



# Irrigated Lands Program Irrigation and Nutrient Management Plan (INMP) Summary Report Instructions

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## What is the INMP Summary Report?

Growers are required to develop and implement an Irrigation and Nutrient Management Plan (INMP) to address the nitrogen discharges to both surface and groundwater.

The [Agricultural Order R3-2021-0040](#) specifies that, at a minimum, the elements of the INMP related to groundwater protection must include monitoring, recordkeeping, planning, management practice implementation and assessment, and a description of all irrigation, nutrient, and salinity management practices implemented and assessed on the ranch. Certain elements of the INMP must be submitted annually in the “INMP Summary Report”.

The INMP Summary Report requirement is a phased-in reporting requirement. Phased-in means that growers begin submitting the INMP Summary Report depending on the groundwater phase area in which their ranch is located. Since the INMP reporting requirement does not start the same year for all ranches, the INMP Summary Report will be available on the first year when the ranch is required to submit the INMP Summary report, but not before. For ranches in phase 1, the INMP Summary Report requirement began in 2023, for phase 2 in 2025, and for phase 3 in 2027. The ranch Groundwater Phase Area is displayed in GeoTracker in the ranch eNOI.

The required ranches must submit the INMP Summary Reports each year by March 1<sup>st</sup>, or within 60 days after a ranch termination.

### INMP Summary Report Availability

The INMP Summary Report is available in GeoTracker from September 1<sup>st</sup> of the reporting period until August 31<sup>st</sup> of the following year, so after the December 31<sup>st</sup> when the reporting period ends. For example, if a ranch is submitting the INMP Summary Report for the 2025 reporting period (January 1<sup>st</sup> to December 31<sup>st</sup>, 2025), the INMP Summary report will be available in GeoTracker from September 1<sup>st</sup>, 2025, until August 31<sup>st</sup>, 2026. This same ranch will have access to the 2026 INMP Summary Report from September 1, 2026, through August 31, 2027, and so on.

For more information about the “INMP Summary Report”, refer to the Irrigated Lands Program [Total Nitrogen Applied Report / Irrigation and Nutrient Management Summary Report](#) link.

## INMP Summary Report Instructions Overview

This document explains what information is required to submit a complete Irrigation and Nutrient Management Plan (INMP) Summary Report. It includes instructions on how to access and submit the INMP Summary Report in GeoTracker and example calculations. The information is organized Section by Section of the INMP Summary Report.

[Attachment A: “Drop-down menus”](#) provides the list of selections under each drop-down menu. [Attachment B: “Available Crops Kc Values”](#) provides the list of crops with available irrigation coefficient (Kc) values. [Attachment C: “Optional Reporting Sections”](#) explains which sections of the INMP Summary Report are optional and how to report

them. [Attachment D: “Crops with Known Nitrogen Removal Conversion Coefficients”](#) provides the list of all known nitrogen removal conversion coefficients.

## How to Submit the INMP Summary Report in GeoTracker

To submit the INMP Summary Report log in to GeoTracker:  
<http://geotracker.waterboards.ca.gov/esi>. Enter the username and password and click on “Login to GeoTracker ESI.”



To submit the INMP Summary Report click on the “[SUBMIT INMP REPORT]” link, located to the far right of each ranch name.

<a href="#">EDIT OPERATION INFORMATION</a>			<a href="#">PRINT OPERATION FORM</a>				<a href="#">ADD RANCH / FARM TO THIS OPERATION</a>	
<a href="#">RANCH / FARM NAME</a>	<a href="#">ADDRESS</a>	<a href="#">CITY</a>	<a href="#">IRRIGATED ACRES</a>	<a href="#">TAILWATER ACRES</a>	<a href="#">GW PHASE AREA</a>	<a href="#">SW PRIORITY AREA</a>		
<a href="#">[EDIT RANCH INFO]</a>	1223 MAIN STREET	SAN LUIS OBISPO	5	0	2	4	<a href="#">[EDIT COMPLIANCE INFO]</a> <a href="#">[SUBMIT INMP REPORT]</a>	

Select the INMP Summary Report reporting year by clicking on the dropdown menu “Reporting Year” located in the upper right corner of the INMP Summary Report form.



Complete all the required sections of the INMP Summary Report from top to bottom and click on the “Save & Submit” button at the bottom of the page. The Summary Report cannot be submitted with incomplete sections. An error message will appear on top in yellow if any section of the form is incomplete.

