prof. Dr. Marcel van der Heijden

Agroscope & University of Zürich
Reckenholzstrasse 191
CH-8046 Zurich, Switzerland

marcel.vanderheijden@agroscope.admin.ch, marcel.vanderheijden@uzh.ch

Literature

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