# California Almond Sustainability Program 2019

| | Practice or Metric | Your Selection & Use Statewide |
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| | **Irrigation Management Module** | |
| | **Introduction and General Information - Irrigation Management** | |
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| | **Orchard Establishment** | |
| **01** | Was this orchard planted by the current farm owners or managers?<br>***If No, then click 'No' and skip to question 14.*** | 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. | |
| **03** | Aerial or satellite photos (e.g., Google Earth) were used to identify potential variations in soil texture, salinity, or other factors. | |
| **04** | Yield maps from the previous crop (almonds or another crop) were used to identify potential variations in soil texture, salinity, or other factors. | |
| **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. | |
| **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).<br>***If No, then click 'No' and skip to question 10.*** | |
| | 07. Deep ripping, slip plowing, or tree hole backhoe pits were dug during orchard establishment to address detected issues with drainage and/or compaction. | |
| | 08. Soils were amended during orchard establishment to adjust detected issues with pH, sodicity or salinity. | |
| | 09. If soil organic matter could be improved, soils were amended with organic matter during orchard establishment. | |
| **10** | All water sources were sampled and lab-evaluated for water quality/irrigation suitability. | |
| **11** | Rootstocks were selected, at least in part, based on soil texture and drainage conditions. | |
| **12** | The irrigation system was designed to 90% or better distribution uniformity. | |
| **13** | The irrigation system was designed for the site so that irrigation sets correspond to soil texture zones and/or topography. | |
| | **Irrigation System Type, Metrics and Source** | |

 

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| **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. | Micro-sprinkler |
| **15** | How many acre inches of water were applied (not rainfall) to this orchard for the past season? | 36.0 acre inches/acre |
| **16** | Is this amount an estimate, or is this amount verified by measurement (e.g., flow meters)?<br>***Answer only if acre-inches was entered.*** | Flow Meter |
| **17** | What is the source of irrigation water for this orchard? | Ground |
| | **Orchard Water Requirements** | |
| **18** | The water district's delivery schedule influenced irrigation scheduling. | No |
| **19** | Irrigation-scheduling technologies were used to decide when and how much to irrigate based on tree need and soil/climate conditions. | Yes |
| **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. | Yes |
| **21** | The available water holding capacity (AWC) of the soil for each irrigation set has been determined and used for irrigation scheduling. | Yes |
| **22** | Water requirements were based on almond orchard evapotranspiration (ETc).<br>***If No, then click 'No' and skip to question 27.*** | Yes |
| | 23. Was historical (normal year) ETc adjusted for weather and, if applicable, cover crops? | Yes |
| | 24. Monthly water requirements were based on historical (normal year) regional ETc values. | Yes |
| | 25. Semi-monthly (every two weeks) water requirements were based on historical (normal year) regional ETc values. | Yes |
| | 26. Weekly water requirements were based on historical (normal year) regional ETc and were adjusted for actual ETc from the previous week. | Yes |
| **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. | Yes |
| **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.) | Not applicable |
| **29** | Cover crop (resident ground cover or planted) was intentionally grown between orchard rows.<br>***If No, then click 'No' and skip to question 32.*** | Yes |
| | 30. The ground cover was a planted cover crop.<br>***If No, then click 'No' and skip to question 32.*** | Yes |
| | 31. The cover crop was selected to stabilize and improve soil (e.g., adding organic matter, water infiltration or managing soil moisture). | Yes |

 

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| **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. | Yes |
| **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.) | Yes |
| **34** | Irrigation system performance (application rate or pressures) was evaluated at least once during the past 3 years and any diagnosed problems were corrected.<br>***If No, then click 'No' and skip to question 39.*** | Yes |
| | 35. Average application rate was evaluated at least once within the past 3 years. | Yes |
| | 36. Variation in system pressure was evaluated at least once within the past 3 years.<br>***If flood/furrow system, then answer 'Not applicable'.*** | Yes |
| | 37. Distribution uniformity based on measured water volume and application rate was evaluated at least once within the past 3 years. | Yes |
| | 38. Distribution uniformity based on measured water volume and application rate was evaluated at least once within the past 2 years | Yes |
| **39** | A pump(s) was used for irrigation for the orchard/facility being assessed.<br>***If No, then click 'No' and skip to question 41.*** | Yes |
| | 40. The irrigation pumping system was tested for energy efficiency within the last three years, and repairs or improvements were made where needed. | Yes |
| **41** | All flow meters have been inspected and calibrated in the past 2 years. | Yes |
| **42** | Pressure gauges are checked for accuracy at least annually. | Yes |
| **Applied Water** | | |
| **43** | Water applied was measured and recorded for the entire season.<br>***If No, then click 'No' and skip to question 47.*** | Yes |
| | 44. Applied water for each irrigation event was calculated from application rate and duration, and recorded. | Yes |
| | 45. Flow meter readings were recorded for each irrigation set, each time it was run.<br>***If 'No', or 'Not applicable' skip to question 47*** | No |
| | 46. Applied water was compared to crop water use (ETc, evapotranspiration) for the entire season to validate irrigation efficiency. | |
| **Soil Moisture** | | |
| **47** | Soil moisture (by feel, or by sensors) was monitored at least every month during the irrigation season.<br>***If No, then click 'No' and skip to question 51.*** | Yes |
| | 48. Auger samples were taken and evaluated to a depth of at least 3-5 feet using NRCS guidelines. | No |

 

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| | 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. | Yes |
| | 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. | Yes |
| | **Plant Water Status** | |
| **51** | Visual cues of plant stress were evaluated at least every other week prior to irrigation. | Yes |
| **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. | Yes |
| **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 ensure trees were not over/under irrigated. | Yes |
| **54** | The first irrigation of the season was based on pressure chamber measurements. | No |
| | **Water Penetration and Salinity** | |
| **55** | Does the orchard have a history of problems with water penetration (infiltration)?<br>***If No, then click 'No' and skip questions 56-61.*** | No |
| | 56. Irrigation was adjusted to shorter, more frequent run times to prevent ponding or runoff. | |
| | 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). | |
| | 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. | |
| | 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. | |
| | 60. Because the soil surface seals, tillage was used to enhance water penetration. | |
| | 61. If problems exist with the quality of the irrigation water, the water is amended to assist infiltration. | |
| | **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).<br>***For more information, go to https://casoilresource.lawr.ucdavis.edu/sagbi/*** | Yes |
| **63** | Groundwater recharge was done intentionally on the orchard.<br>***If No, then click 'No' and skip questions 64 and 65.*** | Yes |
| **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. | No |
| | 64.02. Intentional over-irrigation of the orchard during the growing season. | No |

 

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| | 64.03. Flooding of a recharge basin on the orchard property. | Yes |
| **65** | An incentive, credit or grant was received from the local Groundwater Sustainability Agency, Irrigation District, or other program related to groundwater recharge. | No |
| **Nutrient and Soil Management Module** | | |
| **Introduction and General Information - Nutrient Management** | | |
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| **Metrics** | | |
| **01** | How many units (pounds per acre) of nitrogen (N) sourced from commercial fertilizer (mineral and organic) were applied to this orchard during the past season? (NOTE: The N of N-P-K on fertilizer labels shows the percent of N by weight.) | |
| **02** | How many pounds per acre of P205 (the phosphorous component) sourced from commercial fertilizer (mineral and organic) were applied to this orchard during the past season? (NOTE: The P of N-P-K on fertilizer labels shows the percent of P205 by weight.) | |
| **03** | How many pounds per acre of K2O (the potassium component) sourced from commercial fertilizer (mineral and organic) were applied to this orchard during the past season? (NOTE: The K of N-P-K on fertilizer labels shows the percent of K2O by weight.) | |
| **04** | Has the percent soil organic matter for this orchard been measured in the past 5 years?<br>***If No, then click 'No' and skip to question 5.*** | Yes |
| | 04.01. What was the measured percent soil organic matter? | |
| **Source** | | |
| **05** | Were the following sources of nitrogen utilized in this orchard in the past year? (Answer 'Yes' to all that apply) | |
| | 05.01. commercial in-organic nitrogen fertilizer | Yes |
| | 05.02. commercial organic nitrogen fertilizer | Yes |
| | 05.03. manure (not recommended for food safety reasons) | Yes |
| | 05.04. compost | Yes |
| | 05.05. nitrogen-fixing cover crops | Yes |
| **06** | Nitrogen contributions from compost, manure, or nitrogen-fixing cover crops were included in total nitrogen budgeting.<br>***If compost, manure, or nitrogen-fixing cover crops were not used, then click 'Not applicable.'*** | Yes |
| **07** | Was well water used for irrigation?<br>***If No, then click 'No' and skip to question 10.*** | Yes |
| | 08. Has the nitrogen content of the well water been tested at least once during the past 3 years?<br>***If No, then click 'No' and skip to question 10.*** | Yes |
| | 09. If the test indicated the water had nitrogen, the amount of nitrogen applied via irrigation over the season was calculated and used in calculating the total nitrogen applied. | Yes |

 

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| | ***If well water contained no nitrogen, then click not applicable.*** | |
| | **Amount** | |
| **10** | Tissue testing and other nutrient budgeting techniques (e.g., estimates of yield and nutritional needs for tree growth) were used to efficiently utilize fertilizers. (Efficient fertilizer use limits the energy footprint associated with fertilizer use, manufacture, application and transport.) | Yes |
| **11** | Applied amounts of nitrogen fertilizer were calculated from yield estimates, nitrogen credits from other sources (e.g., irrigation water, compost and/or cover crops), and results of early season leaf sampling.<br>***If No, then click 'No' and skip to question 13.*** | Yes |
| | 12. Was the Almond Board's online Nitrogen Calculator used to determine these nitrogen fertilizer amounts?<br>***ABC Nitrogen Calculator can be accessed at www.SustainableAlmondGrowing.org*** | Yes |
| **13** | Were plant tissues sampled and tested for nutrient content to guide the amounts of fertilizer applications?<br>***If No, then click 'No' and skip to question 21.*** | Yes |
| | 14. Tissue samples were collected following recommended procedures that included taking samples at the appropriate time(s) of year. | Yes |
| | 15. The methods used for tissue sampling ensured that the samples accounted for variations in soil characteristics, tree growth and other factors. | Yes |
| | 16. The tissues analysis included comparison to critical levels or expert recommendations. | Yes |
| | 17. Were multiple tissue samples taken within a single managed unit (generally an orchard or block)?<br>***If No, then click 'No' and skip to question 20.*** | Yes |
| | 18. Test results of tissue tests were mapped to show variation across the managed unit.<br>***If No, then click 'No' and skip to question 20.*** | Yes |
| | 19. Mapped results were used with precision application technology (variable rate technology) to apply different rates of fertilizer within the orchard. | No |
| | 20. Test results were kept from year to year to support future decision making in nutrient management. | Yes |
| **21** | Has the soil been sampled and tested to identify any problems impacting nutrient availability or to guide management decisions?<br>***If No, then click 'No' and skip to question 26.*** | Yes |
| | 22. Soil samples were collected following recommended procedures. | Yes |
| | 23. The methods used for soil sampling ensured that the samples accounted for variations in soil texture and other orchard features. | Yes |
| | 24. Were multiple soil samples taken within a single managed unit (generally an orchard or block)?<br>***If No, then click 'No' and skip to question 26.*** | Yes |
| | 25. Results of soil tests were mapped to show variations and potential management zones within the orchard. | Yes |
| **26** | Soil pH has been measured at least once in the past 3 years.<br>***If No, then click 'No' and skip to question 28.*** | Yes |

 

