

California Almond Sustainability Program Self-Assessment Answer Sheet



Assessed By _____ Orchard/Block _____ Date _____

Practice or Metric		Your Selection
Irrigation Management Module		
INTRODUCTION AND GENERAL INFORMATION - IRRIGATION MANAGEMENT		
ORCHARD ESTABLISHMENT		
01	Was this orchard planted by the current farm owners or managers? <i>If No, then click 'No' and skip to question 14.</i>	<input type="radio"/> Yes <input type="radio"/> No
02	Soil maps (e.g., NRCS soil series or web soil survey) were used to identify potential variations in soil texture, salinity, water holding capacity, or other factors.	<input type="radio"/> Yes <input type="radio"/> No
03	Aerial or satellite photos (e.g., Google Earth) were used to identify potential variations in soil texture, salinity, or other factors.	<input type="radio"/> Yes <input type="radio"/> No
04	Yield maps from the previous crop (almonds or another crop) were used to identify potential variations in soil texture, salinity, or other factors.	<input type="radio"/> Yes <input type="radio"/> No
05	A GPS map of soil characteristics was made using sensing technology (e.g., EC, Veris (R) or SIS), and was used to identify potential variations in soil texture, salinity, or other factors.	<input type="radio"/> Yes <input type="radio"/> No
06	Based on the maps, photos or other observations, backhoe pits were dug or deep auger/core samples were taken in strategic places to evaluate key soil characteristics (e.g., soil texture (percent sand, clay and silt) or saturation percentage, compaction layers or other soil stratification, salinity, pH or soil organic matter). <i>If No, then click 'No' and skip to question 10.</i>	<input type="radio"/> Yes <input type="radio"/> No
	07. Deep ripping, slip plowing, or tree hole backhoe pits were dug during orchard establishment to address detected issues with drainage and/or compaction.	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Not applicable
	08. Soils were amended during orchard establishment to adjust detected issues with pH, sodicity or salinity.	<input type="radio"/> Yes <input type="radio"/> No
	09. If soil organic matter could be improved, soils were amended with organic matter during orchard establishment.	<input type="radio"/> Yes <input type="radio"/> No
10	All water sources were sampled and lab-evaluated for water quality/irrigation suitability.	<input type="radio"/> Yes <input type="radio"/> No
11	Rootstocks were selected, at least in part, based on soil texture and drainage conditions.	<input type="radio"/> Yes <input type="radio"/> No
12	The irrigation system was designed to 90% or better distribution uniformity.	<input type="radio"/> Yes <input type="radio"/> No
13	The irrigation system was designed for the site so that irrigation sets correspond to soil texture zones and/or topography.	<input type="radio"/> Yes <input type="radio"/> No
IRRIGATION SYSTEM TYPE, METRICS AND SOURCE		
14	What is the type of irrigation system for this orchard (not counting separate systems for frost control)? It is recommended that you assess one irrigation set at a time. If you wish to assess an orchard with multiple types of irrigation systems, please select all appropriate types.	<input type="checkbox"/> Drip <input type="checkbox"/> Micro-sprinkler <input type="checkbox"/> Flood/furrow <input type="checkbox"/> Sprinklers

