Agriculture is a major part of the economy in California. Farmers grow a wide variety of crops, including almonds, oranges, and tomatoes, but these are primarily perennial or warm-season crops. In the winter, or cool-season, the Mediterranean climate of California could also support brassica species, including oilseeds like canola (*Brassica napus* L.). Currently, safflower (*Carthamus tinctorius*) is the main oilseed grown in California, but cultivars of canola adapted to these climate conditions may provide a new option for growers.

Stephen Kaffka and Nicholas George at the University of California–Davis have evaluated oilseeds as cool-season crops in California. “I was familiar with [canola] from back in Australia,” explains ASA and CSSA member George, who is originally from Australia. “And you could [see the] potential for it as a crop here.”

Recent changes in California energy policy and restrictions on irrigation water supplies have also increased the interest in oilseeds as winter crops. “[The new policies] desire to see in-state feedstock production for in-state fuel production,” says Kaffka, a member of ASA, CSSA, and SSSA. “So, besides the food oil and protein feed markets available for canola, there would be also an industrial use as a feedstock for bio-diesel or potentially bio-jet fuels.”

Given the potential for canola, the researchers wanted to model canola production across the state. Modeling is a faster and less expensive approach for evaluating how canola might perform at different locations compared with field studies. Kaffka and George report their findings in *Agronomy Journal* (http://bit.ly/2sZD47B).

The first step was to evaluate the reliability of the Agricultural Production Systems Simulator, or APSIM, model for simulating canola production in California. “APSIM uses input information regarding things such as climate, crop management, and soil to simulate various biophysical aspects of cropping systems and their interactions, such as the phenology, water, and nutrient uptake of many crop species, and the behavior of water, solutes and organic matter in the soil,” George explains.

To evaluate the APSIM model, the authors used data from a multi-site study, where different varieties of canola were grown across California. Details of the field study were published in *Crop Science* (http://bit.ly/2rY7zMQ).

The authors found that the predicted values for seed yield, biomass accumulation, seed production, and phenology from the APSIM model had good agreement with observed values from the field study. Satisfied with the accuracy of the APSIM model, the authors were able to run numerous scenarios. Specifically, the authors evaluated canola growth under different irrigation scenarios and potential future climate conditions.

Irrigation simulations included rainfed, pre-sowing irrigation, and irrigation throughout the winter. Precipitation was expected to be a limiting factor, and only one region,
the northern Central Valley, is likely to support rainfed production. The estimated yield from rainfed production in the region was 3,500 kg/ha. Other regions modeled, including the San Joaquin Valley and Imperial Valley, would require irrigation for production to be economically viable. The predicted yields for canola crops with irrigation ranged from 4,000 to 6,000 kg/ha, depending upon site and irrigation practice.

The researchers also evaluated canola production under future climate conditions, which are predicted to become warmer and dryer. Although any future climate predictions come with uncertainty, “the modeling at least provides a baseline for thinking that [canola] will remain a useful crop choice for the foreseeable future under changing climate,” Kaffka says.

In a low CO2 emissions simulation, yield losses were as great as 20%. However, under a high-emission scenario, yields did not decline. This suggests that greater CO2 levels could offset some of the negative impact of increased temperature.

In addition to canola’s value for food and biofuel production, farmers could benefit from added crop choices in the winter period. For example, canola can act as a disease break in wheat fields and a resource for pollinators. “Having good pollen and nectar sources like canola throughout the state would be very beneficial for beekeepers and native pollinator species,” Kaffka says. Considering the reliance upon bees for pollination of crops like almonds, canola can have an indirect benefit on other crops.

There are some challenges to widespread adoption of canola as a winter crop. For one, “[farmers] have to really be a bit more timely in [their] management of canola compared with wheat,” Kaffka says, given the narrower harvest window for canola. There is also an issue of perception—if farmers perceive canola to be difficult to grow, or if it is not profitable, they will not grow the crop.

To overcome hesitation on the part of farmers will require additional research and economic analyses. The high yields observed in trials of the most promising varieties are essential. Kaffka and George hope to continue to collaborate with and learn from canola growers and researchers across the U.S., Canada, and Australia.

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