**Condition Change: UC ANR contributed to protection and conservation of soil quality**

**Issue**

Soil health is essential for productive agriculture lands.  Critical issues that require solutions in California include addressing salinity and nutrients in the soil. Healthy soils can lead to reduced greenhouse gas (GHG) emissions, and improvements in crop yields, drought and flood tolerance, and air and water quality. Soil health can be improved through farm management that increases soil organic matter. Proper understanding and care of soil is essential for a healthy and abundant food supply for Californians.

**Methods**

UC ANR develops research projects and extends information throughout the state to better monitor and understand soil composition, impacts from agricultural uses, and improved management strategies to conserve soil.

Current research at the UC Davis Agriculture Experiment Station location focuses on understanding the interactions of soils and soil microorganism communities and how these relate to nutrient availability and uptake in agricultural systems. Collaborative research on soil amendments such as compost, biochar and biosolids demonstrates how soil biology is directly relevant to production and supports economic and environmental sustainability (Kate Scow).

University of California Cooperative Extension (UCCE) scientists conducted research and extended information about soil management practices. One UCCE scientist conducted soil health management workshops for new and beginning small farmers to improve their agricultural productivity (Aparna Gazula). Other UCCE scientists led the formation of the Orchard Cover Crop Support Network of Yolo, Solano, and Sacramento Counties. A five-part series of meetings on soil health was organized for the network, which empowers growers and managers to learn from each other as they implement cover crop use in their orchards (Katherine Jarvis-Shean and Emily Lovell). A 3-year field test is evaluating the use of winter cover crops into annual production in the Sacramento Valley. In addition, the benefits of cover cropping, composting, and reduced tillage was extended through demonstration field days (Amber Vinchesi and Sarah Light).

Because there is not a certification program in California for laboratories that conduct soil analysis, growers, consultants and analysts are left without reliable means to select a laboratory.  An assessment of the quality and reliability of eight commercial laboratories was carried out to provide users with science-based evidence of the accuracy and precision of soil chemical analysis (Andre Biscaro).

As a result of UC ANR research, outreach and education, growers learned and adopted practices that demonstrated improved soil quality and conservation practices. Outcomes with specific measured indicators follow.

**Outcomes**

**Participants learned about or intend to adopt recommended soil management practices.**

* As a result of the soil health management workshop for new and beginning small farmer education
  + 74% or more of the 28 participants increased their knowledge of the following: cover crops, composting, soil amendments, conservation tillage and soil health assessment
  + 66% of attendees indicated that they would adopt one or more practices discussed during the workshop. (Aparna Gazula)
* Through the Orchard Cover Crop Support Network, 27 growers and managers, including representatives from some of the biggest management companies in Yolo and Solano County, gained knowledge about implementing cover crop use as a soil conservation tactic, and made connections to continue to learn from each other. (Katherine Jarvis-Shean)

**Participants adopted recommended soil management practices.**

* A participating grower in the cover crop field trials, saw improvements in soil health including reduced weed pressure in cover crop treatments, and increased total carbon and nitrogen in the topsoil. Additionally, early adopters of improved soil health practices in the Sacramento Valley using cover crops and compost have reduced water use, and seen reduced pest pressure from using soil health practices. (Amber Vinchesi and Sarah Light)

**Science-based information was applied to soil decision making.**

* Growers, consultants, and academics have used the results of the soil laboratory assessment to reassess which laboratory to use. Improved profitability, research accuracy, and environmental sustainability are expected from this study. (Andre Biscaro)

These measured outcomes demonstrate growers learned and adopted practices that improve soil quality and conservation. As growers adopt healthy soil techniques, it could lead to improved soil quality while benefiting the biodiversity of the soil. For example, from 2016 to 2017 there was a 2.4 million pound reduction in fumigant pesticides used in California. Through these efforts, UC ANR contributes to the public values of protecting California’s natural resources.