Publicación de la oferta y baremo

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Titulación requerida

Ingeniería Agronómica o Master Universitario en Agrobiología Ambiental o Master Universitario en Ingeniería Agronómica o asimilables

Tareas a realizar

La persona a contratar debe de tener conocimientos básicos en sistemas de cultivos de plantas (hidroponía pura, fertirriego, etc), procesos de compostaje y fisiología vegetal básica. Asimismo, se requerirá un conocimiento básico de técnicas analíticas para determinación de metabolitos, actividades enzimáticas, etc.

Descripción de las labores que desarrollará en las diferentes tareas del proyecto:
1) Crecimiento de plantas en sistemas de cultivo sin suelo en cámaras de crecimiento e invernaderos.
2) Formulación de soluciones nutritivas, mantenimiento de instalaciones de fertirrigación e hidroponía, cambios de solución, recogida de muestras y análisis de evolución de nutrientes, pH y conductividad
3) Seguimiento de parámetros fisiológicos in vivo (ej. parámetros Dualex, fotosíntesis, conductancia estomática, fijación biológica de nitrógeno, etc.)
4) Cosechas con medición de biomasa, congelado inmediato y secado de muestras para sus posteriores análisis. Molienda de material tanto congelado (en frío) como seco (a temperatura ambiente)
5) Preparación de extractos y determinaciones de metabolitos por cromatografía iónica, electroforesis capilar…
6) Determinaciones metabólicas: Actividades enzimáticas del metabolismo primario del nitrógeno de plantas, inmunodetección de proteínas.

Sobre el proyecto

Titulo:
Re-evaluación de la aplicación de fertilizantes nitrogenados orgánicos e inorgánicos sobre la fijación simbiótica de nitrógeno en leguminosas: agricultura sostenible y economía circular (**NitroSym**)

Brief description of Objectives and Methodology

The main objective of **NitroSym** is to provide **new physiological and molecular insights controlling the regulation of symbiotic nitrogen fixation, with practical implications in the management of N fertilizers and organic compost applications to N_2-fixing crops.**

To achieve this goal, we will employ two closely phylogenetically related legume plants: the model legume *Medicago truncatula*, for which multiple resources are available, including genomic information, and the crop *Medicago sativa* (alfalfa), the second most widely cultivated legume in Europe. We propose three specific objectives:

- Objective 1. To identify key N availability concentrations inhibiting SNF *in planta* as measured using apparent nitrogenase activity assays in *M. truncatula.*

- Objective 2. To analyze the effects of the long-term application of N fertilizers in N_2-fixing *M. sativa* (alfalfa) plants.

- Objective 3. To identify new molecular mechanisms involved in the nitrate-based inhibition of symbiotic nitrogen fixation in *M. truncatula*: connection between nitrate transport/signaling and ethylene.

Nitrate-based inhibition of symbiotic nitrogen fixation has been known for decades. However, only recently we have started to understand the molecular mechanisms controlling this regulation. It has been established that members of the family of NIN transcription factors are involved. Also, the plant hormone ethylene has been implicated in this response. Nevertheless, **the molecular mechanisms connecting nitrate sensing and the ethylene-mediated inhibition of nitrogen fixation in legumes remain largely unknown**. Additionally, past works analyzed this inhibition based indirect techniques such as the acetylene reduction assay, a technique which, despite its widely spread use, has been shown prone to errors. In NitroSym we will carry out doses dependent experiments, monitoring the effect of the full range of N acquisition systems (HATS and LATS) using a superior technique, apparent nitrogenase activity, in intact plants. We will take advantage of the availability of a hyper-nodulating *M. truncatula* mutant, *skl*, which is ethylene insensitive, to evaluate the contribution of this hormone to the inhibitory process. We will perform three types of approaches: one focused on the analysis of **short-term** physiological responses **(Objective 1),** physiological effects of **continuous long-term applications (Objective 2) and molecular responses (phosphorylation at the protein level)** associated with very rapid changes related to nitrate signaling processes **(Objective 3).**