15	How many acre inches of water were applied (not rainfall) to this orchard for the past season?	
16	Is this amount an estimate, or is this amount verified by measurement (e.g., flow meters)? Answer only if acre-inches was entered.	<input type="radio"/> Flow Meter <input type="radio"/> Estimate/Calculation
17	What is the source of irrigation water for this orchard?	<input type="radio"/> Ground <input type="radio"/> Surface/district <input type="radio"/> Ground & surface/district
ORCHARD WATER REQUIREMENTS		
18	The water district's delivery schedule influenced irrigation scheduling.	<input type="radio"/> Yes <input type="radio"/> No
19	Irrigation-scheduling technologies were used to decide when and how much to irrigate based on tree need and soil/climate conditions.	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Not applicable
20	Fertilizer-efficient and irrigation-efficient practices were used together to maintain desired nitrogen in the root zone, and reduce losses from N2O emissions, nitrate leaching or runoff.	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Not applicable
21	The available water holding capacity (AWC) of the soil for each irrigation set has been determined and used for irrigation scheduling.	<input type="radio"/> Yes <input type="radio"/> No
22	Water requirements were based on almond orchard evapotranspiration (ETc). If No, then click 'No' and skip to question 27.	<input type="radio"/> Yes <input type="radio"/> No
	23. Was historical (normal year) ETc adjusted for weather and, if applicable, cover crops?	<input type="radio"/> Yes <input type="radio"/> No
	24. Monthly water requirements were based on historical (normal year) regional ETc values.	<input type="radio"/> Yes <input type="radio"/> No
	25. Semi-monthly (every two weeks) water requirements were based on historical (normal year) regional ETc values.	<input type="radio"/> Yes <input type="radio"/> No
	26. Weekly water requirements were based on historical (normal year) regional ETc and were adjusted for actual ETc from the previous week.	<input type="radio"/> Yes <input type="radio"/> No
27	Strategic Deficit Irrigation (SDI) was used throughout the hullsplit interval to provide a uniform hullsplit, increase drying on the tree, and facilitate a rapid, timely harvest.	<input type="radio"/> Yes <input type="radio"/> No
28	A leaching fraction for salinity was applied if indicated by soil or water quality testing. (A leaching fraction is an extra portion of irrigation water applied to flush salts from the root zone.)	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Not applicable
29	Cover crop (resident ground cover or planted) was intentionally grown between orchard rows. If No, then click 'No' and skip to question 32.	<input type="radio"/> Yes <input type="radio"/> No
	30. The ground cover was a planted cover crop. If No, then click 'No' and skip to question 32.	<input type="radio"/> Yes <input type="radio"/> No
	31. The cover crop was selected to stabilize and improve soil (e.g., adding organic matter, water infiltration or managing soil moisture).	<input type="radio"/> Yes <input type="radio"/> No
IRRIGATION SYSTEM PERFORMANCE		
32	Irrigation system infrastructure (e.g., pumps, lines, filters and emitters) was regularly tested and, if necessary, corrected to maintain optimal efficiency.	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Not applicable
33	The pH, EC (electroconductivity or salinity), bicarbonate, and/or iron levels of the irrigation water source(s) have been tested at least once in the past year. (Water chemistry testing results should guide system maintenance.)	<input type="radio"/> Yes <input type="radio"/> No
34	Irrigation system performance (application rate or pressures) was evaluated at least once during the past 3 years and any diagnosed problems were corrected. If No, then click 'No' and skip to question 39.	<input type="radio"/> Yes <input type="radio"/> No