**SECTION XI: CERTIFICATION - This form must be reviewed and certified by the Operator/Responsible Party listed on the eNOI**

I certify under penalty of perjury that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Save & Submit Print

If the report is complete, a pop-up message will appear stating that the INMP Summary Report has been successfully saved and submitted. Click on “OK” and you will be redirected back to the GeoTracker screen with the list of ranches. This confirms that the INMP Summary Report has been submitted for a ranch.

## Submittal Errors

GeoTracker will not allow an incomplete INMP Summary Report to be saved or submitted. If an INMP Summary Report is incomplete and the “Save & Submit” is clicked on, a highlighted yellow list of incomplete and required fields will appear at the top of the form. If this occurs, please complete the sections, correct all errors listed in yellow at the top of the page before resubmitting the INMP Summary Report.

Example of a highlighted yellow list of errors.

- *PHYSICAL RANCH ACRES REPORTING IS A REQUIRED FIELD.*
- *TOTAL VOLUME OF WELL / CITY WATER / SURFACE WATER IS A REQUIRED FIELD.*
- *AVERAGE NITRATE CONCENTRATION IN WELL / CITY WATER / SURFACE WATER IS A REQUIRED FIELD.*
- *NITRATE / NITROGEN SELECTION IS A REQUIRED FIELD.*
- *CROP TYPE IS A REQUIRED FIELD.*
- *TOTAL CROP ACRES IS A REQUIRED FIELD.*
- *NITROGEN PRESENT IN SOIL IS A REQUIRED FIELD.*
- *NITROGEN APPLIED IN CONVENTIONAL FERTILIZERS IS A REQUIRED FIELD.*
- *AT LEAST ONE NITROGEN PRESENT IN SOIL MUST BE > 0*
- *BASIS IS A REQUIRED FIELD.*

Once the form is completed, click on the “Save & Submit” button at the bottom of the form. If the report is complete, a pop-up message will appear stating that the INMP Summary Report has been successfully saved and submitted.

## Warning Pop-up Messages

Some sections of the INMP Summary Report form contain warning pop-up messages, when the value entered is below or above a typical range. The warning pop-up message will appear in red alerting the user to double check the entered value and/or units are correct (i.e., pounds nitrogen/crop acre). These warning pop-up messages will not prevent the INMP Summary Report from being saved or submitted.

Example of a Warning Pop-up Message:

The water volume applied does not fall within the typical range.  
Review all information reported in Section I, II and IV to verify the estimation of water volume applied is correct.

## How to View a Previously Submitted INMP Summary Report

To view a previously submitted INMP Summary Report, click on the “[SUBMIT INMP REPORT]” link located to the far right of each ranch name. Once on the reporting page, select the INMP Summary Report year from the dropdown menu “Reporting Year” located in the upper right corner of the form and select the reporting year.

To revise a previously submitted INMP Summary Report, click on the Reporting Year dropdown menu, and select the report year. If the INMP Summary Report is still available in GeoTracker, make all necessary revisions and click on “Save & Submit” at the bottom of the report. Refer to the What is the INMP Summary Report section above to learn when is the INMP Summary Report available in Geotracker.

## Required and Optional Information in the INMP Summary Report

To submit an INMP Summary Report all the required sections must be completed.

### Information Required to submit the INMP Summary Report:

1. Crops names, crops acres, crops duration;
2. Total nitrogen applied in pounds in fertilizers, amendments, and materials/products containing nitrogen in any form or concentration. This includes, but it's not limited to, organic, inorganic, and foliar fertilizers, slow-release products, compost, compost teas, manure, and extracts;
3. Weighted average nitrogen concentration in the measured volume of irrigation water applied during the annual reporting period<sup>1</sup>;
4. The measured total volume of irrigation water applied to the ranch;
5. Total nitrogen present in the soil (lbs./crop-acre). The nitrogen present in the soil must be reported at least once per annual reporting period<sup>2</sup>;
6. The nitrogen removed through harvest, for the crops that were harvested during the reporting period.
7. The total estimated volume of irrigation water discharged from the ranch to surface water and the evapotranspiration of the crops that were harvested during the reporting period.

### Optional Information that can be Included in the INMP Summary Report

1. The carbon to nitrogen ratio (C:N) of compost, high carbon amendments, and woody mulch materials;

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<sup>1</sup> The total nitrogen applied from irrigation water in pounds/ranch-acre (lbs./ranch-acre) will be automatically calculated.

<sup>2</sup> The nitrogen present in the soil must be reported in the row of the first crop listed on the INMP Summary Report form.



