



**Putting an economic value on cover crops:  
Impacts on profitability and soil quality in a conventional tomato system**

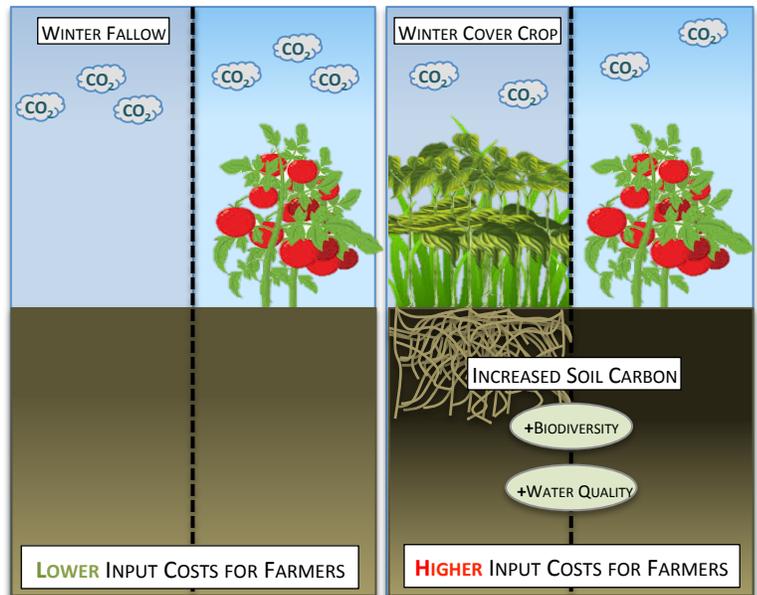
**The Challenge:**

Cover crops (CC) increase soil organic matter (SOM), which provides a series of benefits:

- Soil carbon (C) sequestration
- Filtering of nutrients and pollutants
- Reduced sediment erosion and dust
- Improved soil structure and water holding capacity
- Increased biodiversity

However, cover crops require additional costs to farmers for seeds, fuel, labor, and equipment inputs. Potential benefits to the farmer may take several years to take effect.

*How do cover crops change the economics of a conventional tomato system, and can we incentivize cover crop use by paying for C?*



**Methods:**

We conducted a Land Use System (LUS) economic analysis<sup>1</sup> using data on operations, fuel use, labor hours, water use, and other inputs collected at Russell Ranch. The LUS modeled a 1-acre conventional tomato-corn plot at Russell Ranch, but modified the rotation to be 3 years of tomato into 1 year of corn. The model spanned 24 years and calculated the *net present value (NPV)* of each scenario below. NPV is a measure of profitability based on future costs and benefits that are discounted to give the present value. The discount rate used here was 4.25%.<sup>2</sup>



**Results:**

Use of cover crops reduces the NPV of the conventional system compared to without cover crops due to increased inputs and labor. Reduced water and fertilizer use help to offset these costs, but NPV in the scenarios with cover crops remains low.

*How can we value the social benefits of cover crops to incentivize their use?*

**Valuing C:**

Data from Russell Ranch show that in 20 years, tomato-corn plots with cover crops (mixed system) have gained 2.11 ton C acre<sup>-1</sup> over conventional tomato-corn plots without cover crops (0-30 cm).<sup>3</sup> However, in order to make up for the loss in NPV, the price of C would be between \$2600 and \$3250 per ton C, higher than the price in any C market globally.<sup>4</sup>

**Alternatives to paying for soil C:**

Valuing only soil C causes the price per ton to be too expensive compared to global C markets. However, if we can *value other ecosystem services* provided by cover crops, such as reduced erosion or filtering of nutrients, we can compensate farmers for all of the societal benefits they provide, not only C sequestration.

<sup>1</sup>Vosti et al., 1997; <sup>2</sup>Wright et al., UC CE, 2015; <sup>3</sup>Chiaras et al., in prep; <sup>4</sup>World Bank Group/ECOFYS Report, 2014