Master Thesis at FiBL

Title	**Greenhouse gas emissions after field application of recycled fertilizers**
Background	In the project Recycle4Bio, FiBL together with Agroscope has established a multi-year field experiment in order to investigate the effects of various recycled fertilizers added alone or in combination with biochar. Anaerobically digested organic fertilizers such as biogas slurry, liquid and solid digestates are increasingly used in organic agriculture as an alternative to traditional manure. However, effects on yields, product quality, nitrogen use efficiency and nitrogen losses via leaching or volatilization are not well known. The combination of biochar with liquid organic fertilizers is supposed to reduce nitrogen losses and N_2O emissions, but long-term field data is missing. The subproject GHG-Recycle4Bio is focused on the quantification of soil derived greenhouse gas emissions: nitrous oxide (N_2O) and methane (CH_4). Research questions: • Do the emissions of the greenhouse gases N_2O and CH_4 differ between traditional manure and recycled fertilizers? • Can biochar amendment to biogas slurry decrease soil-derived N_2O- and CH_4-emissions? • Which factors (fertilizer composition, environment, climate) have the greatest influence on the emissions of N_2O and CH_4?
Procedure	In this MSc thesis, emissions of N_2O and CH_4 will be measured for 3-4 months after application of the fertilizers in the field using the closed chamber method during cultivation of winter barley. Field work: The fertilizers will be applied in early spring 2020 (February/March). Measurements are done at least weekly, with increased frequency after management activities. Soil parameters such as mineral nitrogen, dissolved organic carbon and pH will be quantified in order to identify the main factors governing greenhouse gas emissions. The field experiment is located on a farmer's field at 15min drive from FiBL in Wallbach, Switzerland.
Requirements	We seek a student who is highly motivated to work intensively in the field and also in the lab. Knowledge of one or more of the following

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	fields are useful: soil science, greenhouse gas emissions from soils, organic fertilizer management. Intermediate to good R skills are beneficial.
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Duration	February 2020 – July 2020
Literature	Möller, K., Stinner, W., 2009. Effects of different manuring systems with and without biogas digestion on soil mineral nitrogen content and on gaseous nitrogen losses (ammonia, nitrous oxides). European Journal of Agronomy 30, 1-16.

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