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| | 27. Based on this measurement, soil amendments or other inputs (e.g., irrigation acid injection) for adjusting pH have been applied as needed to benefit nutrient availability.<br>***If not measured or adjustments to pH were not needed, then click 'Not applicable.'*** | Yes |
| | **Timing** | |
| **28** | All applications of fertilizers were made at recommended timings (coinciding with crop growth and demand). | Yes |
| **29** | Was commercial fertilizer nitrogen applied to the orchard during the year using the following methods?<br>***If No, then click 'No' and skip to question 30.*** | Yes |
| | 29.01. Nitrogen was applied broadcast | No |
| | 29.02. Nitrogen was fertigated | Yes |
| | 29.03. How many soil or fertigation applications of fertilizer nitrogen (including post-harvest) were made during the year? | 5 or more applications |
| | **Placement** | |
| **30** | Which of the following practices were used to place fertilizer nitrogen in the root zone and/or minimize nitrogen leaching or runoff? (Answer 'Yes' to all that apply) | |
| | 30.01. The depth of irrigation was monitored to ensure the nitrogen was positioned only in the root zone. | Yes |
| | 30.02. Irrigation-scheduling technologies were used to decide when and how much to irrigate based on tree need and soil/climate conditions. | Yes |
| | 30.03. Water requirements were based on almond orchard evapotranspiration (ETc).<br>***If No, then click 'No' and skip to question 30.05.*** | Yes |
| | 30.04. Weekly water requirements were based on historical (normal year) regional ETc and were adjusted for actual ETc from the previous week. | Yes |
| | 30.05. Does the orchard have a history of problems with water penetration (infiltration)?<br>***If No, then click 'No' and skip questions 30.06 - 30.07.*** | No |
| | 30.06. 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. | |
| | 30.07. Because the soil surface seals, tillage was used to enhance water penetration. | |
| | 30.08. 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. | Yes |
| | 30.09. Additions of soil organic matter were made or a cover crop was grown, or vegetative filter strips were used. | Yes |
| | 30.10. Natural habitat has been maintained and/or perennial vegetation (hedgerows or trees) has been planted or retained in unfarmed areas within or surrounding the orchard. (Planting and maintaining can also benefit pollinators and provide other ecosystem services.) | Yes |
| | **Nitrogen Management Plan and Budget** | |

 

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| **31** | To ensure overall nitrogen use efficiency, a documented comprehensive nitrogen management plan and budget for this orchard was used. | Yes |
| | **Fertigation** | |
| **32** | Was fertigation used to provide any nutrients to the orchard during the year being assessed?<br>***If No, then click 'No' and skip to question 36.*** | Yes |
| | 33. The injection time for fertilizers was determined to ensure their proper placement in the root zone and prevent leaching. (Prior to initiating injection, the system was at the proper pressure.) | Yes |
| | 34. The injection time for system cleaning solutions was determined and used to ensure to ensure effective cleaning and rinsing. | Yes |
| | 35. At least one back flow prevention device was installed between the water source and the injection site. (County regulations vary - some require more than one device.) | Yes |
| | **Enhancing Soil Properties and Preventing Water Contamination** | |
| **36** | Over the past three years, how frequently has the orchard floor been tilled (excluding floating, smoothing or rolling)? | 0 times in past 3 years (never) |
| **37** | Organic soil amendments (e.g., compost) were used to stabilize soil by increasing moisture retention and reducing compaction. | Yes |
| **38** | Cover crop (resident ground cover or planted) was intentionally grown between orchard rows.<br>***If no, then click 'No' and skip to question 41.*** | Yes |
| | 39. The ground cover was a planted cover crop.<br>***If No, then click 'No' and skip to question 41.*** | Yes |
| | 40. The cover crop was selected to stabilize and improve soil (e.g., adding organic matter, water infiltration or managing soil moisture). | Yes |
| **41** | Orchard equipment was chosen (e.g., ATV instead of tractor) or modified (e.g., via wider or bigger diameter tires, or lower tire pressure) to minimize soil compaction. | Yes |
| **42** | Farm roads and/or equipment yards and their margins have been graded or engineered, kept in vegetation or otherwise managed to minimize erosion. | Yes |
| **43** | Down-slope orchard margins, stream banks, or other areas prone to runoff had vegetated buffers, fabric fencing, filter strips, straw bale check dams or water bars, sediment basins and/or other means to slow and retain water and filter contaminants (sediment, nutrients and pesticides). | No |
| **44** | Drainage and erosion prevention systems were cleaned/maintained prior to the rainy season and checked regularly during stormy periods. | No |
| **45** | Culverts were properly sized to accommodate high-flow events and had hardened inlets and outlets or energy dissipaters to reduce erosion. | No |
| **46** | If areas had eroded previously, efforts were made to stabilize (e.g., via geotech fabric or berms) and restore the damaged area. | Yes |

 

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| **47** | Fertilizer storage was secured and measures were taken to minimize any risks (e.g. associated with spills) to humans and environment. | Yes |
| **Air Quality Module** | | |
| **Introduction and General Information - Air Quality** | | |
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| **Orchard Floor Management - Reducing Particulates and Enhancing Carbon Sequestration** | | |
| **01** | Orchard floor management techniques were used to reduce tractor passes and associated energy use (e.g., judicious use of preemergent herbicides to reduce the passes needed for weed management). | Yes |
| **02** | A plan was implemented to minimize passes by equipment and motorized vehicles in the orchard. | Yes |
| **03** | Organic soil amendments (e.g., compost) were used to stabilize soil by increasing moisture retention and reducing compaction. | Yes |
| **04** | Cover crop (resident ground cover or planted) was intentionally grown between orchard rows.<br>***If No, then click 'No' and skip to question 7*** | Yes |
| | 05. The ground cover was a planted cover crop.<br>***If No, then click 'No' and skip to question 7.*** | Yes |
| | 06. The cover crop was selected to stabilize and improve soil (e.g., adding organic matter, water infiltration or managing soil moisture). | Yes |
| **07** | Natural habitat has been maintained and/or perennial vegetation (hedgerows or trees) has been planted or retained in unfarmed areas within or surrounding the orchard. (Planting and maintaining can also benefit pollinators and provide other ecosystem services.) | Yes |
| **Unpaved Surfaces - Reducing Particulates** | | |
| **08** | Unpaved roads had speed limits of 15 mph or less posted to reduce dust generation. | Yes |
| **09** | Vehicle access to unpaved roads was restricted physically (e.g., by a gate). | Yes |
| **10** | Applications of water or organic dust suppressants (e.g., road oil or polymers) or layering of mulches, chips (during winter), sand or gravel was used on unpaved roads and/or on unpaved equipment yards. | Yes |
| **Harvest - Reducing Particulates** | | |
| **11** | Year-round floor management resulted in a smooth, level and clean orchard floor at harvest, to help optimize harvest efficiency and minimize dust. | Yes |
| **12** | For this orchard, who was primarily responsible for harvest equipment and carrying out harvest activities? | Owner/staff |
| **13** | A harvest dust management plan was implemented that ensured operators of sweepers and pickup machines (including custom harvesters) and others involved in harvest activities were appropriately trained before harvest. | Yes |
| **14** | How many sweeper blower passes were used? | 1 |

 

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| **15** | Sweeper and pickup machine passes and travel direction directed dust into tree canopies (filter mechanism) and away from roads, homes and other sensitive locations such as schools, hospitals and day care centers. | Yes |
| **16** | Was the orchard adjacent to a public road(s)?<br>***If No, then click 'No' and skip to question 19.*** | No |
| | 17. Traffic signs warning of low visibility were posted along the roads during sweeping and pickup activities. | |
| | 18. Sweeping and pickup activities occurred when road traffic was at a minimum. | |
| **19** | To reduce dust, the sweeper head was set at the manufacturer-recommended height (not lower). | Yes |
| **20** | The sweeper head used wire tines only (no rubber or plastic). | Yes |
| **21** | The angle of the sweeper blower spout and speed of the fan were adjusted to match orchard conditions so only nuts were moved and not soil. | Yes |
| **22** | Harvest sweepers designed to minimize passes and reduce dust were used (e.g., sweepers with a mounted berm brush). | Yes |
| **23** | Groundspeed for conventional pickup machines was lowered to match local conditions (e.g., 1.5 mph instead of 3 mph). | Yes |
| **24** | Separator fan speed for conventional pickup machines was lowered to match local conditions (e.g., 910 instead of 1,080 rpm fan speed). | Yes |
| **25** | Was a conditioner used prior to using a harvester for pickup?<br>***If No, then click 'No' and skip to question 29.*** | Yes |
| | 26. How many conditioner passes per row were done? | 1 |
| | 27. What type of conditioner was used? | Conventional |
| | 28. Please specify the approximate percent (%) of acreage that was conditioned. | All (100%) |
| **29** | Dust was reduced by setting head heights for pickup machines to optimum levels based on local conditions (not too low). | Yes |
| **30** | Was at least one type of low-dust harvester used?<br>***If No, then click 'No' and skip to question 33.*** | No |
| | 31. Which type(s) of low-dust harvester(s) were used?<br>***Answer 'yes' to all that apply.*** | |
| | 31.01. Pull-behind PTO or self-propelled low-dust harvester. | |
| | 31.02. Low-dust retrofit technology for harvester (e.g., cyclone separator). | |
| | 31.03. Off-ground harvester (off-floor harvesting).<br>***If No, then click 'No', and skip to question 33.*** | |
| **32** | If nuts were harvested using off-ground harvesting equipment, please select the scenario that best describes the overall harvesting practice:<br>***Answer 'Yes' to the best fit*** | |

 

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| | 32.01. Off-ground equipment was used to reallocate the nuts directly to the windrow, followed by a low dust or conventional harvester (avoiding use of a sweeper and/or conditioner). | |
| | 32.02. Nuts were naturally dried on-ground outside of the orchard with pick-up using a standard harvester. | |
| | 32.03. Nuts never touched the ground prior to arriving at the processing facility, and nuts were mechanically dried. | |
| | **Combustion (Fuel and Wood) and Alternatives - Reducing Particulates, Ozone Precursors and Greenhouse Gases** | |
| **33** | Prunings were not burned, but were used productively (e.g., chipped or composted and used on-site, used for energy generation or used on unpaved roads). | Yes |
| **34** | Vehicles, excluding farm equipment, using low-emission technology or low-emission fuels (e.g., flex fuel, hybrids or biodiesel) were used by the business. | Yes |
| **35** | Selection of stationary power equipment was based, in part, on emissions ratings (e.g., electric motors instead of diesel engines for pumping systems). | Yes |
| **36** | Engine emissions have been reduced by retrofitting/replacing diesel engines to Tier 3 or 4 standards. | Yes |
| **37** | Diesel engines have been replaced (or retrofitted) with technology relying on cleaner-burning fuel (e.g., propane, natural gas or biodiesel) or electricity. | Yes |
| **38** | On-site renewable energy sources (e.g., solar, wind, biogas digester or fuel cells) supplied at least some electricity or heat requirements.<br>***If No, then click 'No' and skip to question 42.*** | No |
| | 39. On-site solar energy was used to generate electricity or heat (e.g., hot water or processing heat). | |
| | 40. On-site wind power was used to generate electricity. | |
| | 41. An on-site biogas digester(s) or fuel cell(s) was used to generate electricity or heat. | |
| **42** | The operation contracted with its electrical utility to receive more than the standard blend of the electricity requirement from renewable sources, e.g., PG&E Solar Choice (TM) or SMUD Greenergy (R) programs. | No |
| | **Irrigation Pumps - Reducing Particulates, Ozone Precursors and Greenhouse Gases** | |
| **43** | A pump(s) was used for irrigation for the orchard/facility being assessed.<br>***If No, then click 'No' and skip to question 49.*** | Yes |
| | 44. One or more pumps was powered by an electric motor.<br>***If No, then click 'No' and skip to question 46.*** | Yes |
| | 45. Variable-speed drives have been installed for electric pumps experiencing variable loads. | Yes |
| | 46. The irrigation pumping system was tested for energy efficiency within the last three years, and repairs or improvements were made where needed. | Yes |
| | 47. Irrigation pumping was done during off-peak hours whenever possible to reduce demand on the energy grid (for electric pumps), and when ozone formation and water evaporation are lower. | Yes |

