

Master 2 internship: Identify root traits effects on soil strength to traffic-induced shear in agroecosystems.

This internship is part of a thesis project working on roots effects on soil strength to traffic induced shear in agroecosystem. Traffic induced soil compaction is known as one of the major threats to soil quality in European arable field (Berge et al. 2017). Soil compaction could be described as the sum of two forces: compression (i.e. the vertical force applied) and shear (i.e. the horizontal force applied). Compression mainly lead to decrease soil porosity, while shear mainly lead to decrease pore continuity on the top soil (Berisso et al., 2013). Both will impact soil hydrodynamics properties. Shear will have harmful impact on water and air exchange in the topsoil and therefore on water availability and yields.

Conservation agriculture aim to preserve soil physical state (e.g. pore continuity) by reducing or removing soil tillage. Shear consequences on the topsoil can thus be problematic for farmer in conservation agriculture who will particularly suffer from the shear-induced pore continuity loss.

Improving soil shear strength (i.e. resistance to shear) could be a good solution to limit traffic-induced soil degradation. Positive effects of roots of perennial species on soil shear strength have been showed in studies working on slope stability (Stokes et al., 2009 among many others). Results from these studies allow to think that roots of annual species found in agroecosystems could have a positive impact on soil shear strength.

This internship have multiples objectives: i) quantify root effects of annual species on soil shear strength ii) characterise root traits implied in the soil shear strength using the functional trait approach (Faucon et al., 2017), iii) identify and select the most interesting traits to increase soil shear strength.

Mission

1. Literature research on root traits effects on soil shear strength,
2. Participation in the field sampling campaign which include : i) root trait quantification, ii) soil shear strength measurements, iii) measurement of the soil hydrodynamics state,
3. Implementation of an ex-situ experimentation under controls to study roots traits effects on soil shear strength of 10 cover crop species. It include: i) implementation of the experiment, ii) root trait and soil shear strength quantification, iii) analysis and discussion of experiment results. This task is the internships main objective.

Desired profile

Master 2 in Agronomy, Ecology or Environmental sciences

Taste for scientific research and affinity for statistics and R software is a plus. Scientific rigour, autonomy and a good English level are required.

Knowledge on soil sciences is an asset.

Internship location and conditions

This internship take place at UniLasalle in Beauvais (France). The intern will benefit of the multiple services available on the campus (100 student associations, fitness room, university restaurant...). He/she will appreciate the campus landscape, its 30 ha of forest and its 150 ha of arable fields.

<https://www.unilasalle.fr/>.

This internship will be done among the Agricultural Machinery and New Technologies Chair of UniLaSalle <https://blogs.unilasalle.fr/chaire-agro-machinisme-nouvelles-technologies/>, in the research team AGHYLE UP 2018.C101, and in collaboration with all the contributors of the project : Matthieu Forster (PhD Student), Michel-Pierre Faucon (assistant professor in plant ecology and agroecology ; Research director), Carolina Ugarte (assistant professor in soil physics) and Mathieu Lamandé (Aarhus University ; Researcher in soil physics and mechanics and in hydropedology)

Duration: 6 months

Beginning period: Between the 15th February and the 15th March

Gratification: legal basis for internship compensation. Housing facilities available on campus.

Contacts

To candidate, send your CV and a motivation letter to Matthieu Forster (intern supervisor; matthieu.forster@unilasalle.fr) with in copy Michel-Pierre Faucon (intern co supervisor; Michel-pierre.faucon@unilasalle.fr) and Carolina Ugarte (intern co supervisor, carolina.ugarte@unilasalle.fr)

References

Berge, H.F.M. ten, Schroder, J.J., Olesen, J.E., Giraldez Cervera, J.V., 2017. Research for AGRI Committee- Preserving agricultural soils in the EU. European Parliament, Policy Department for Structural and Cohesion Policies, Brussels.

Berisso, F.E., Schjønning, P., Lamandé, M., Weiskopf, P., Stettler, M., Keller, T., 2013. Effects of the stress field induced by a running tyre on the soil pore system. Soil Tillage Res. 131, 36–46.

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