January 15, 2019

Central Coast Regional Water Quality Control Board
895 Aerovista Place, Suite 101
San Luis Obispo, CA 93401
Attn: John Robertson

Re: Comments to Ag Order 4.0 Options Tables

Dear Central Coast Regional Water Quality Control Board Members,

The California Avocado Commission (CAC) is a grower-funded commodity board representing California's 2,000 commercial avocado growers who produce avocados on 51,000 acres, nearly 13,000 of which are within CCRWQCB's jurisdiction.

California avocado growers produce 90 percent of the domestically grown avocados in the United States. Average annual California avocado production is 300-400 million pounds, with an average farm-gate value of $390 million. Our growers are primarily small, 10-20 acres, multi-generational farmers who have been stewarding their land for decades.

CAC continuously monitors agricultural regulations in California, with particular interest in water regulations, to ensure that our growers' interests are heard during the rulemaking process. It's important to note that California avocado growers use microirrigation technology to maximize water application efficiency and minimize losses due to runoff and evaporation.

The attached comments are in response to the request for written comments regarding the Ag Order 4.0 Conceptual Regulatory Requirement Options. The following comments highlight the stewardship of California avocado growers with respect to nitrogen and phosphorous fertilizer use as demonstrated by scientific research. We are seeking an exemption for California avocado growers to the nutrient reporting requirements proposed in the draft Ag Order 4.0 based on the low risk for nitrogen discharge from California avocado production.

Sincerely,

Timothy Spann, Ph.D.
Research Program Director

Ken Melban
Vice President of Industry Affairs

CAC Comments to Central Coast Regional Water Quality Control Board

Avocado Irrigation

Based on 2011 data, irrigation accounts for up to 33% of the cultural costs of producing avocados within the CCRWQCB's jurisdiction (Takele et al., 2012). Thus, growers strive to be as efficient as possible with their water. Irrigation is applied just to meet tree demand using microirrigation — micro sprinklers and drip irrigation — systems. Microirrigation systems utilize low pressure and low flow rates, applying irrigation water slowly over longer durations, to prevent runoff and reduce evaporation (U.S. EPA, 2018).

Avocados are irrigated with efficient microirrigation systems that prevent runoff.

Nutrient Demands of Avocado Fruit

Avocados are an "expensive" fruit to produce from a nutrient standpoint. Avocados have the highest protein content [protein is about 16% nitrogen(N)] of all commonly produced fruit, including deciduous, subtropical and tropical tree crops (Hall et al., 1980). The protein content of avocados typically exceeds 2.3% per unit fresh weight (Pearson, 1975; Slater et al., 1975; Hall et al, 1980), whereas other fruits average 0.8% protein (FAO, 1970).

Avocados are a high protein fruit that are energetically demanding to produce and requiring adequate plant nutrition.

Nitrogen Application Rates to Avocados

California avocado growers typically apply 75 to 150 pounds of N per acre annually (Lovatt, 1995), depending on planting density and yield. The current recommendation is to apply N in several small doses starting no earlier than February and ending no later than November (Lovatt 2001; Salvo and Lovatt, 2016). This ensures that N is applied during periods of active tree demand and potential N losses caused by winter rains are minimized. Furthermore, the requirement for annual application of N at key phenological stages of development has been documented as necessary to maintain tree productivity (Salvo and Lovatt, 2016).

The timing and rates of application of N to California avocados is based on detailed scientific studies to maximize uptake efficiency and minimize risk of discharge to surface water and loading of groundwater.

Nitrogen Requirements of Avocados

Lovatt (1995) excavated and dissected 8-year-old 'Hass' avocado trees on Duke 7 rootstock in September, the standard time for determining tree N status by leaf analysis in California (Embleton et al., 1959), to determine the total N content of the tree. The data show that a nearly

mature tree contains approximately 0.95 pounds of N. The greatest concentration of N was found in the fruit (28.0%) and small branches (< 1-inch diameter) (34.4%), which together account for 62.4% of N in the tree. Leaves (17.5%) and scaffold branches (15.1%) account for another 32.5%, and new shoots, trunk and roots account for the balance.

Avocado groves planted within the last 25-30 years average about 110 trees per acre. Groves planted within the last 10 years average about 194 trees per acre. Some growers are planting as many as 400 trees per acre. Based on Lovatt's (1995) data, a standard grove with 110 trees contains 104.5 pounds of N in total standing biomass, and a more modern grove planted at 194 trees per acre contains 184 pounds of N in total standing biomass. Of this N, 80% is contained in organs and tissues that are ephemeral (leaves and fruit) or produced continuously throughout the tree's life (small branches). Based on planting densities of 110 to 194 trees per acre, approximately 84 to 147 pounds of N needs to be supplied annually per acre to support the growth and development of leaves, fruit and small branches.

California avocado growers apply N sufficient only to meet annual crop removal rates as well as tree growth and development needs based on scientific data, limiting excess N that can potentially discharge to surface water and pose a groundwater loading risk.

Avocado Nitrogen and Phosphorous in Surface Water Runoff and Soil Water

Mangiafico et al. (2009) analyzed samples from 11 citrus and avocado groves, and 7 ornamental nurseries in Ventura County for nutrient and pesticide residues in stormwater runoff and soil water. Unfortunately, their stormwater runoff data combined citrus and avocado groves so data for just avocado groves are not available. However, they found that there was no correlation between N and P applied and the concentration of these two nutrients in stormwater runoff.

For soil water, Mangiafico et al. (2009) found that avocado groves had the lowest median soil nitrate + nitrite concentration, 3.4 $mg \cdot L^{-1}$. This is substantially below the U.S. Environmental Protection Agency (EPA) recommended water quality criterion (RWQC) for human health of 10 $mg \cdot L^{-1}$. This contrasts with citrus groves (8.2 $mg \cdot L^{-1}$) and nurseries (20.2 $mg \cdot L^{-1}$), which had significantly higher levels of nitrate + nitrite contamination. They also found a linear correlation between N applied and nitrate and nitrite concentration in the soil water. Like their findings for N, they found avocado groves had the lowest orthophosphate concentration in soil water, 0.1 $mg \cdot L^{-1}$, compared with citrus (0.2 $mg \cdot L^{-1}$) and nurseries (1.7 $mg \cdot L^{-1}$), and the orthophosphate concentration in soil water was also linearly correlated with P applied.

Avocado growers' judicious use of N — only enough to meet tree needs — reduces N discharge in surface water runoff and groundwater loading to levels well below U.S. EPA RWQC, and significantly lower than levels found for other agricultural industries.

In Summary:

- Avocados are grown using efficient microirrigation systems that prevent runoff
- Avocados are high protein fruit with strong nutrient demands
- Avocado growers apply 75 to 150 pounds of N per acre annually
- Avocado trees require 84 to 147 pounds of N per acre annually
- Avocado groves are documented to have lower nitrate + nitrite and orthophosphate levels in soil water than other agricultural industries

RECOMMENDATION: AVOCADO GROWERS SHOULD BE EXEMPTED FROM THE NUTRIENT REPORTING REQUIREMENTS AS OUTLINED IN THE DRAFT AG ORDER 4.0. THIS REQUEST IS BASED ON SOUND SCIENTIFIC DATA THAT DEMONSTRATES THE LOW RISK FOR NITROGEN DISCHARGE AND GROUNDWATER LOADING FROM CALIFORNIA AVOCADO PRODUCTION.

Citations

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