2. The C:N ratio of planted cover crops;
3. The C:N ratio of organic fertilizers;
4. The nitrogen sequestered in the woody plant tissue of permanent or semi-permanent crops;
5. The nitrogen removed by treatment methods, or other methods and technologies,
6. The biomass, height, C:N ratio, and percent nitrogen concentration of the Pacheco Triticale or Merced Rye cover crops.

## How to Report Crop Information

Select the specific crop name from the dropdown menu and follow the instructions below depending on the crop growing duration and harvest events.

### Short-Term Crops

Short-term crops are crops that grow for less than 12 months. these crops should be reported in the year when they were harvested. In the Crop Duration column, select S-Short-term Crop (< 12 months long) for crops that were harvested during the reporting period.

Select SI-NFH – Short and Intermediate-term Crop (less than 24 months long) NOT Final Harvest for short term crops that were not harvested during the reporting period. For example: a strawberry crop that was grown for 4 months in 2024 but will not be harvested until 2025 for a total crop duration of 7 months can be reported as SI-NFH.

If the short-term crop is harvested, report<sup>3</sup>:

- The nitrogen applied to the entire crop throughout its growing cycle,
- The amount of crop material and nitrogen removed when the crop is harvested,
- The crop evapotranspiration.

### Intermediate-Term Crops

Intermediate-term crops grow for more than 12 months but less than 24 months (examples are strawberries and bell peppers). The nitrogen applied during the entire growing cycle of these crops, is reported multiple times. First, for the first year when the crop is planted, and second, in the year when the crop is harvested. When the crop is harvested, report the total amount of nitrogen applied in fertilizers during the entire crop growing cycle.

In the first year, when the crop is not harvested, in the Crop Duration column select “SI-NFH, Short and Intermediate-term Crop (12 to 24 months long), Not Final Harvest”. This indicates that the crop is still in the ground and will be finally harvested after December

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<sup>3</sup> To report baby crops (e.g., baby lettuce) select the "crop, baby" option from the crop dropdown menu.



31<sup>st</sup>. Note: all crops reported as “SI-NFH”, will automatically appear in the INMP form the next year, and all the reported information will be auto-populated. All the auto-populated values will be highlighted pink. In the first year report:

- The amount of nitrogen applied to the crop from the beginning of its growing cycle until December 31<sup>st</sup>,

In the following (second) year, or when the intermediate-term crop is harvested, update the Crop Duration column selection from “SI-NFH, Short and Intermediate-term Crop (12 to 24 months long), Not Final Harvest”, to “I-FH, Intermediate-term Crop (12 to 24 months long), Final Harvest”. In the second year, report:

- The nitrogen applied from fertilizers and other materials throughout the entire crop growing cycle,
- The amount of crop material and nitrogen removed when the crop was harvested,
- The crop evapotranspiration throughout the entire crop growing cycle,

### **Long-Term Crops**

Long-term crops grow for more than 24 months (i.e., blueberries). Long-term crops may be harvested some years, but not every year. If the long-term crop was harvested select “L-FAH”, Long-term Crop (> 24 months long), Final or Annual Harvest” in the Crop Duration column. If the long-term crop was not harvested that year, enter zeroes (0) in the amount of crop material and nitrogen removed at harvested, and select “L-NFAH, Long-term Crop (> 24 months long), Not Final or Annual Harvest” in the Crop Duration column. Note: all crops reported as “L-NFAH”, will automatically appear in the INMP form the next year, and all the reported information will be auto-populated. All the auto-populated values will be highlighted pink. On an annual basis, report the following information

- The amount of nitrogen applied to the crop during the reporting period, from January 1<sup>st</sup> to December 31<sup>st</sup>,
- The crop evapotranspiration throughout the reporting period,
- If the long-term crop was harvested that year, report the amount of crop material and nitrogen removed when the crop was harvested,
- If the long-term crop was not harvested that year, enter zeroes (0) in the amount of crop material and nitrogen removed at harvested.

## Section I: General Ranch Information

In this section, growers report general ranch information and acreage.

### Name of Operation, AW#, Ranch Name, and Global ID

Some information reported in the ranch eNOI is auto populated into the INMP Summary Report form. Therefore, the information reported in the ranch information page, or ranch eNOI, must be current and accurate prior to submitting the INMP Summary Report. If the information reported in the eNOI is not correct, return to the ranch eNOI, update and save it before completing the INMP Summary Report form.

