FONTAGROTECH

Reduction of greenhouse gases in potato-pasture production systems in Ecuador and Peru

ECUADOR, PERÚ

Webstory

Technological solution

The measurement of greenhouse gas (GHG) emissions, mainly carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), is essential for understanding the environmental impact of agriculture and developing effective climate change mitigation strategies. Quantifying these emissions makes it possible to identify the main GHG sources within production systems, evaluate the effects of agricultural management practices, and generate technical information under real field conditions. In addition, it contributes to improving the efficiency of fertilizer and soil resource use, promoting sustainable and resilient production systems. In Andean regions such as Ecuador and Peru, where small-scale agricultural systems and high climate sensitivity predominate, this information is crucial for strengthening the sustainability of agroecosystems. Furthermore, GHG monitoring provides scientific evidence to support the development of public policies.

Technological description

Nearly two-thirds of agricultural greenhouse gas (GHG) emissions come from nitrous oxide (N_2O), a gas with a global warming potential significantly higher than carbon dioxide. These emissions are mainly generated through the biological and physicochemical transformation of nitrogen fertilizers and organic matter in the soil, processes intensified by conventional agricultural practices such as excessive tillage and inefficient fertilizer use. In potato-pasture production systems in Ecuador and Peru, these conditions can contribute to soil degradation, loss of organic carbon, and reduced production efficiency. In this context, the project proposes the implementation of conservation agriculture practices, including reduced tillage, efficient fertilizer management, and soil cover management, with the aim of decreasing GHG emissions and improving the sustainability of Andean agroecosystems.

Impacts and results

As expected results, the initiative aims to characterize potato-pasture production systems in Chimborazo (Ecuador) and Jauja (Peru). Agronomically, the project will evaluate the impact of conservation agriculture versus conventional practices on crop productivity, soil nutrients, and economic returns. Simultaneously, greenhouse gas emissions from experimental plots will be quantified using gas chromatography and compared against intergovernmental panel (IPCC) estimates. The generated productive, environmental, and socioeconomic data will be integrated into mathematical models to facilitate regional scaling. Finally, technical validation will strengthen the capacities of local researchers and transfer the findings to producers through training workshops, technical notes, and targeted dissemination materials.

40 Learning plots

8 Training workshops

5 Treatments

+ 15 % Yield

- 20 % GHG emissions

1500 Beneficiaries

50 % Trained women

100 Benefited students

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