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Dr. Jeff Dlott, Chair
Environmental Farming Act (EFA)
Scientific Advisory Panel (SAP) of the
California Department of Food and Agriculture (CDFA)

Re: Public Comments on Recommendations of the Ad Hoc Advisory Group on the SWEEP

Dear Chair Dlott,

This letter with joint comments below in response to the request for Public Comments on Recommendations of the Ad Hoc Advisory Group on the State Water Efficiency and Enhancement Program issued May 2021. The following comments are made jointly by Brian Kolodji, PE and owner of California companies Kolodji Corp and Black Swan, LLC, providing engineering and patented technologies for Free Air of Carbon Dioxide Enrichment, and awardee with Dosanjh Bros of a 2018 SWEEP grant, an SDFR located in an SDAC; Dr. Bruce Kimball Retired Collaborator and Soil Scientist of the US Arid-Land Agriculture Research Center (ARS), USDA, Maricopa, AZ and VP of The Greenleaf Group, Phoenix, AZ; and Dr. Brian Marsh, current County Director, UC Cooperative Extension- Kern County. These joint comments address and provide recommendations regarding primarily the first question posed by CDFA's SAP about SWEEP, specifically the program's ability to help farmers improve water use efficiency- what's working well and what might the program seek to improve (as noted on page 3.)

First, we introduce "Free Air Carbon (Dioxide) Enrichment" or FACE, the practice of exposing open-field crops to elevated concentrations of CO₂. The source of CO₂ could be a natural gas fired well pump, a nearby almond processing plant boiler, or other industrial CO₂-emitting equipment. The amount of enrichment is from ambient CO₂ concentration (about 400 ppm) up to circa 600 ppm. Results of research by the Brookhaven National Laboratory (BNL), USDA, and other groups have shown yield increases of woody crops of 40 to 70% and increase water use efficiency (WUE) of 40 to 80%. Assuming almond responds similarly to other woody crops, the expected yield increase for an almond orchard is 40%, and WUE is 55%. For citrus in open-top chambers, increases of yield and WUE were about 70% (see attached publications by Kimball et al. and Leavitt et al.)

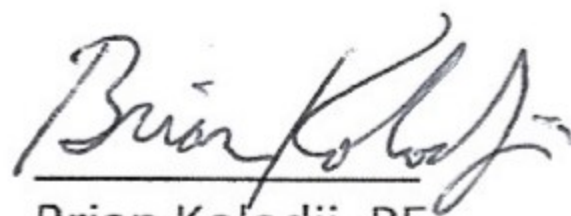
The Dosanjh Bros were awarded a \$100,000 2018 SWEEP award to practice the significant water saving innovation of FACE technology in a 50-acre Almond Orchard in Bakersfield. What has worked well because of SWEEP are the successful short-term trials showing sustained increase in CO₂ in the biosphere of over 1000 ppm CO₂ in a small portion (less than an acre) of the orchard under treatment, as made possible with CDFA funding. With less than \$5000 expended so far, this effort is one of the world's largest FACE facilities to date. These initial results were published by the authors of these comments and were widely acclaimed at the 2020 Agronomy Society of America National Meeting.

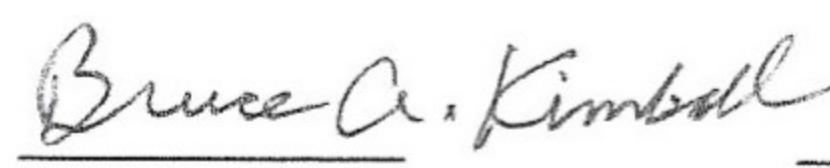
A comment for improvement of the SWEEP program is in line with recommendation on the bottom of page 16 and on pages 20 through 22 regarding the "Quantification of Project Benefits", specifically the calculator for Green House Gas and Water Savings. The calculators as currently provided only allow for CO₂ reduction credits due to savings in the irrigation water pump power. Ignored by the current calculators, and thus GHG savings not credited to FACE technology use is the biosequestration of the CO₂ in the biomass of the trees in the almond orchard, as well as the increase in yield. For each acre, an expected increase of a ½ ton per acre minimum is expected, all of which can be attributed to CO₂ biosequestration. Further, the whole tree biomass (the trunk, branches, base, roots, etc. fixed in place for up to 30 years) can increase by 70% as shown by Kimball et al. (2007) in the seventeen-year-long citrus tree study (attached), and none of such biosequestration is allowed to be credited as GHG savings.

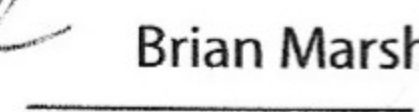
It is hoped that CDFA SAP will allow for additional funding of FACE technology if funded in the future. There are several entities (wineries, refineries, power plants, food production/ processing) throughout California with CO₂ emissions in the millions of tons that can be used as sources for nearby almond orchards. A new recommendation is to allow for these entities to apply for FACE technology application for nearby orchards. Further, it is hoped that the funding maximum amount can be increased to \$300,000 to allow for FACE technology to be used for even larger orchard plots.

Again, thank you for the opportunity to tender these comments on CDFA's OEFI SWEEP.

Respectfully Submitted by,


Brian Kolodji, PE


Bruce A. Kimball, PhD

 Brian Marsh
Brian Marsh, PhD

Digitally signed by Brian Marsh
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With Attachments of two Papers