	35. Average application rate was evaluated at least once within the past 3 years.	<input type="radio"/> Yes <input type="radio"/> No
	36. Variation in system pressure was evaluated at least once within the past 3 years. <i>If flood/furrow system, then answer 'Not applicable'.</i>	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Not applicable
	37. Distribution uniformity based on measured water volume and application rate was evaluated at least once within the past 3 years.	<input type="radio"/> Yes <input type="radio"/> No
	38. Distribution uniformity based on measured water volume and application rate was evaluated at least once within the past 2 years	<input type="radio"/> Yes <input type="radio"/> No
39	A pump(s) was used for irrigation for the orchard/facility being assessed. <i>If No, then click 'No' and skip to question 41.</i>	<input type="radio"/> Yes <input type="radio"/> No
	40. The irrigation pumping system was tested for energy efficiency within the last three years, and repairs or improvements were made where needed.	<input type="radio"/> Yes <input type="radio"/> No
41	All flow meters have been inspected and calibrated in the past 2 years.	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Not applicable
42	Pressure gauges are checked for accuracy at least annually.	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Not applicable
APPLIED WATER		
43	Water applied was measured and recorded for the entire season. <i>If No, then click 'No' and skip to question 47.</i>	<input type="radio"/> Yes <input type="radio"/> No
	44. Applied water for each irrigation event was calculated from application rate and duration, and recorded.	<input type="radio"/> Yes <input type="radio"/> No
	45. Flow meter readings were recorded for each irrigation set, each time it was run. <i>If 'No', or 'Not applicable' skip to question 47</i>	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Not applicable
	46. Applied water was compared to crop water use (ETc, evapotranspiration) for the entire season to validate irrigation efficiency.	<input type="radio"/> Yes <input type="radio"/> No
SOIL MOISTURE		
47	Soil moisture (by feel, or by sensors) was monitored at least every month during the irrigation season. <i>If No, then click 'No' and skip to question 51.</i>	<input type="radio"/> Yes <input type="radio"/> No
	48. Auger samples were taken and evaluated to a depth of at least 3-5 feet using NRCS guidelines.	<input type="radio"/> Yes <input type="radio"/> No
	49. Moisture monitoring was done at least every two weeks to a depth of at least 3-5 feet using manually operated soil sensors, and results were used to ensure that calculated water amounts were not over/under irrigating.	<input type="radio"/> Yes <input type="radio"/> No
	50. Moisture monitoring was done weekly to a depth of at least 3-5 feet using automated soil sensors, and results were used to ensure that calculated water amounts were not over/under irrigating.	<input type="radio"/> Yes <input type="radio"/> No
PLANT WATER STATUS		
51	Visual cues of plant stress were evaluated at least every other week prior to irrigation.	<input type="radio"/> Yes <input type="radio"/> No
52	At least monthly prior to irrigation, plant water status was evaluated using pressure chambers to measure midday stem water potential, and measurements were compared to applied water to ensure trees were not over/under irrigated.	<input type="radio"/> Yes <input type="radio"/> No
53	At least weekly prior to irrigation, plant water status was evaluated using pressure chambers to measure midday stem water potential, and measurements were compared to applied water to	<input type="radio"/> Yes <input type="radio"/> No

	ensure trees were not over/under irrigated.	
54	The first irrigation of the season was based on pressure chamber measurements.	<input type="radio"/> Yes <input type="radio"/> No
WATER PENETRATION AND SALINITY		
55	Does the orchard have a history of problems with water penetration (infiltration)? <i>If No, then click 'No' and skip questions 56-61.</i>	<input type="radio"/> No <input type="radio"/> Yes
	56. Irrigation was adjusted to shorter, more frequent run times to prevent ponding or runoff.	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Not applicable
	57. The water source was alternated (e.g., between well and district/surface water) to take advantage of the effect of different salt levels on water penetration (not applicable to all situations).	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Not applicable
	58. Periodically, organic soil amendments have been applied or between-row ground cover (resident or planted) has been intentionally grown to improve water penetration and moisture retention.	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Not applicable
	59. Gypsum, sulfuric acid, or other chemical additives, such as organic polyacrylamides (PAM) and polysaccharides or surfactants, was applied to the soil or in irrigation water to improve water penetration.	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Not applicable
	60. Because the soil surface seals, tillage was used to enhance water penetration.	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Not applicable
	61. If problems exist with the quality of the irrigation water, the water is amended to assist infiltration.	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Not applicable
GROUNDWATER RECHARGE		
62	The orchard location was evaluated for efficiency or suitability of groundwater recharge (e.g., using the Soil Agricultural Groundwater Banking Index - SAGBI). <i>For more information, go to https://casoilresource.lawr.ucdavis.edu/sagbi/</i>	<input type="radio"/> Yes <input type="radio"/> No
63	Groundwater recharge was done intentionally on the orchard. <i>If No, then click 'No' and skip questions 64 and 65.</i>	<input type="radio"/> Yes <input type="radio"/> No
64	Check all of the following methods used to recharge groundwater on the orchard:	
	64.01. Flood irrigation of the orchard in the dormant, winter season.	<input type="radio"/> Yes <input type="radio"/> No
	64.02. Intentional over-irrigation of the orchard during the growing season.	<input type="radio"/> Yes <input type="radio"/> No
	64.03. Flooding of a recharge basin on the orchard property.	<input type="radio"/> Yes <input type="radio"/> No
65	An incentive, credit or grant was received from the local Groundwater Sustainability Agency, Irrigation District, or other program related to groundwater recharge.	<input type="radio"/> Yes <input type="radio"/> No