 

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| | 48. The irrigation system was computer controlled (e.g., by a SCADA system) to allow users to monitor flow rates and/or other efficiency data about the system. | Yes |
| | **Irrigation Efficiency - Reducing Particulates, Ozone Precursors and Greenhouse Gases** | |
| **49** | Water applied was measured and recorded for the entire season. | Yes |
| **50** | Irrigation system infrastructure (e.g., pumps, lines, filters and emitters) was regularly tested and, if necessary, corrected to maintain optimal efficiency. | Yes |
| **51** | Irrigation-scheduling technologies were used to decide when and how much to irrigate based on tree need and soil/climate conditions. | Yes |
| **52** | Water requirements were based on almond orchard evapotranspiration (ETc).<br>***If No, then click 'No' and skip to question 54.*** | Yes |
| | 53. Weekly water requirements were based on historical (normal year) regional ETc and were adjusted for actual ETc from the previous week. | Yes |
| **54** | 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. | Yes |
| | **Pest Management and Spray Operations - Reducing Particulates, Ozone Precursors and Greenhouse Gases** | |
| **55** | Integrated pest management (IPM) techniques were used to reduce the likelihood of treatments for insect, disease and weed control and associated energy use. | Yes |
| **56** | When choosing pesticides, low-VOC formulations (e.g., not emulsifiable concentrates) were used when available and practical for application. | Yes |
| **57** | Was this orchard planted by the current farm owners or managers?<br>***If No, then click 'No' and skip to question 61.*** | No |
| | 58. Was the site fumigated before planting?<br>***If No, then click 'No' and skip to question 61.*** | |
| | 59. Was a totally impermeable film (TIF) tarp used for the fumigation? | |
| | 60. The fumigant(s) was applied before or after the peak ozone interval, from May 1 to Oct. 31. | |
| | **Fertilization - Reducing Greenhouse Gases** | |
| **61** | Applied amounts of nitrogen fertilizer were calculated from yield estimates, nitrogen credits from other sources (e.g., irrigation water, compost and/or cover crops) , and results of early season leaf sampling.<br>***If No, then click 'No' and skip to question 63.*** | Yes |
| | 62. Was the Almond Board's online Nitrogen Calculator used to determine these nitrogen fertilizer amounts?<br>***ABC Nitrogen Calculator can be accessed at www.SustainableAlmondGrowing.org*** | Yes |
| **63** | How many soil or fertigation applications of fertilizer nitrogen (including post-harvest) were made during the year? | 5 or more applications |
| | Tissue testing and other nutrient budgeting techniques (e.g., estimates of yield and nutritional needs for tree growth) were used to | |

 

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| **64** | efficiently utilize fertilizers. (Efficient fertilizer use limits the energy footprint associated with fertilizer use, manufacture, application and transport.) | Yes |
| **65** | 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. | Yes |
| **66** | Were plant tissues sampled and tested for nutrient content to guide the amounts of fertilizer applications?<br>***If No, then click 'No' and skip to question 70.*** | Yes |
| | 67. Were multiple tissue samples taken within a single managed unit (generally an orchard or block)?<br>***If No, then click 'No' and skip to question 70.*** | Yes |
| | 68. Test results of tissue tests were mapped to show variation across the managed unit.<br>***If No, then click 'No' and skip to question 70.*** | Yes |
| | 69. Mapped results were used with precision application technology (variable rate technology) to apply different rates of fertilizer within the orchard. | No |
| **70** | To ensure overall nitrogen use efficiency, a documented comprehensive nitrogen management plan and budget for this orchard was used. | Yes |
| **Orchard Removal - Fate of Removed Trees** | | |
| **71** | Was any acreage on this orchard removed and/or replanted in the past year?<br>***If No, then click 'No' and skip all parts of question 72.*** | No |
| **72** | Of acreage removed and/or replanted in the last year, please specify the approximate number of acres of the almond orchard/trees by category: | |
| | 72.01. Chipped and incorporated into the soil onsite (i.e., whole-orchard recycling). | |
| | 72.02. Chipped and used as mulch to existing orchard ground, or layer to surfaces such as unpaved roads.<br>***If none, enter "0".*** | |
| | 72.03. Used for energy generation. | |
| | 72.04. Burned in the field. | |
| | 72.05. Other, Please specify: | |
| **Energy Efficiency Module** | | |
| **Introduction and General Information - Energy Efficiency** | | |
| | . | |
| **Monitoring Electricity Use** | | |
| **01** | Electricity use in my operation was recorded and tracked beyond filing paid bills.<br>***If No, click "No" and skip to question 5.*** | Yes |
| | 02. Electricity use was recorded and tracked for the operation as a whole. | Yes |

 

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| | 03. Electricity use was recorded and tracked by specific orchard(s) or facility(ies). | No |
| | 04. Electricity use per acre or pound of almonds produced or processed was calculated and tracked.<br>***If No, then click 'No' and skip to question 5.*** | No |
| | 04.01. Enter the electricity use per acre for this orchard for the year assessed. | |
| **Monitoring Fuel Use - Diesel, Gasoline, Propane and Nontraditional Fuels (e.g., Biodiesel or Natural Gas)** | | |
| **05** | Fuel use in the operation was recorded and tracked beyond filing paid fuel bills.<br>***If No, click "No" and skip to question 10.*** | Yes |
| | 06. Fuel use was recorded and tracked for the operation as a whole. | Yes |
| | 07. Fuel use was recorded and tracked by specific vehicles or equipment. | No |
| | 08. Fuel use was recorded and tracked by specific orchard(s) or facility(ies). | No |
| | 09. Fuel use per acre (for orchards) or per pound (for facilities) of almonds was calculated and tracked.<br>***If No, then click 'No' and skip to question 10.*** | Yes |
| | .. Enter the relevant fuel use per acre for this orchard for the year assessed. (Enter 0's for fuels not used.) | |
| | 09.01. Diesel | 17.5 gals diesel per acre |
| | 09.02. Gasoline | 2.8 gals of gasoline per acre |
| | 09.03. Propane | 0.0 gals propane per acre |
| | 09.04. Name of other fuel: | |
| | 09.05. Other fuel: | |
| **Energy Audits and Planning - Electricity** | | |
| **10** | In the past 5 years, the operation has been audited by a qualified expert (e.g., utility representative or paid consultant) to identify opportunities to improve electricity energy efficiency.<br>***If No or Not applicable, then click 'No' or 'Not applicable' and skip to question 14.*** | No |
| | 11. Using results of the audit, the operation developed an energy management plan and budget for short- and long-term (e.g., 1-, 3- and 5-year) improvements.<br>***If No, then click 'No' and skip to question 14.*** | |
| | 12. More than 50% of the energy management plan has been implemented. | |
| | 13. The energy management plan has been fully implemented, and the operation continues to seek further opportunities for improvement. | |
| **Energy Audits and Planning - Fuel Use** | | |
| | In the past 5 years, the operation has been audited by a fuel efficiency expert and/or analyzed its fuel use to identify opportunities | |

 

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| **14** | to improve fuel use efficiency.<br>***If No or Not applicable, then click 'No' or 'Not applicable' and skip to question 18.*** | No |
| | 15. Using results of the audit and/or internal analysis, the operation has developed a fuel management plan and budget for short- and long-term (e.g., 1-, 3- and 5-year) improvements.<br>***If No, then click 'No' and skip to question 18.*** | |
| | 16. More than 50% of the fuel management plan has been implemented. | |
| | 17. The fuel management plan has been fully implemented, and the operation continues to seek opportunities for improvement. | |
| **Irrigation Pumps** | | |
| **18** | A pump(s) was used for irrigation for the orchard/facility being assessed.<br>***If No, then click 'No' and skip to question 24*** | Yes |
| | 19. One or more pumps was powered by an electric motor.<br>***If no, then click 'No' and skip to question 21.*** | Yes |
| | 20. Variable-speed drives have been installed for electric pumps experiencing variable loads. | Yes |
| | 21. The irrigation pumping system was tested for energy efficiency within the last three years, and repairs or improvements were made where needed. | Yes |
| | 22. Irrigation pumping was done during off-peak hours whenever possible to reduce demand on the energy grid (for electric pumps), and when ozone formation and water evaporation are lower. | Yes |
| | 23. The irrigation system was computer controlled (e.g., by a SCADA system) to allow users to monitor flow rates and/or other efficiency data about the system. | Yes |
| **Irrigation Efficiency** | | |
| **24** | Water applied was measured and recorded for the entire season. | Yes |
| **25** | Irrigation system infrastructure (e.g., pumps, lines, filters and emitters) was regularly tested and, if necessary, corrected to maintain optimal efficiency. | Yes |
| **26** | Irrigation-scheduling technologies were used to decide when and how much to irrigate based on tree need and soil/climate conditions. | Yes |
| **27** | Water requirements were based on almond orchard evapotranspiration (ETc).<br>***If No, then click 'No' and skip to question 29.*** | Yes |
| | 28. Weekly water requirements were based on historical (normal year) regional ETc and were adjusted for actual ETc from the previous week. | Yes |
| **29** | 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. | Yes |
| **Vehicle Selection** | | |

 

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| **30** | Lighter vehicles were used for road trips not requiring a large vehicle (small pickup instead of a large pickup, car instead of a pickup, etc.). | Not applicable |
| **31** | Instead of tractors or larger vehicles, bicycles or vehicles with smaller motors/engines (e.g., ATVs, motorcycles, golf carts, and self-propelled light-spray rigs) were used for on-site transportation requiring less horsepower. | Yes |
| **32** | Calculated horsepower needs and fuel efficiency were factored into purchasing decisions for tractors or other heavy, fuel-powered equipment. | Yes |
| **33** | Vehicles, excluding farm equipment, using low-emission technology or low-emission fuels (e.g., flex fuel, hybrids or biodiesel) were used by the business. | Yes |
| **34** | The operation provided incentives, facilitated carpooling, or promoted other ways for employees to reduce single-occupancy vehicle trips. | No |
| **Above-Ground Fuel Storage Tanks** | | |
| **35** | This operation had above-ground fuel storage tanks.<br>***If no, then click 'No' and skip to question 40.*** | Yes |
| | 36. All above-ground fuel storage tanks were painted/coated white or aluminum to reflect solar radiation. | Yes |
| | 37. All above-ground fuel storage tanks were shaded. | No |
| | 38. All above-ground fuel storage tanks used pressure-relief vacuum caps rather than conventional caps. | Yes |
| | 39. All above-ground fuel storage tanks were concrete-lined 'vault' tanks or other type of highly insulated tanks, e.g., ConVault (R), Fireguard (R) or SuperVault (TM). | Yes |
| **Lighting** | | |
| **40** | Did this orchard or facility have lighted buildings (e.g., office, shop or plant) or outdoor lights?<br>***If no, then click 'No' and skip to question 45.*** | Yes |
| | 41. Motion sensors or timers/daylight sensors controlled yard and/or shop/plant lights. | Yes |
| | 42. Solar-powered yard lights were used. | No |
| | 43. The shop or plant lighting was designed with task or area lighting to allow work without lighting unused spaces. | No |
| | 44. Shop/Plant lighting was augmented with natural light from skylights or windows to reduce the need for electrical lighting during the day. (Note: In air-conditioned facilities, this may increase heat gain or loss. Consult an expert to avoid increasing HVAC use.) | Yes |
| **Office Equipment** | | |
| **45** | Did this operation have dedicated office equipment such as computer(s), printer(s) or copier(s)?<br>***If no, then click 'No' and skip to question 47.*** | Yes |
| | 46. Office equipment was installed or replaced with Energy Star-certified or equivalent energy-efficient equipment. | No |
| **47** | Refrigerators, freezers and other appliances were Energy Star-certified. | No |

