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Title: H43G-2535 Evapotranspiration-based Irrigation Scheduling in Cool-Season Vegetables

Abstract:
Crop evapotranspiration (ETc) is strongly linked with photosynthetically active vegetation fraction (Fc). Estimation of ETc may support efficiency gains in irrigation water management, which in turn can mitigate nitrate leaching, promote water supply sustainability, and reduce energy costs associated with water pumping or transport. The University of California Cooperative Extension operates the CropManage (CM) model as a freely-available web-application for growers and consultants to support irrigation and nitrogen scheduling decisions. CM accounts for the rapid growth and typically brief cycle of cool-season vegetables, where Fc and crop coefficient (fraction of reference ET) can change daily during canopy development. Daily weather conditions are inherently accounted for by use of grass reference ETo data imported from the California Dept. Water Resources. Crop water requirement calculations are output in terms of irrigation system runtime. Empirical equations are used to estimate daily Fc time-series for a given crop type, primarily as a function of planting date and expected harvest. An applications programming interface (API) enables CM to import satellite-based Fc observations from NASA's Satellite Irrigation Management Support, which uses Landsat imagery to monitor about eight million irrigation acres statewide. The API is intended to provide a check on internal CM predictions of Fc and to facilitate expansion of the web-app to new crops and regions. A replicated irrigation trial was performed on cauliflower during spring/summer 2018 at the USDA Agricultural Research Station in Salinas, CA. The crop was established by sprinkler irrigation, and CropManage was then used to guide a series of drip irrigation treatments at 50%, 75%, 100%, and 150% of ETc replacement levels. Results will be presented with respect to water use efficiency, nitrogen use efficiency, biomass yield, and marketable yield. Additional findings will be presented for a celery trial harvested during autumn 2018.

Key Words: Evapotranspiration-based, Irrigation, Cool-Season, Vegetables