### Physical Ranch Acres Reporting

The physical ranch acres reporting value will be auto-populated from the eNOI, however growers can overwrite it with a value greater than zero. The physical ranch acres reporting value cannot be zero. If a crop is planted, and/or irrigated, and/or either conventional or organic fertilizer was applied during the reporting period, but could not be harvested (e.g., disease, pest infestation, etc.) report as follow: the INMP report must include the volume of irrigation water applied (which could be a zero value), crop type, crop acres planted, the fertilizer type, the amount of fertilizer applied (which could be a zero value) and select “No Yield” in the “Additional Information” column of “Section IV-A: Nitrogen Applied with Conventional Fertilizers” to indicate the crop could not be harvested, and a zero crop material removed value in “Section VII-A: Total Nitrogen Removed from the Field for Each Specific Crop Through Harvest or Sequestration.”

If no crop was grown during the reporting period, leave the physical ranch acres value as populated from the ranch eNOI (or update this information if needed) and report the physical ranch acreage as fallow acres (i.e., physical ranch acreage = 50 and fallow acreage = 50, which results in zero acreage). The rest of the form will grey out.

The physical ranch acres reporting includes all farmed acres plus any fallowed acres (fallowed during the entire 12 months: January 1<sup>st</sup> to December 31<sup>st</sup>). Acres with planted cover crops must also be included, even if no nitrogen was applied to the cover crops.

### Fallow Acres

Report any fallowed acres that were not under crop production during the entire reporting period of January 1<sup>st</sup> to December 31<sup>st</sup>. The fallowed acres must be included in the “Physical Ranch Acres Reporting” and reported separately as “Fallow Acres”.

### Sum of Total Crop Acres

The sum of total crop acres value is automatically calculated from the crop acres reported in “Section IV-A and IV-B: Nitrogen Applied with Conventional and/or Organic Fertilizers”. This value is intended to help ensure all required acres are reported on.

The sum of the total crop acres plus the fallow acres should equal or exceed the physical ranch acres reported as “Physical Ranch Acres Reporting”. If there are unusual circumstances where the sum of the total crop acres plus fallow acres is less than the

physical ranch acres reported, provide an explanation in “Section IX: Explanations and Comments”.

### **Greenhouse, Nursery, or Hydroponic Reporting Selections**

Select one of the options to best describe how the irrigation water is managed, collected, and discharged from the greenhouse, nursery, or hydroponic production.

For example: If a greenhouse operation has a reverse osmosis (RO) system installed that recycles irrigation water up to 5 times, and the salts (brine) of the RO system is cleaned and removed as dry material, then the proper selection is "All excess water is captured and recycled; the only waste is dry material, which is properly disposed of."

### **Assessor Parcel Number(s) (APNs)**

The Assessor Parcel Number APN information is automatically generated and updated in the INMP Summary Report from the ranch eNOI. Select the APN(s) that correspond to the acreage included in the INMP Summary Report.

If APN(s) are not selected, provide an explanation in “Section IX: Explanations and Comments”.

In instances where an APN was removed from the ranch eNOI, prior to INMP Summary Report submittal, but the information in the INMP Summary Report includes the acres of the removed APN, that APN must be temporarily added back to the ranch eNOI. After the INMP Summary Report is submitted, remove the APN from the ranch eNOI.

### **Errors in Section I**

The field “Physical Ranch Acres Reporting” is a required field. Please report the number of acres that correspond to the INMP Summary Report.

The background of the "Sum of Total Crop Acres" cell will be pink if the sum of the crop acres reported in “Section IV-A: Nitrogen Applied with Conventional” and Section I: “Fallow Acres”, is less than the “Physical Ranch Acres Reporting”. To correct this error, double-check that cropped and fallowed acres are reported correctly.

## **Section II: Nitrogen Applied with Irrigation Water**

In this section, growers report all the sources of irrigation water applied, the nitrogen concentration of the irrigation water, and the amount of nitrogen applied in irrigation water during the entire report period. Both the nitrogen concentration and the volume of irrigation water applied are needed to calculate the nitrogen applied in irrigation water.

### **Section II-A: Water Source(s)**

Report all sources of irrigation water applied to the ranch during the report period (January 1<sup>st</sup> to December 31<sup>st</sup>). Include all the applications of water that occurred on the ranch (leaching, runoff, backflush, operational spills, etc.). To report more than one type of water source, select all the sources of water applied from the dropdown menus. Rainwater should not be included.

This section contains two dropdown menus. The first menu includes options to select if the irrigation water comes from a well, city, or surface water source. The second menu includes options to select if the irrigation water comes from a recycled or reclaimed source.