 

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| **Heating, Ventilation and Air-Conditioning (HVAC)** | | |
| **48** | This operation had a structure with a heating and/or cooling system.<br>***If no, then click 'No' and skip to question 52.*** | No |
| | 49. The HVAC system was maintained regularly, including frequent checking and cleaning of filters. | |
| | 50. Shop/Plant heat gain or loss was reduced through insulation, weather stripping, radiant barriers, etc. | |
| | 51. High-efficiency HVAC options such as radiant floor heating and/or Energy Star or high-SEER equipment were used. | |
| **Motors (Excluding Irrigation Pump Motors)** | | |
| **52** | This orchard or facility had a significant number of motors, such as in a huller or sheller operation, processing plant, etc.<br>***If no, then click 'No' and skip to question 59.*** | No |
| | 53. Horsepower for all motors matched load needs. | |
| | 54. Motors rated for high efficiency (such as NEMA Premium Efficiency) have been used for new installations or to replace less-efficient motors. | |
| | 55. Cog belts (notched V-belts) were used on large motors for better energy transfer. | |
| | 56. Variable-frequency drives have been installed for motors with variable loads. | |
| | 57. Sensors or other automatic controls shut off motors during idle times such as between lots. | |
| | 58. Key motorized equipment has been engineered to reduce load. | |
| **Clean-Energy Sourcing** | | |
| **59** | On-site renewable energy sources (e.g., solar, wind, biogas digester or fuel cells) supplied at least some electricity or heat requirements.<br>***If No, then click 'No' and skip to question 63.*** | No |
| | 60. On-site solar energy was used to generate electricity or heat (e.g., hot water or processing heat). | |
| | 61. On-site wind power was used to generate electricity. | |
| | 62. An on-site biogas digester(s) or fuel cell(s) was used to generate electricity or heat. | |
| **63** | The operation contracted with its electrical utility to receive more than the standard blend of the electricity requirement from renewable sources, e.g., PG&E Solar Choice (TM) or SMUD Greenergy (R) programs. | No |
| **Vehicle and Equipment Passes** | | |
| **64** | Integrated pest management (IPM) techniques were used to reduce the likelihood of treatments for insect, disease and weed control and associated energy use. | Yes |
| **65** | Orchard floor management techniques were used to reduce tractor passes and associated energy use (e.g., judicious use of preemergent herbicides to reduce the passes needed for weed management). | Yes |

 

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| **66** | Harvest sweepers designed to minimize passes and reduce dust were used (e.g., sweepers with a mounted berm brush). | Yes |
| **67** | A plan was implemented to minimize passes by equipment and motorized vehicles in the orchard. | Yes |
| | **Fertilization Efficiency** | |
| **68** | Tissue testing and other nutrient budgeting techniques (e.g., estimates of yield and nutritional needs for tree growth) were used to efficiently utilize fertilizers. (Efficient fertilizer use limits the energy footprint associated with fertilizer use, manufacture, application and transport.) | Yes |
| **69** | 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. | Yes |
| **70** | Were plant tissues sampled and tested for nutrient content to guide the amounts of fertilizer applications?<br>***If No, then click 'No' and skip to question 74.*** | Yes |
| | 71. Were multiple tissue samples taken within a single managed unit (generally an orchard or block)?<br>***If No, then click 'No' and skip to question 74.*** | Yes |
| | 72. Test results of tissue tests were mapped to show variation across the managed unit.<br>***If No, then click 'No' and skip to question 74.*** | Yes |
| | 73. Mapped results were used with precision application technology (variable rate technology) to apply different rates of fertilizer within the orchard. | No |
| **74** | Applied amounts of nitrogen fertilizer were calculated from yield estimates, nitrogen credits from other sources (e.g., irrigation water, compost and/or cover crops), and results of early season leaf sampling.<br>***If No, then click 'No' and skip to question 76.*** | Yes |
| | 75. Was the Almond Board's online Nitrogen Calculator used to determine these nitrogen fertilizer amounts?<br>***ABC Nitrogen Calculator can be accessed at www.SustainableAlmondGrowing.org*** | Yes |
| **76** | To ensure overall nitrogen use efficiency, a documented comprehensive nitrogen management plan and budget for this orchard was used. | Yes |
| | **Pest Management Module** | |
| | **Introduction and General Information - Pest Management** | |
| | . | |
| | **Orchard Establishment - Preventing Future Pest Problems** | |
| **001** | Was this orchard planted by the current farm owners or managers?<br>***If No, click 'No' and skip to question 19.*** | No |
| | **Orchard Establishment - Preventing Future Pest Problems - Site Preparation** | |
| **002** | Old trees (or other previous crop) were removed and destroyed, and residual roots were removed as deeply as possible from the soil. | |
| **003** | The site was fallowed or planted with a non-host cover crop for nematodes (e.g., Piper Sudan or safflower) for at least one year. | |

 

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| **004** | Before planting, populations of weeds (especially perennials) were reduced by repeated cycles of irrigation, tillage and drying; and/or by postemergent herbicide application followed by cultivation. | |
| **005** | The site was graded or modified before planting to ensure even drainage and prevent low spots and puddle formation, which can stress trees and/or increase problems with weeds and diseases. | |
| **006** | If the site is subject to standing water, trees were planted on berms or mounds. | |
| **Orchard Establishment - Preventing Future Pest Problems - Sampling and Strategy** | | |
| **007** | Prior to planting, the site's micro-climate and crop and pest history were researched to determine potential problems, especially if almonds or related crops (e.g., peaches, plums or cherries) were grown. | |
| **008** | The soil and, if possible, roots from the previous crop were sampled for nematodes before planting to determine if management actions (e.g., fumigation and/or resistant rootstock) were needed. | |
| **Orchard Establishment - Preventing Future Pest Problems - Fumigation Considerations** | | |
| **009** | Was the site fumigated before planting?<br>***If No, then click 'No' and skip to question 14.*** | |
| | 010. What fumigation method was used? | |
| | 011. Was a totally impermeable film (TIF) tarp used for the fumigation? | |
| | 012. A thorough review of typically used fumigation methods (e.g., row strip or tree site) was completed, and appropriate safety, quality control and emergency responses were included in documented management plans. | |
| | 013. The fumigant(s) was applied before or after the peak ozone interval, from May 1 to Oct. 31. | |
| **Orchard Establishment - Preventing Future Pest Problems - Planting Considerations** | | |
| **014** | If this site had problems with root diseases (e.g., oak root fungus) or nematodes, a university-recommended resistant/tolerant rootstock(s) was utilized. | |
| **015** | Variety selection was based, in part, on disease resistance. | |
| **016** | Only virus-indexed and certified nematode-free planting materials were used. | |
| **017** | Trees were planted so that graft unions were at least 2 inches above the soil surface to prevent the infection of scions by soil pathogens. | |
| **018** | Tree guards (e.g., milk cartons) were used to prevent feeding by vertebrate pests on the trunks, and to protect trunks from herbicides (if used). | |
| **General IPM and Pesticide Risk Management - Prevention - Irrigation and Nutrient Management** | | |
| **019** | Irrigation did not result in standing water (e.g., by using shorter but more frequent run times for heavier soils), which can stress trees and promote weeds and diseases. | Yes |
| **020** | To prevent diseases, the irrigation system was designed and installed to avoid wetting trunks and lower leaves. | Yes |

 

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| **021** | Applied amounts of nitrogen fertilizer were calculated from yield estimates, nitrogen credits from other sources (e.g., irrigation water, compost and/or cover crops), and results of early season leaf sampling.<br>***If No, then click 'No' and skip to question 23.*** | Yes |
| | 022. Was the Almond Board's online Nitrogen Calculator used to determine these nitrogen fertilizer amounts?<br>***ABC Nitrogen Calculator can be accessed at www.SustainableAlmondGrowing.org*** | Yes |
| **General IPM and Pesticide Risk Management - Monitoring and Strategy** | | |
| **023** | The orchard was monitored by a licensed PCA for insects, mites, diseases and pest natural enemies (i.e., beneficials) at least once every two weeks during the growing season. (Note: diseases should be monitored weekly during bloom and spring.)<br>***If No, then click 'No' and skip to question 29.*** | Yes |
| | 024. Written or electronic scouting reports were kept by or provided to the farm owner or staff to inform decision making.<br>***If No, then click 'No' and skip to question 26.*** | Yes |
| | 025. To improve future decision-making, a year-end review of pest levels and trends was completed. | Yes |
| | 026. Scouting data, university guidelines and practical experience were used to design and implement management strategies for insects, mites and diseases. | Yes |
| | 027. Scouting continued after the use of each pest control tactic to verify efficacy and/or resistance issues. | Yes |
| | 028. Orchard monitoring for pests was done using repeatable representative processes (e.g., as recommended by the UC Statewide IPM Program). | Yes |
| **General IPM and Pesticide Risk Management - Efficacy and Safety of Control - Pesticide Application Equipment** | | |
| **.** | If a custom applicator or farm management company was primarily responsible for applying pesticides, you may have to answer 'Not applicable' for some of the following questions related to spray equipment and applications. However, please answer 'Not applicable' ONLY if necessary. | |
| **029** | For this orchard, who was primarily responsible for applying pesticides? | Owner/staff |
| **030** | Pesticide application equipment has been calibrated prior to use each year, after every equipment repair or modification, and when other circumstances requiring recalibration occur (e.g., when changes were made in operating pressure, spray pattern, fan speed, tractor type and/or tractor wheels). | Yes |
| **031** | A log of calibration and repairs to pesticide application equipment was maintained to ensure timely maintenance and efficient operation. | Yes |
| **032** | Sprayer operating manuals have been reviewed, and all applicators have been trained in proper operation. | Yes |
| **General IPM and Pesticide Risk Management - Efficacy and Safety of Control - Aerial Spraying of Pesticides** | | |
| **033** | Was this orchard aerially sprayed?<br>***If No, click 'No' and skip to question 35.*** | Yes |
| | 034. Aerial spraying was only done when serious pest damage or outbreak is imminent and the orchard cannot be accessed by ground. | Yes |
| **General IPM and Pesticide Risk Management - Efficacy and Safety of Control - Air Blast Pesticide Sprayers** | | |

 

