Schweizerische Eidgenossenschaft
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Eidgenössisches Departement für
Wirtschaft, Bildung und Forschung WBF
Agroscope

Master thesis or practical period:

Title: Sustainable Food Production with Biologicals – Testing the effects of beneficial mycorrhizal fungi and other microbial consortia on crop yield

Context

Modern conventional agriculture relies heavily on high fertilizer inputs and pesticides to reach high yields. However, easily available phosphate fertilizer sources will be depleted in about 50-100 years and the production of nitrogen fertilizer is energetically expensive and can have a negative on the environment. There is, therefore, an increased interest to develop more sustainable agricultural practices and search for alternatives for fertilizer and pesticide use.

Recent studies indicate that soil microbes that naturally associate with plants can be used for developing more sustainable farming practices. One group of microbes with huge potential are the arbuscular mycorrhizal (AM) fungi. AM fungi form symbiotic associations with two-thirds of all land plants and have been repeatedly shown to positively influence plant nutrition and health, as well as enhanc-ing pest resistance. Up to 80% of plant P and up to 25% of plant N can be provided by these plant root symbionts. AM fungi form associations with major crops including wheat, maize, and soybean, as well as with a number of cash crops (crops with high revenues) including tomato, cucumber, apples, and grapes.

Objectives

In this project, you will test the impact of mycorrhizal fungi and plant growth promoting microbes (e.g. Trichoderma and nitrogen fixing bacteria) on plant yield and plant nutrition under greenhouse and field conditions. The results of this work will help to develop sustainable production systems with reduced fertilizer input.

Dates and application

- Starting date: Flexible
- Duration: 6-12 months ((the whole year for greenhouse studies and the spring/ summer for field experiments)
- Note: for students from abroad: a guest house is available at our institute

- Contact:
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Literature

Banerjee, S., Walder, F., Büchi, L., Meyer, M., Held, A.Y., Gattinger, A, Keller, T., Charles, R., van der Heijden, M.G.A. (2019) Agricultural intensification reduces microbial network complexity and the abundance of keystone taxa in roots. ISME Journal (online, in press)

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Köhl L, van der Heijden M. 2016. Bauer sucht Pilz: eine fruchtbare Beziehung. Agridea Merkblatt (leaflet for farmers on mycorrhizal fungi).