FACCE-JPI is the **Joint Programming Initiative on "Agriculture, Food security and Climate change"**. It brings together 21 European and associated countries to coordinate their research capacities to address the vital challenge of ensuring sufficient production of food, as well as feed, fibres and bio-fuels, in the context of demographic growth and a changing climate.

The Multi-partner Call on Agricultural Greenhouse Gas Research, initiated by FACCE-JPI with the American National Institute of Food and Agriculture of the USDA, New Zealand's Ministry for Primary Industries and Agriculture and Agri-Food, Canada aims to bring together excellent research consortia to enhance international collaboration in the face of the global issue of climate change mitigation.

In the frame of this call, the following project has been recommended for funding:

Basic Data

Title	**Manipulating Grass - Fungal Endophyte Symbioses to Reduce Greenhouse Gas Emissions and Increase Soil Carbon Sequestration in Grasslands of Finland, Spain, and the United States**
Acronym	**EndoGas**
Theme	Study of mitigation options at the field, animal and manure management scales with quantification of their technical potential for a range of agricultural systems and regions
Topic	Greenhouse gas emissions in the agriculture sector arising from agricultural soils including crops and grasslands, domestic livestock and waste management systems
Duration	01.01.2014 – 31.12.2016
Total cost (in €)	432 095€
Requested funding (in €)	325 183€

Coordinator

Organisation Name	**University of Kentucky**
Country	**USA**
First Name	Rebecca
Lastname	McCulley
E-Mail	ebecca.mcculley@uky.edu
Phone	001-859-257-6388

Partners

Organisation Name	**MTT Agrifood Research Finland**
Country	Finland

Organisation Name	**CSIC**
Country	Spain

Summary

Cool season grasses cover significant acreage in temperate locations, providing forage for pastoral grazing systems and contributing to ecosystem services such as biodiversity and soil carbon sequestration. Many of these grasses are capable of forming symbiotic associations with fungal endophytes that can enhance the environmental stress tolerance of the host plant and confer anti-herbivore and -pathogen activity. Such symbiotic associations have been manipulated in agronomic and turf cool season grasses for ~20 years, by seed industries eager to capitalize on the natural 'benefits' of the symbiosis. While effects of these grass-endophyte associations on aboveground parameters (such as animal production, plant production, and plant and insect diversity) have been well-studied, much less work has been done to evaluate whether there are effects on belowground parameters. Recent studies have shown that for at least one grass species, tall fescue, fungal endophyte presence can stimulate soil carbon sequestration, and fungal endophyte strain can alter the flux of two important greenhouse gases, CO_2 and N_2O, from the soil to the atmosphere. To our knowledge, there has been no equivalent work exploring whether these types of endophyte effects are also observed in other important cool season grass species or in other locations. To fill this knowledge gap, we propose to quantify fungal endophyte symbiotic effects on greenhouse gas (GHG) emissions and soil carbon sequestration for three cool season grasses (meadow fescue, red fescue, and tall fescue) that are common in Europe and the United States. We will utilize existing projects located primarily in Finland, Spain, and the United States to achieve this objective. We hypothesize that grass-endophyte symbioses will vary in their ability to impact soil carbon sequestration and GHG fluxes. We will also construct a unique database from our efforts and make it publicly available on a project website, in an effort to facilitate and promote additional international work and analyses evaluating grass-endophyte effects on belowground processes. This proposal represents a new collaboration between the three partners and addresses a topic of national priority to all three countries involved, as well as the larger international community; therefore, our proposal contains significant international added value. By exploring whether plant-microbe symbiotic interactions can promote environmental benefits, by lowering GHG emissions and increasing soil carbon sequestration, while simultaneously continuing to support agricultural production, our research may directly improve agricultural sustainability of temperate grasslands worldwide and help mitigate future additional changes to atmospheric GHG concentrations.