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| **035** | Prior to each air blast and/or aerial application, the weather was checked for current and forecasted wind speed and direction, inversion conditions, temperature and rain. | Yes |
| **036** | Air blast and/or aerial applications only occurred when winds were between 2 and 8 mph (minimizes drift from inversions and wind). | Yes |
| **037** | Air blast applications only occurred at ground speeds of 2 mph or less (optimizes coverage). | Yes |
| **038** | Air blast applications only occurred at night or during the coolest part of the day (to avoid vapor drift and for worker safety), as long as it was not bloom when bees were active. | Yes |
| **039** | Air blast and/or aerial applications only occurred when rain was not forecasted for 48 hours unless applications just before rainfall were recommended (e.g., for managing diseases) and zero runoff into waterways was expected. | Yes |
| **040** | Low-drift nozzles for air blast and/or aerial sprayers were used to optimize spray placement and minimize off-target movement. | Yes |
| **041** | Sprayer nozzles for air blast sprayers have been replaced at least once per season, or more frequently if powders or other corrosive materials were used. | Yes |
| **042** | The air blast spray pattern was adjusted according to the orchard's average tree size and shape (e.g., reducing size of lower nozzles for a mature orchard with a thin lower canopy, or shutting off top nozzles for a young orchard with short trees). | Yes |
| **043** | When shifting between foliar sprays and dormant or bloom sprays for air blast sprayers, the fan speed, pressure and/or nozzle type were adjusted for the canopy density. | Yes |
| **044** | Spray coverage was periodically checked using water-sensitive paper placed in the target zone. | Yes |
| **045** | Proven drift-control spray additives (as long as no impacts to bees were expected) or drift-reducing sprayers have been used. | Yes |
| **046** | To reduce drift, the air blast sprayer(s) was operated at the lowest pressure providing uniform coverage. | Yes |
| **047** | Interference spraying (involving the use of a second spray rig to run in parallel blowing inwards on rows near the orchard edge) was used as a method to minimize spray drift. | Yes |
| **General IPM and Pesticide Risk Management - Efficacy and Safety of Control - Other Pesticide Sprayers** | | |
| **048** | Sprayer shields or drift guards were used to keep sprays on target (e.g., for weed sprayers). | Not applicable |
| **049** | Ultra-low-volume spray equipment or target-sensing sprayers (e.g., SmartSpray (R) or WeedSeeker (R) technology) were used to reduce spray volumes or amounts of pesticides. | No |
| **General IPM and Pesticide Risk Management - Efficacy and Safety of Control - Accounting for Sensitive Sites** | | |
| **050** | Sprayers were turned off when making row turns and spraying did not resume until the nozzles were adjacent to the first trees. | Yes |
| **051** | A map of sensitive sites (e.g., aquatic areas, residences, schools, pollinator and pest natural enemy habitat) and associated buffer zones within or near the orchard has been created and reviewed with everyone involved in pesticide applications. | No |
| **052** | Spraying near waterways (e.g., creeks or irrigation canals) or other sensitive sites (e.g., residences, schools, pollinator and pest natural enemy habitat) was discontinued when winds blew in the direction of these sites. | Not applicable |
| | When operating air blast sprayers next to open or sensitive sites (e.g., aquatic areas, residences, schools, pollinator and pest natural | |

 

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| **053** | enemy habitat), the two rows directly adjacent to these sites were sprayed on the outer side only (i.e., to direct spray into the orchard). | Not applicable |
| **054** | If drainage ditches or other aquatic areas exist within or near the orchard, pesticides were not applied within 100 feet upslope of these sites. | Yes |
| **055** | When choosing pesticides, low-VOC formulations (e.g., not emulsifiable concentrates) were used when available and practical for application. | Yes |
| **General IPM and Pesticide Risk Management - Efficacy and Safety of Control - Accounting for Endangered Species** | | |
| **056** | The person(s) responsible for pest management could identify endangered or threatened species that may be found in the area, and periodically checked for signs of them. | No |
| **057** | The person(s) responsible for pesticide selection and application regularly checked county, state or federal sources for endangered species updates that may impact pest management options and, if necessary, modified the selection of products or applications accordingly. | No |
| **General IPM and Pesticide Risk Management- Efficacy and Safety of Control - Wells and Groundwater Protection** | | |
| **058** | The orchard had an operational well(s).<br>***If No, then click "No" and skip to question 61.*** | Yes |
| | 059. Wellheads were situated or berms or other barriers were in place to prevent surface water from contacting the wellhead and potentially contaminating groundwater. | Yes |
| | 060. Pesticide mixing and loading was done more than 100 feet from wellheads unless they were protected from contamination by berms or other physical characteristics. | Yes |
| **061** | The orchard had an abandoned well(s).<br>***If No, then click 'No' and skip to question 63.*** | Yes |
| | 062. To prevent groundwater contamination, the abandoned well(s) have been properly sealed according to local requirements. | Yes |
| **063** | For mixing and loading pesticides, either a double-check valve, reduced pressure principle backflow prevention device or an air gap was in place and maintained between the water source and sprayer tank. | Yes |
| **064** | A separate water supply tank (e.g., nurse tank) was used for mixing pesticides to prevent contamination of source water. | Yes |
| **065** | If pesticides were applied in irrigation water (chemigation), appropriate and functional backflow prevention devices were installed to prevent leaks and contamination of the water source. | Yes |
| **066** | Safe pesticide storage included storing dry products above liquids, storing only undamaged containers, and ensuring the storage area was more than 100 feet from the nearest well and had an impermeable floor and sump to contain leaks. | Yes |
| **067** | An emergency response plan covering pesticide or fertilizer spills and exposure was posted in the appropriate languages and locations, and any employees were trained to follow the plan.<br>***If you do not have employees, answer 'Yes' if a posted plan covering spills and exposure exists.*** | Yes |
| **Insect and Mite Pests - Prevention - Navel Orangeworm (NOW)** | | |

 

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| **068** | To reduce outbreaks of NOW, mummy nuts were counted and removed, as needed, during the winter, so that less than two mummies per tree remained by February 1 (less than one mummy per tree for the southern San Joaquin Valley or within 3 miles of pistachio orchards). | Yes |
| **069** | By March 1, mummy nuts on the ground were destroyed (e.g., by mowing or discing). | Yes |
| **070** | Timely harvest (harvesting as soon as nuts were dry enough) was completed to reduce nut damage by NOW. | Yes |
| **071** | 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. | Yes |
| **072** | A mating disruption program for NOW has been used for this orchard. | Yes |
| **073** | A non-aflatoxin producing Aspergillus strain (e.g., AF36) was used prior to hullsplit to reduce aflatoxin development associated with damage from NOW. | No |
| **Insect and Mite Pests - Prevention - Web-Spinning Mites** | | |
| **074** | To reduce outbreaks of mites, dust was reduced on orchard roadways (e.g., via dust suppressants, oiling, watering, mulching, vegetative cover and/or driving slowly). | Yes |
| **075** | Irrigation was managed to prevent levels of water stress that can cause problems with web-spinning mites. | Yes |
| **Insect and Mite Pests - Prevention - Damage from Other Pests** | | |
| **076** | Rapid pickup of nuts off the ground was completed to reduce nut damage by ants and other pests. | Yes |
| **Insect and Mite Pests - Monitoring and Strategy - Sampling Nut Damage at Harvest** | | |
| **077** | At harvest, farm staff or a PCA sampled and analyzed the nuts for types of nut rejects to determine the pest(s) causing the damage, the efficacy of the year's pest management program, and the plan for the next year. | Yes |
| **Insect and Mite Pests - Monitoring and Strategy - Navel Orangeworm (NOW)** | | |
| **078** | Was NOW sprayed in the past year?<br>***If No, then click "No" and skip to question 81.*** | Yes |
| | 079. How many sprays have been applied for NOW in the past year? | 2 |
| | 080. Check all of the following combinations of spray timing and monitoring used to ensure efficacy: | |
| | 080.01. Spring spray timing was based on egg traps and degree-day calculations. | Yes |
| | 080.02. Hullsplit spray timing was based on the percentage of split hulls. | Yes |
| | 080.03. Hullsplit spray timing was based on egg traps and degree-day calculations. | Yes |
| | 080.04. Hullsplit spray timing was based on pheromone trap catches. | Yes |
| **Insect and Mite Pests - Monitoring and Strategy - San Jose Scale (SJS)** | | |

 

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| **081** | Was SJS sprayed in the past year?<br>***If No, then click "No" and skip to question 83.*** | No |
| | 082. Check all of the following types of monitoring used to decide if and when to spray: | |
| | 082.01. Dormant spur monitoring of scales and parasitized scales (also detects brown and European red mites). | |
| | 082.02. Monitoring SJS using pheromone traps and degree-day calculations. | |
| | 082.03. Monitoring crawler emergence (e.g., with sticky tape). | |
| | 082.04. SJS parasite activity was monitored using SJS pheromone traps, which also attract the parasites. | |
| **Insect and Mite Pests - Monitoring and Strategy - Peach Twig Borer (PTB)** | | |
| **083** | Was PTB sprayed in the past year (dormant, bloom or spring sprays)?<br>***If No, click "No" and skip to question 85.*** | No |
| | 084. Check all of the following types of monitoring used to decide if and when to spray: | |
| | 084.01. At the previous harvest, nuts were monitored for PTB damage. | |
| | 084.02. Shoot strike monitoring began in April to determine if the number of strikes reached a treatment threshold (generally four or more strikes per tree for mature orchards; threshold should be lower for second- and third-leaf orchards). | |
| | 084.03. Monitoring PTB using pheromone traps and degree-day calculations. | |
| **Insect and Mite Pests - Monitoring and Strategy - Web-Spinning Mites** | | |
| **085** | Hot spots for web-spinning spider mites (e.g., orchard areas along dusty roads) were monitored (generally May to August) to guide management decisions. | Yes |
| **086** | Mite predators (e.g., predatory mites and six-spotted thrips) were also monitored to estimate the amount of biological control, and the estimate was used for management decisions that reduced pests and preserved natural enemies (i.e., beneficials). | Yes |
| **087** | Were mites sprayed in the past year?<br>***If No, click 'No' and skip to question 90.*** | Yes |
| | 088. Miticides were only applied after mite populations exceeded an established threshold of 25% of leaves infested if there were no natural enemies, or 40% of leaves infested if natural enemies were present. | Yes |
| | 089. How many sprays have been applied for mites in the past year? | 1 |
| **Insect and Mite Pests - Monitoring and Strategy - Ants** | | |
| **090** | The person(s) responsible for pest management was able to identify common ants and distinguish pest from non-pest species. | Yes |
| **091** | In mid- or late spring, the number of fire ant and pavement ant colonies per 5,000 square feet was estimated, and results were used for management decisions. | Yes |
| **Insect and Mite Pests - Monitoring and Strategy - Leaffooted Bugs and Stinkbugs** | | |

 

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| **092** | Spring and summer monitoring included scouting for nut drop, nut gummosis and signs of other damage from leaffooted bugs and/or stinkbugs, and results were used for management decisions. | Yes |
| **093** | During fall or winter, sheltered areas (e.g., woodpiles, redwoods, junipers, cypress and eucalyptus) were scouted for aggregations of leaffooted bugs to determine the potential for future problems and/or for considerations about removing or otherwise managing these overwintering sites. | Yes |
| **Insect and Mite Pests - Efficacy and Safety of Control** | | |
| **094** | How many times have dormant sprays been applied to this orchard in the past five years? | 3 to 4 |
| **095** | What dormant spray material(s) was used last year? | Other material(s) |
| **096** | When insecticide applications were necessary, the lowest label rates shown to be effective (e.g., by UC IPM guidelines) were used. | Yes |
| **097** | If effective alternatives existed, broad-spectrum insecticides and acaricides, such as pyrethroids, organophosphates and carbamates, were not used because of their potential negative effects on beneficial and nontarget organisms. | Yes |
| **098** | Prior to applying newly registered pesticides, impacts to bees and natural enemies were checked (using information from labels and other sources such as the UC IPM website), and the product with the fewest precautions and/or shortest residual was considered for use. | Yes |
| **099** | In addition to following required practices on product labels, mode-of-action group numbers for insecticides and acaricides (on labels or in UC Pest Management Guidelines) were recorded and used to guide pesticide rotation/resistance decisions. | Yes |
| **Diseases - Prevention - Pruning and Wound Prevention** | | |
| **100** | Were trees pruned?<br>***If No, then click "No" and skip to question 103.*** | No |
| | 101. Pruning resulted in minimal stub cuts or damaged branch collars, which could be sites for disease entry. | |
| | 102. Pruning was completed during dry weather (e.g., immediately after harvest) to minimize open wounds being exposed to rain. (This practice is especially important for young trees.) | |
| **103** | During harvest, good shaker management was practiced to avoid tree wounding. | Yes |
| **104** | Field equipment was operated to avoid wounding tree crowns (where the trunk and roots meet). | Yes |
| **Diseases - Monitoring and Strategy - Alternaria** | | |
| **105** | The orchard was monitored for signs of Alternaria leaf spot from April to June to guide management decisions. | Yes |
| **106** | Temperature and leaf wetness duration were monitored and used in a disease severity value (DSV) model to help forecast Alternaria leaf spot. | No |
| **107** | Was Alternaria leaf spot sprayed in the past year?<br>***If No, click "No" and skip to question 109.*** | No |
| | 108. How many sprays have been applied for Alternaria leaf spot in the past year? | |

