

# Conservation Agriculture as a Potential Pathway to Better Resource Management, Higher Productivity, and Improved Socio-Economic Conditions in the Andean Region

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## THE CONTEXT

A challenge facing the Andean Region (AR) is finding agricultural practices to raise incomes while enhancing the natural resource base. Recent and forecasted climate changes will increase stress on and vulnerability of these systems. Evidence of stress is found in two sub-watersheds in Ecuador and Bolivia, where our project will test the concept of conservation agriculture (CA) for smallholder farmers.



## METHODS

1. Identify feasible conservation agriculture practices (e.g. tillage practices, cover crops and rotations);
2. Determine agronomic feasibility and impacts on outcomes of interest;
3. Investigate synergies among practices;
4. Field-test CAPS;
5. Conduct research on economic viability of practices and steps that can be taken to improve CAPS profitability; and
6. Conduct outreach.



## OBJECTIVES

1. Identify and evaluate production practices and farming components that can be assembled into CAPS;
2. Validate candidate CAPS in terms of impacts on: soil health, soil retention and carbon and other nutrient balances; sustained productivity; profitability; risk bearing; environment; compatibility with household livelihood strategies; and social conditions including gender considerations;
3. Promote adoption of the most appropriate CAPS by identifying mechanisms to increase their profitability;
4. Design and evaluate mechanisms for disseminating results to similar areas; and
5. Strengthen the capacity of government and non-government institutions to develop and disseminate CAPS in the Andean regions of target countries

## EXPECTED RESULTS

1. Evaluate costs and benefits of CA practices and CAPS to identify the most promising packages for extension to farmers. Our evaluation will consider impacts on soil health, long-term productivity, and economic and social considerations.
2. We will produce a menu of associated agronomic practices to control pathogens and improve productivity while lowering costs. These will include IPM techniques for pathogen control, soil amendments and others.
3. Several tools will be generated for use by farmers, extension agents and other researchers: Soil nitrogen assessment tool, Soil carbon assessment tool and CA adoption probability assessment tool (for identifying likely adopters)
4. Institutional assessments: PES assessment and Market access assessments
5. Training outputs.



## RESEARCH PROGRESS BY OBJECTIVE

### Objective 1

- Field research design established using vulnerability maps
- Potential CA components for each farming system assessed.
- Most likely full CAPS for each farming system identified in both countries: Soil conservation practices, rotation, tillage, ground cover, intensive pasture management

### Objective 2

- Protocol for evaluating soil and crop sustainability in experiments created.
- Protocol for measuring economic dimensions of CAPS created.
- Mexican nitrogen index tool adapted to conditions in Ecuador and Bolivia.

### Objective 3

- Biological controls and biological inputs for improved productivity refined.
- Protocols for integrating biological controls into our conservation agriculture systems



### Objective 5

- *Soil health and productivity:* Baseline soil samples have been taken on farmer fields. Protocol for measuring erosion loss under different CA management practices has been established. Training in use of nitrogen index has been undertaken.
- *Economic and social :* Protocols for collecting data on costs for all field experiments established. Market data on input and product prices collected. Regular participatory assessments are conducted
- *Environmental:* Research protocol within soil erosion test plots used. These plots include metal-demarcated boundaries, erosion collection points, and mechanisms for monitoring rainfall events. Water quality monitoring program reinstated.

### Objective 6:

- Gender sensitivity training for all project staff conducted.
- Four long-term graduate trainees (all women) have started their programs at US universities

## PROJECT HIGHLIGHTS

- Experimental trials have been designed and protocols for measuring key variables have been established.
- Costs of production are being measured
- Several satellite trials have been started to examine effectiveness of biological controls and soil amendments.
- Gender training for both country teams has been completed.
- A nitrogen index prototype has been developed. This tool will assist farmers and extension agents in evaluating nitrogen balances without resorting to costly soil chemical evaluations.