Introduction

- Irrigated cropland in California accounted for about 9 million acres in 1995.
- The conversion of native lands to irrigated cropland affects organic matter dynamics and storage by changing the vegetative cover, inputs of organic materials, and soil moisture and nutrient content.
- Irrigated soils have been shown to both increase and decrease the total soil organic carbon content compared to the native soil (pre-cultivated conditions).
- It is not clear how the conversion of native land to irrigated cropland has affected organic carbon storage and dynamics in arid-zone soils within California.

Study sites

- Two areas were chosen for sampling: near Wasco in the San Joaquin Valley and near Holtville in the Imperial Valley (Figure 1).
- Climate data for the study areas:
  - San Joaquin Valley
    - Soil samples were from 4 sites: a native site and 3 sites that were cultivated for either 10, 20, or 30 yrs.
    - Within each site, samples were taken from 6 locations (replicates) at four depths.
  - Imperial Valley
    - Soil samples were from 5 sites: a native site and 2 sites that were cultivated for either 50 or 90 yrs.
    - Samples were taken from 5 locations (replicates) at four depths.

Results

To gain insight into changes in carbon storage in native soils and cropland soils under various management systems

Wasco, San Joaquin Valley

Holtville, Imperial Valley

Conclusions

- Preliminary research indicates that irrigated agriculture increases the soil OC content in the upper soils profiles (0 to 60 cm). Deeper in the soil profile, however, the total OC content is essentially the same in native and irrigated soils for both sites.
- Irrigated agriculture also increases the labile OC in the upper soil profiles for both sites. Cultivation length does not seem to have a significant effect on labile OC content.
- Future research is needed to compare OC dynamics in native and irrigated soils.

Research in Progress

- To gain insight into OC dynamics we will use:
  - carbon-13 nuclear magnetic resonance (C\textsuperscript{13} NMR) spectroscopy analyses of bulk soil samples to understand organic matter transformation process with soil depth and with increasing time of cultivation; and
  - total OC and C\textsuperscript{13} isotopic measurements on soil physical fractions (i.e. sand, silt, and clay size fractions) to understand mechanisms of OC storage.