 

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| | **Diseases - Monitoring and Strategy - Hull Rot** | |
| **109** | Was Hull Rot observed in the orchard during this past crop season?<br>***If No, click 'No' and skip to question 112.*** | Yes |
| | 110. Rank the perceived severity of hull rot in the orchard during this past crop season: | Medium |
| **111** | Hull rot was caused by one or more of the following pathogens: | |
| | 111.01. Monilinia | No |
| | 111.02. Rhizopus | No |
| | 111.03. Aspergillus | No |
| | 111.04. Not known | Yes |
| **112** | Were fungicide sprays used to control hull rot in the past year?<br>***If No, click 'No' and skip to question 114.*** | Yes |
| | 113. How many fungicide sprays have been applied for hull rot in the past year? | 2 |
| | **Diseases - Monitoring and Strategy - General** | |
| **114** | The orchard was monitored for shot hole or rust lesions and fruiting structures in the fall to determine if treatment would be necessary during the following season. (NOTE: Zinc sprays applied as foliar fertilizers in the fall may cause incidental leaf loss, thereby reducing potential infection sites.) | Yes |
| **115** | During bloom and spring periods, decisions to spray for diseases were based on temperature and rainfall patterns conducive for disease development. | Yes |
| **116** | To determine necessary fungicides, rates and timings, disease symptoms were monitored weekly prior to and during bloom, and throughout spring, until weather was no longer conducive for disease development. | Yes |
| **117** | The orchard was scouted during postharvest for nuts or leaves stuck on trees or shoot die-back, which may indicate hull rot or damage from San Jose Scale, and the need for future control for these pests. | Yes |
| | **Diseases - Efficacy and Safety of Control** | |
| **118** | In addition to required practices on product labels, the most recent fungicide efficacy and resistance management information was reviewed (e.g., UC Fungicide Efficacy and Treatment Timing tables) to guide active ingredient rotation/resistance management decisions. | Yes |
| **119** | During bloom, necessary fungicides (or Bacillus thuringiensis) were applied in the late afternoon or evening when bees and pollen were not present. | Yes |
| **120** | Arrangements were made with the beekeeper about which pesticides could be applied if daytime applications were necessary while hives were present; if an application(s) was necessary, the beekeeper was provided with 48-hour advance notice. | Yes |
| | **Nematodes - Prevention** | |
| **121** | Equipment used in orchards infested with nematodes was cleaned of soil and roots before being moved to noninfested areas. | Not applicable |

 

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| **122** | Cover crop (resident ground cover or planted) was intentionally grown between orchard rows.<br>***If No, then click 'No' and skip to question 125.*** | Yes |
| | 123. The ground cover was a planted cover crop.<br>***If No, then click 'No' and skip to question 125.*** | Yes |
| | 124. The plant species used for cover were rotated annually to restrict the growth of nematode populations. | Yes |
| **Nematodes - Monitoring and Strategy** | | |
| **125** | If weak areas of tree growth were evident, root and soil samples were taken from these areas and tested for nematode pests and used for management decisions. | Yes |
| **Nematodes - Efficacy and Safety of Control** | | |
| **126** | Organic matter was added to the soil (e.g., as compost or a cover crop) to enhance root growth and health. | Yes |
| **Weeds - Prevention** | | |
| **127** | Cover crop (resident ground cover or planted) was intentionally grown between orchard rows.<br>***If No, then click "No" and skip to question 130.*** | Yes |
| | 128. The ground cover was a planted cover crop.<br>***If No, then click 'No' and skip to question 130.*** | Yes |
| | 129. The cover crop was selected, seeded and managed to outcompete weeds and prevent weed colonization of tree rows. | Yes |
| **130** | To prevent transferring weeds among orchards, equipment was cleaned after working in weedy areas, especially if herbicide-resistant species were suspected or present. | Yes |
| **Weeds - Monitoring and Strategy** | | |
| **131** | Weeds were monitored at least twice a year, preferably during the fall after harvest and first rains (for winter annuals and perennials) and during late spring (summer annuals and perennials), and monitoring information was used for management decisions.<br>***If No, then click 'No' and skip to question 135.*** | Yes |
| | 132. Species and infestation levels were recorded to guide the weed management strategy and type and timing of control(s). | Yes |
| | 133. Monitoring records included growth stages (seedling or mature) and potential herbicide resistance issues. | Yes |
| | 134. Monitoring included an evaluation after each treatment to identify and manage problems with efficacy, including resistance. | Yes |
| **135** | Some annual weeds were tolerated within the tree rows if competition from them was negligible and their presence did not increase rodents or interfere with irrigation or harvest. | Yes |
| **136** | An integrated weed management strategy was developed (e.g., involved multiple control tactics, and rotation of herbicides with different modes of action) that considered monitoring results, past treatments, herbicide resistance, regulations and physical characteristics of the orchard and surrounding sensitive areas. | Yes |
| **Weeds - Efficacy and Safety of Control** | | |
| **137** | Weed control involving cultivation, mowing or flaming did not damage almond roots or trunks or irrigation systems. | Yes |

 

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| **138** | Herbicides generally were applied only within the tree rows (not orchard middles). | Yes |
| **139** | Rates of pre-emergent herbicides were adjusted for soil texture to prevent tree damage and leaching. | Yes |
| **140** | Rates of applied postemergent herbicides were decreased by spot-spraying (e.g., manually or by use of smart sprayers).<br>***If No or Not applicable, click 'No' or 'Not applicable' and skip to question 143.*** | Yes |
| | 141. Spot spraying was done manually. | Yes |
| | 142. Spot spraying was done with use of smart sprayer technology (e.g., SmartSpray or WeedSeeker technology). | No |
| **143** | Suspected or identified herbicide-resistant weeds were managed with alternative tactics including cultural practices (such as hoeing small patches when first noticed) and alternating herbicides with different modes of action. | Yes |
| **Vertebrate Pests - Prevention** | | |
| **144** | Potential vertebrate shelters (e.g., piles of rocks, unused sprinkler pipe, farm equipment, brush piles or brushy vegetation) have been removed from the orchard and its margins. | Yes |
| **145** | If the orchard is adjacent to grasslands or other wild areas, a cleared margin was maintained to discourage rodents from entering the orchard. | Yes |
| **146** | Orchard floors were managed to prevent weeds from getting tall and providing shelter for rodents (especially directly adjacent to almond trees). | Yes |
| **Vertebrate Pests - Monitoring and Strategy** | | |
| **147** | The orchard and its margins were monitored for signs of vertebrate pests (e.g., ground squirrels and gophers) throughout the season to support management decisions.<br>***If No, then click 'No' and skip to question 150.*** | Yes |
| | 148. To detect and control problems early, orchards were intensely monitored during the onset of vertebrate activity (e.g., spring). | Yes |
| | 149. To prevent harm to nontarget species from control tactics, vertebrate pests were accurately identified before management actions were taken (e.g., distinguishing ground squirrel burrows from endangered kit fox dens). | Yes |
| **Vertebrate Pests - Efficacy and Safety of Control - Gophers, Ground Squirrels and Other Small Burrowing Vertebrates** | | |
| **150** | Burrowing vertebrate pests were managed without toxic baits or fumigants.<br>***If Yes, then click 'Yes' and skip to question 154.*** | Yes |
| | 151. Trapping (where permitted) was used in combination with chemicals. | |
| | 152. Exclusion devices (e.g., bait stations with small openings) or other methods were used to reduce risks to nontarget species from toxins. | |
| | 153. For severe or chronic infestations, a treatment plan was developed that accounted for pest species and bait acceptance, toxicity and residual activity, and other considerations about efficacy, worker safety and nontarget effects. (E.g., fumigants can pose high risks to applicators but low risks to nontarget vertebrates; some baits are more effective as broadcast than spot treatments.) | |
| | Biological control of burrowing vertebrate pests was encouraged by installing nest boxes or perches for predatory birds (e.g., owls or | |

 

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| **154** | hawks) at orchard margins.<br>***If No, then click 'No' and skip to question 156.*** | Yes |
| | 155. Nest boxes or perches were periodically maintained and cleaned to maximize predator occupancy, which included cleaning the orchard floor under them before harvest. | No |
| | **Postharvest Pest Management - Stockpile Management** | |
| **156** | This orchard or facility stockpiled nuts (in the orchard or elsewhere):<br>***If No, then click 'No' and skip questions 157-166.*** | Yes |
| | **Postharvest Pest Management - Stockpile Management - Prevention** | |
| **157** | Stockpiles were located on clean (e.g., not treated with manure or other contaminants in the past year), dry soil or concrete where water does not collect. | Yes |
| **158** | Stockpiles were oriented north to south to minimize condensation and mold. | Yes |
| **159** | Moisture content of nuts was determined while on the orchard floor, before or after sweeping, and before stockpiling. | Yes |
| **160** | Nuts were not stockpiled if kernel moisture was over 8% or hull moisture was over 16%.<br>***If Yes, then click 'Yes' and skip to question 162.*** | Yes |
| | 161. If there was noticeable condensation on the interior of tarps, then stockpiles were uncovered during the day, when humidity was lower, and recovered at night. | |
| **162** | Stockpiles were built with smooth tops to reduce valleys, where condensation concentrates. | Yes |
| **163** | Stockpiles were covered with white-on-black tarps to minimize condensation and temperature changes. | Yes |
| | **Postharvest Pest Management - Stockpile Management - Efficacy and Safety of Control** | |
| **164** | Employees handling stockpiles were trained to properly manage them, including use of safe fumigation practices. | Yes |
| **165** | Traceability procedures were followed when creating stockpiles. | Yes |
| **166** | A thorough review of typically used types of fumigation (stockpile fumigation, hull pile fumigation, etc.) has been done, and appropriate safety, quality control and emergency responses are in written management plans. | Yes |
| | **Ecosystem Management Module** | |
| | **Introduction and General Information - Ecosystem Management** | |
| | . | |
| | **General Landscape Issues** | |
| **01** | The name and basic characteristics of the ecological region (e.g., Sacramento Valley, Bay/Delta, Sierra Foothills or San Joaquin Valley) where the farm or facility is located were known. | Yes |
| **02** | The watershed where the farm or facility is located was known. | Yes |
| **03** | One (or more) member of the farm or facility was an active member in a local or regional water quality coalition. | Yes |

 

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| **04** | One (or more) member of the farm or facility participated in a watershed stewardship planning group. | Yes |
| | **Threatened or Endangered Species** | |
| **05** | The threatened or endangered species that might inhabit the farm or facility grounds have been identified.<br>***If there has been no determination of potential threatened/endangered species, then click 'No' and skip to question 09.*** | No |
| | 06. The identified threatened or endangered species that might inhabit the farm or facility grounds have been documented. | |
| | 07. Habitat for any threatened or endangered species that might inhabit the farm or facility property has been identified. | |
| | 08. The farm or facility property was managed to protect or enhance habitat for threatened or endangered species (e.g., Safe Harbor Agreement). | |
| | **Promotion of Biodiversity** | |
| **09** | The value (ecosystem services) of ensuring a high level of appropriate biodiversity (e.g., beneficial wildlife, plants and soil organisms; pollinators; and pest natural enemies) on the farm or facility property was understood.<br>***If no, then click 'No' and skip to question 15.*** | Yes |
| | 10. Farmed or landscaped areas were managed (e.g., cover crops, low/no tillage, additions of organic matter or landscape plantings) to increase appropriate biodiversity. | Yes |
| | 11. Areas not farmed or landscaped were managed to increase appropriate biodiversity, including beneficial wildlife (e.g., by providing owl and songbird nest boxes, bat boxes or raptor perches). | Yes |
| | 12. Habitat features on the farm or facility property were connected by vegetated corridors and to adjacent properties to provide connectivity for beneficial wildlife. | Yes |
| | 13. Numbers and/or symptoms of desirable animals and plants on the farm or facility property were observed to determine impacts from management. | Yes |
| | 14. Numbers and/or symptoms of desirable animals and plants on the farm or facility property were measured and recorded to determine impacts from management. | Yes |
| | **Conservation Easements** | |
| **15** | Some or all of the natural areas of the farm or facility property were protected by a natural resources conservation easement. | No |
| **16** | Some area(s) or the entire farm was protected by an agricultural conservation easement. | No |
| | **Upland Habitat Maintenance and Enhancement** | |
| **17** | Hedgerows of trees and/or shrubs were maintained on at least some edges of the farm or facility property. | Yes |
| **18** | Hedgerows of flowering shrubs, such as coyote brush, were maintained along at least some edges of the farm or facility to provide alternative nutrition sources for managed and native pollinators and pest natural enemies. | Yes |
| **19** | Vegetation was maintained on or adjacent to the farm or facility that provided pollen and nectar sources for pollinator bees before and/or after almond bloom (includes nutritional ground cover). | Yes |

 

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| **20** | Vegetation such as grasses, trees or shrubs was maintained along roadsides, ditch-banks, headlands and/or irrigation canals, to provide habitat for beneficial wildlife and to slow and retain water and filter contaminants. | Yes |
| **21** | Beneficial trees (besides almonds) that existed before farm or facility establishment have been maintained, and/or beneficial trees were planted after establishment, such as along roadsides, to provide habitat for beneficial wildlife. | Yes |
| | **Riparian and Wetland Habitat Maintenance and Enhancement** | |
| **22** | Riparian habitat, swales, vernal pools or water courses were present on the farm or facility property.<br>***If no, then click 'No' and skip to question 30.*** | No |
| | 23. Swales were managed with setbacks to preserve them and prevent their rutting by equipment when the soil was wet. | |
| | 24. If vernal pools or water courses exist on the farm or facility property, setbacks were in place to minimize their disturbance.<br>***If no, then click 'No' and skip to question 30.*** | |
| **25** | Does a water course(s) exist on the farm or facility property?<br>***If no, then click 'No' and skip to question 29.*** | |
| | 26. The banks of the water course(s) were maintained with resident non-woody vegetation (excluding noxious weeds). | |
| | 27. The banks of the water course(s) were maintained with a mix of grasses, trees and shrubs. | |
| | 28. There was enough canopy cover to adequately shade the water course(s) and thus benefit its functions as habitat. | |
| **29** | Dying trees (unless infested with damaging disease), snags and downed logs were maintained in riparian buffer areas to provide cover, forage and habitat for beneficial wildlife. | |
| | **Ecosystem Management Planning** | |
| **30** | An environmental survey and map of the farm or facility property has been completed and notes sensitive areas (e.g., swales, waterways, trees, habitat for endangered species and other features).<br>***If no, then click 'No' and skip to question 33.*** | No |
| | 31. The map was used for pesticide use reporting. | |
| | 32. The map was used for ecosystem management planning. | |
| **33** | A documented ecosystem/habitat management plan has been completed for the farm or facility that includes goals for production areas, goals for managing areas not used for farming or processing, and a monitoring protocol to measure improvement over time. | Yes |
| | **Financial Management Module** | |
| | **Introduction and General Information - Financial Management** | |
| | . | |
| | **Profitability and Production Planning** | |
| **01** | Financial targets, including net profit, were established. | Yes |
| **02** | Was your business involved in direct sales decisions for any part of your almond crop (if assessing an orchard) or processed almond components (if assessing a huller/sheller or processor facility)? | Yes |

 

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| | ***If No, then click No and skip to question 4.*** | |
| | 03. A documented sales and marketing plan, as well as a supporting production plan, have been developed and implemented based on financial targets. | Yes |
| **04** | Revenue from all sources was estimated for use in budgeting. | Yes |
| **05** | Costs were estimated for use in budgeting. | Yes |
| **06** | A **documented** purchasing and financial borrowing plan has been established that includes: (a) decision making and approval authority, (b) number of required quotes from vendors or lenders, and (c) return on investment (ROI) as an acceptability criterion.<br>***If no, then click 'No' and skip to question 08.*** | Yes |
| | 07. Criteria for environmental and social considerations were included in the plan. | Yes |
| **08** | The ROI was calculated and evaluated prior to any renovation, expansion and/or renewal (e.g., orchard replanting) over the last five years. | Yes |
| **Business Risk Management Planning** | | |
| **09** | A documented succession plan has been established. | No |
| **10** | A written will and estate plan for the business has been prepared and reviewed at appropriate intervals. | Not applicable |
| **11** | A documented business continuation plan (disaster management plan) has been developed | Yes |
| **12** | A documented financial risk management plan has been developed that includes issues which may affect future profitability (e.g., urban sprawl, water quality, water availability, labor availability and climate change). | Yes |
| **13** | Risk-related insurance policies (e.g., fire, crop replacement and liabilities) were in place and evaluated to ensure adequate coverage based on needs and the scale of the operation. | Yes |
| **14** | An employee health insurance program was provided to manage financial risk from business productivity loss due to employee absence and impaired work efficiency. | Yes |
| **15** | Changes in almond prices and/or yield were considered when analyzing financial risk. | Yes |
| **16** | Costs associated with risk management plans were calculated for use in budgeting. | Yes |
| **Creating and Maintaining a Budget** | | |
| **17** | After the initial planning process, a budget (yearly) was established and updated with actual results on a regular basis (monthly/quarterly). | Yes |
| **18** | The budget was reviewed regularly and necessary adjustments were made to meet upcoming targets | Yes |
| **Financial Accounting, Tracking, Analysis and Optimization** | | |
| **19** | A financial accounting system and budgeting approach to track and report finances for the farm or facility was used to inform operational decisions. | Yes |

 

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| **20** | Ownership or appropriate management staff understood how to interpret and utilize cash and accrual statements including a balance sheet, income statement, cash flow and financial ratios to accurately report and manage financial performance. | Yes |
| **21** | An independent tax and/or financial advisor were consulted to optimize financial performance. | Yes |
| **22** | Financial management reports (profit and loss statements) were generated to track and manage performance for each management unit (e.g., field/block or facility segment). | Yes |
| **23** | Input costs and productivity measures were calculated and tracked for all key practices to help manage financial efficiency. | Yes |
| **24** | Input costs and productivity measures were calculated and tracked for newly implemented practices and compared to previously used practices to help manage financial efficiency. | Yes |
| **Workplace and Communities Module** | | |
| **Introduction and General Information - Workplace and Communities** | | |
| | . | |
| **Workplace - Employee Staffing and Development** | | |
| **01** | How many employees were in your business?<br>***If you do not have employees, then select '0' and skip to question 24.*** | 21 or more |
| **Workplace - Employee Staffing and Development - Equitable Staffing** | | |
| **02** | A documented long-term staffing plan has been developed and updated as needed, and is based on expected farm expansion or facility growth, and sustainability strategies. | Yes |
| **03** | The average and range of compensation levels per position within the almond industry and/or by location were checked to ensure compensation packages were competitive and minimized employee attrition because of salary issues. | Yes |
| **04** | A standardized process for recruiting has been documented and used to meet regulations (e.g., child labor, anti-discrimination and employment eligibility). | Yes |
| **05** | A standardized process has also been used to establish interview questions per position based on skills and competencies; exchange information about business policies, culture and job expectations; and establish an objective system to evaluate candidates. | Yes |
| **Workplace - Employee Staffing and Development - Employee Orientation and Development** | | |
| **06** | An orientation program has been provided for new employees.<br>***If No, then click 'No' and skip to question 08.*** | Yes |
| | 07. The orientation program included an employee handbook. | Yes |
| **08** | Employees were provided the opportunity to enhance their workplace knowledge, skills and competencies through in-house or external company sponsored-training or education. | Yes |
| **09** | A process has been established and was used to train and develop employees for career advancement opportunities. | Yes |
| **Workplace - Business Culture and Staff Relations** | | |

 

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| **10** | A documented process was used to evaluate and improve employee satisfaction. | Yes |
| **11** | A documented program was used to recognize employees (e.g., safety, operational, community or environmental contributions; and/or years of service). | Yes |
| **12** | A team-building activity was held for all employees. | No |
| **13** | A process was used to receive, evaluate, respond to and apply employee suggestions for improving company practices, the work environment and other aspects of the business. | Yes |
| **14** | A meeting of top management was held to exchange and apply ideas for improving the quality of life for employees and their families. | Yes |
| **15** | An employee meeting was held to review and discuss business goals and exchange ideas for revisions and improvements to the business. | Yes |
| **16** | A documented grievance process (e.g., detailed in an employee handbook) was followed and grievances have been recorded and processed in a timely manner. | Yes |
| **Workplace - Employee Health and Safety - Employee Wellness** | | |
| **17** | The farm or facility offered or sponsored lifestyle improvement programs (e.g., stress management, weight management, financial planning or smoking cessation). | Yes |
| **18** | The farm or facility encouraged or provided opportunities to improve physical fitness. | Yes |
| **19** | The farm or facility offered a health care plan. | Yes |
| **20** | The farm or facility offered health screenings, medical exams, vaccinations and flu shots on-site and/or through health care plans. | Yes |
| **21** | Healthy food and beverage options and nutritional information were provided in on-site cafeterias and/or canteens. | Yes |
| **Workplace - Employee Health and Safety - Safety Training (Employees)** | | |
| **22** | Safety training was done according to Cal OSHA regulations, i.e., for new employees; as well as for employees beginning new job assignments or using new processes, procedures, substances or equipment posing hazards. | Yes |
| **23** | Employee participation in safety training was recorded, tracked and reviewed to ensure requirements were met, which enhances employee safety, satisfaction and performance, and limits business risk. | Yes |
| **Workplace - Employee Health and Safety - Safety Training (Non-Employees) and Performance** | | |
| **24** | If labor was contracted, appropriate verification was completed to ensure that the labor company trained its workers according to regulations. | Yes |
| **25** | If a service provider(s) was contracted, appropriate verification was completed to ensure that the service provider(s) trained its workers according to regulations. | Yes |
| **26** | Safety failure statistics such as frequencies of procedural violations, equipment malfunctions and accidents have been documented, tracked and retained for a minimum of two years; and causes for safety failures were determined and documented, and appropriate actions were taken to prevent future incidents. | Yes |

 

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| **27** | Management reviewed published information about workplace safety to identify opportunities to improve safety for employees and/or contracted workers. | Yes |
| **Communities - Neighbor and Community Relations** | | |
| **28** | The following existing and potential neighbor and community issues were evaluated on an ongoing basis and appropriate actions were taken (Answer 'Yes' to all that apply): | |
| | 28.01. pesticide and other chemical use (e.g., timing applications to minimize drift) | Yes |
| | 28.02. dust (e.g., upgrading equipment to capture dust or timing harvest to minimize dust creation) | Yes |
| | 28.03. traffic (e.g., not blocking roads) | No |
| | 28.04. noise (e.g., avoiding early morning or late evening operations) | No |
| | 28.05. light (e.g., ensuring outside lighting is defused) | No |
| | 28.06. erosion (e.g., minimizing runoff) | No |
| | 28.07. odor (e.g., minimizing or eliminating sources) | No |
| **29** | Practices for maintaining the property's appearance were used to ensure goodwill and prevent/minimize neighbor and community concerns and complaints. | Yes |
| **30** | Production practices were altered as needed to prevent/minimize neighbor concerns and complaints. | Yes |
| **31** | Neighbors were provided with appropriate business contact information for questions, comments or concerns. | Yes |
| **32** | The farm or facility sought and executed friendly dialogue with nearby residents, such as neighbors, schools, and surrounding businesses, to maintain/improve relationships and understandings. | Yes |
| **33** | The farm or facility has hosted or participated in activities (e.g., orchard tours, open houses, seminars, public forums, service organizations and/or with news media) to educate and build trust with neighbors and the community. | Yes |
| **34** | The farm or facility prepared and/or distributed written, printed or electronic information (e.g., postcards, brochures, newsletters and/or via the business website) to educate and build trust with neighbors and the community. | Yes |
| **35** | A documented process has been established and appropriate employees have been trained to receive and respond to questions, comments and concerns about farm or facility operations. | Yes |
| **Communities - Support and Improvement** | | |
| **36** | A program was in place to encourage employee contributions (money, property and/or time) to charitable organizations. | No |
| **37** | The farm or facility made contributions (e.g., money, products and/or time) to charitable organizations. | No |
| **38** | Members of the farm or facility participated in activities (e.g., boards, community organizations and programs, and/or industry organizations) that contribute to community well-being.<br>***If No, then click No and skip the remaining questions.*** | No |

 

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| **39** | Members of the farm or facility participated in activities that contribute to community well-being in the following areas (Answer 'Yes' to all that apply): | |
| | 39.01. arts and culture | |
| | 39.02. housing | |
| | 39.03. industry | |
| | 39.04. land/environmental planning, protection or restoration | |
| | 39.06. school/educational | |
| | 39.05. public health and safety | |
| | 39.07. transportation | |
| | 39.08. religion/church | |
| **Bee Health and Pollination Module** | | |
| **Introduction and General Information - Pollination Efficiency** | | |
| **.** | The practices in this module cover recommended practices for reducing potential adverse impacts to managed honey bees and native pollinators. Almond pollination by managed honey bees from hives placed to service specific orchards is key to successful pollination. However, native bees occurring on and off the farm year-round also pollinate almonds and other crops and plants. For optimal crop production and ecosystem function, it is important that pest management and cultural practices used year-round, on and off the farm, protect and nurture managed honey bees and native pollinators. | |
| **Best Management Practices Guide** | | |
| **01** | Our operation was aware of the Almond Board's guide: Honey Bee Best Management Practices for California Almonds.<br>***If No, then click 'No' and skip to question 4.*** | Yes |
| | 02. Practices in the guide specific to our internal farm operation were used. | Yes |
| | 03. Practices in the guide relevant to our role in communication and coordination with parties throughout the pollination and pest management communication chain were used. | Yes |
| **Agreements with Beekeepers** | | |
| **04** | A pollination agreement was executed with the beekeeper.<br>***If No, then click 'No' and skip to question 7.*** | Yes |
| | 05. The pollination agreement executed with the beekeeper was documented. | Yes |
| | 06. The agreement stipulated (Answer 'Yes' to all that apply): | |
| | 06.01. hive strength | Yes |
| | 06.02. number of hives placed | Yes |

 

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| | 06.03. price per hive | Yes |
| | 06.04. payment schedule | Yes |
| | 06.05. hive access | Yes |
| | 06.06. hive inspection | Yes |
| | 06.07. potential pesticide applications | Yes |
| | 06.08. hive maintenance | Yes |
| | 06.09. hive removal date | Yes |
| **07** | Hives were put into place no later than the timing recommended by the University of California (about 10% bloom). | Yes |
| **08** | Hives were placed at sites not susceptible to pesticide drift from outside sources. | Yes |
| **09** | Abundant potable water, free from contamination, was provided for bees. | Yes |
| **10** | It was ensured that the beekeeper registered locations of the hives with the county agricultural commissioner's office. | Yes |
| **11** | An inspection was completed by the beekeeper, or third party consultant, to ensure expectations for hive strength were met (two hives per acre having an average of eight frames of bees, with six-frame minimum strength is common). | Yes |
| **12** | Arrangements were made with the beekeeper about which pesticides could be applied if daytime applications were necessary while hives were present; if an application(s) was necessary, the beekeeper was provided with 48-hour advance notice. | Yes |
| **13** | Which, and when during the day, pesticides could be applied while hives were present were communicated to the person responsible for pesticide recommendations, as well as the applicator. | Yes |
| **14** | Beekeepers were advised to remove hives based on timing recommended by the University of California (about 90% of latest blooming variety is at petal fall). | Yes |
| **Pollinator Risk Mitigation - General Pest Monitoring (Year-Round)** | | |
| **15** | The orchard was monitored by a licensed PCA for insects, mites, diseases and pest natural enemies (i.e., beneficials) at least once every two weeks during the growing season. (Note: diseases should be monitored weekly during bloom and spring.)<br>***If No, then click 'No' and skip to question 20.*** | Yes |
| | 16. Written or electronic scouting reports were kept by or provided to the farm owner or staff to inform decision making.<br>***If No, then click 'No' and skip to question 18.*** | Yes |
| | 17. To improve future decision-making, a year-end review of pest levels and trends was completed. | Yes |
| | 18. Scouting data, university guidelines and practical experience were used to design and implement management strategies for insects, mites and diseases. | Yes |
| | 19. Orchard monitoring for pests was done using repeatable representative processes (e.g., as recommended by the UC Statewide IPM Program). | Yes |
| **Pollinator Risk Mitigation - Disease Monitoring (During Bloom and Spring}** | | |

 

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| **20** | During bloom and spring periods, decisions to spray for diseases were based on temperature and rainfall patterns conducive for disease development. | Yes |
| **21** | To determine necessary fungicides, rates and timings, disease symptoms were monitored weekly prior to and during bloom, and throughout spring, until weather was no longer conducive for disease development. | Yes |
| **Pollinator Risk Mitigation - Pesticides (During Bloom)** | | |
| **22** | Before applying pesticides to the orchard during bloom, beekeepers with hives on nearby properties were notified using an appropriate communication method (e.g., through the County Ag Commissioner, BeeWhere, CalAgPermits, etc.). | Yes |
| **23** | Pesticides were not used during bloom that had label cautions "highly toxic to bees", "toxic to bees," "residual times" or "extended residual toxicity." | Yes |
| **24** | Except for possibly Bacillus thuringiensis, insecticides (including tank mixes with fungicides) were not applied during bloom. | Yes |
| **25** | During bloom, necessary fungicides (or Bacillus thuringiensis) were applied in the late afternoon or evening when bees and pollen were not present. | Yes |
| **26** | Honey bee hives were never directly sprayed with any pesticide. | Yes |
| **27** | Water sources for pollinator bees were covered before or replaced after pesticide applications. | Yes |
| **28** | The orchard manager was familiar with common symptoms of honey bee exposure to pesticides. | Yes |
| **29** | If incidences of possible pesticide-related bee incidences were observed, they were immediately reported to the county agricultural commissioner's office. | Yes |
| **Pollinator Risk Mitigation - Pesticides (Year-Round)** | | |
| **30** | If effective alternatives existed, broad-spectrum insecticides and acaricides, such as pyrethroids, organophosphates and carbamates, were not used because of their potential negative effects on beneficial and nontarget organisms. | Yes |
| **31** | Prior to applying newly registered pesticides, impacts to bees and natural enemies were checked (using information from labels and other sources such as the UC IPM website), and the product with the fewest precautions and/or shortest residual was considered for use. | Yes |
| **32** | Before applying pesticides to the orchard anytime of the year, beekeepers with hives on nearby properties were notified using an appropriate communication method (e.g., through the County Ag Commissioner, BeeWhere, CalAgPermits, etc.). | Yes |
| **Pollinator Risk Mitigation - Pesticide Spraying** | | |
| **.** | If a custom applicator or farm management company was primarily responsible for applying pesticides, you may have to answer 'Not applicable' for some of the following questions related to spray equipment and applications. However, please answer 'Not applicable' ONLY if necessary. | |
| **33** | Prior to each air blast and/or aerial application, the weather was checked for current and forecasted wind speed and direction, inversion conditions, temperature and rain. | Yes |
| **34** | Air blast and/or aerial applications only occurred when winds were between 2 and 8 mph (minimizes drift from inversions and wind). | Yes |

 

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| **35** | Low-drift nozzles for air blast and/or aerial sprayers were used to optimize spray placement and minimize off-target movement. | Yes |
| **36** | The air blast spray pattern was adjusted according to the orchard's average tree size and shape (e.g., reducing size of lower nozzles for a mature orchard with a thin lower canopy, or shutting off top nozzles for a young orchard with short trees). | Yes |
| **37** | When shifting between foliar sprays and dormant or bloom sprays for air blast sprayers, the fan speed, pressure and/or nozzle type were adjusted for the canopy density. | Yes |
| **38** | To reduce drift, the air blast sprayer(s) was operated at the lowest pressure providing uniform coverage. | Yes |
| **39** | Sprayer shields or drift guards were used to keep sprays on target (e.g., for weed sprayers). | Not applicable |
| **40** | Ultra-low-volume spray equipment or target-sensing sprayers (e.g., SmartSpray (R) or WeedSeeker (R) technology) were used to reduce spray volumes or amounts of pesticides. | No |
| **Pollinator Risk Mitigation - Accounting for Sensitive Sites** | | |
| **41** | Sprayers were turned off when making row turns and spraying did not resume until the nozzles were adjacent to the first trees. | Yes |
| **42** | A map of sensitive sites (e.g., aquatic areas, residences, schools, pollinator and pest natural enemy habitat) and associated buffer zones within or near the orchard has been created and reviewed with everyone involved in pesticide applications. | No |
| **43** | Spraying near waterways (e.g., creeks or irrigation canals) or other sensitive sites (e.g., residences, schools, pollinator and pest natural enemy habitat) was discontinued when winds blew in the direction of these sites. | Not applicable |
| **44** | When operating air blast sprayers next to open or sensitive sites (e.g., aquatic areas, residences, schools, pollinator and pest natural enemy habitat), the two rows directly adjacent to these sites were sprayed on the outer side only (i.e., to direct spray into the orchard). | Not applicable |
| **Alternative Forage for Pollinators** | | |
| **45** | Hedgerows of flowering shrubs, such as coyote brush, were maintained along at least some edges of the farm or facility to provide alternative nutrition sources for managed and native pollinators and pest natural enemies. | Yes |
| **46** | Vegetation was maintained on or adjacent to the farm or facility that provided pollen and nectar sources for pollinator bees before and/or after almond bloom (includes nutritional ground cover). | Yes |
| **47** | Cover crop (resident ground cover or planted) was intentionally grown between orchard rows.<br>***If No, then click 'No' and skip questions 48 - 49*** | Yes |
| | 48. The ground cover was a planted cover crop.<br>***If No, then click 'No' and skip question 49.*** | Yes |
| | 49. The cover crop was recommended for providing forage to pollinators (e.g., mustards, clovers, vetch and/or wildflowers). | Yes |

 