If the ranch used well, city water, and/or surface water, the nitrogen applied with this source of irrigation water is reported by completing “Section II-B: Well / City Water / Surface Water”. If the ranch used water from a recycled or reclaimed water source, the nitrogen applied with this source of irrigation water is reported by completing “Section II-C: Recycled / Reclaimed Water”. If the ranch used both well, city, and/or surface water and a recycled / reclaimed source, complete both sections.

### **Section II-B: Well / City Water / Surface Water**

#### **Weighted Average Nitrate Concentration in Well / City Water / Surface Water (mg/L)**

Concentration value. Report the weighted average nitrate concentration (mg/L) in the irrigation water applied from all sources, such as well, city water, and/or surface water. If more than one source of water is used to irrigate, then the weighted average must be calculated using volume and concentration information from each water source.

Growers must obtain a precise nitrogen concentration for each water source used on their ranch during the report period. Growers can obtain a laboratory analysis or utilize a portable (handheld) measuring device that provides a precise numeric result. Methods that produce a concentration range, such as a nitrate quick test strip, and/or use a color scale, should not be used unless additional technology or methods are used to obtain a precise numeric value from the test strip. Growers must also measure the volume applied from each source of irrigation water to obtain the weighted average nitrate concentration (i.e., all irrigation wells). This number should only include the amount of nitrate naturally dissolved in the water during use and should not include the concentration of the irrigation water after liquid fertilizers are applied during fertigation.

Growers using an irrigation source that is not located on their ranch must still obtain a precise nitrogen concentration from that source of irrigation water during the reporting period. When necessary, coordinate with the landowner to ensure the well water can be sampled and tested.

Tip! Use this link: “[weighted average concentration](#)” to access an Excel tool to help you calculate the weighted average concentration if more than one sample from one or more sources of irrigation water was used.

Concentration units. Select the proper units to report the weighted average nitrate concentration of irrigation water: Nitrate as Nitrate (commonly shown as NO<sub>3</sub> in laboratory reports) or Nitrate as Nitrogen (commonly shown as NO<sub>3</sub>-N in laboratory reports). Note: milligrams per liter (mg/L) = parts per million (ppm).

### **Measured Total Volume of Well / City Water Applied to Entire Reporting Acres During Reporting Period (gallons):**

Enter the measured total gallons of irrigation water from wells, delivered by the city, or sourced from surface water applied to the entire reporting acreage during the report period of January 1<sup>st</sup> to December 31<sup>st</sup>. To measure the total volume of irrigation water growers must install a flow meter, or another volume measuring device.

Some water agencies or purveyors may provide the volume of irrigation water delivered or pumped out of the ground on an annual basis. Please contact your local water agency for more information.

Tip! Use the “[convert to gallons](#)” Excel tool to help convert the volume applied from acre-feet or acre-inches into gallons.

If the total volume of irrigation water applied from all sources during the reporting period is zero, you must provide an explanation in “Section IX: Explanations and Comments.”

Note: The Measured Total Volume of Irrigation Water Applied should include all water applied for leaching, backflush, or that occurs as runoff and/or operational spills, etc. Rainwater should not be included.

### **Section II-C: Recycled / Reclaimed Water**

Report if Recycled / Reclaimed irrigation water was used on the ranch from any of the recycled or reclaimed water projects and/or the general categories listed below. If the source of Recycled / Reclaimed irrigation water used is not listed, select “Other” and type the name of the recycled or reclaimed water project.

The contact information for the recycled or reclaimed water sources are listed below.

- Blue Valve, San Benito County Water District Website: <https://www.sbcwd.com/about-us/>, Delivered Water: <https://www.sbcwd.com/recycled-water/>, Phone: (831) 637-8218.
- CSIP, Monterey County Water Resources Agency, Castroville Seawater Intrusion Project/ Salinas Valley Reclamation Website: <https://www.co.monterey.ca.us/government/government-links/water-resources-agency/about/contact>, Email: [mcwater@co.monterey.ca.us](mailto:mcwater@co.monterey.ca.us), Seawater Intrusion Project: <https://www.montereyonewater.org/210/Castroville-Seawater-Intrusion-Project-O>, Email: [customerservice@my1water.org](mailto:customerservice@my1water.org), Phone: (831) 372-3367 or (831) 422-1001.

- Hollister Domestic Recycled Water Plant, Hollister Tertiary Treated Recycled Water Website: <https://hollister.ca.gov/government/city-departments/community-services/utilities-sewer/>, Email: [pio@hollister.ca.gov](mailto:pio@hollister.ca.gov), Phone: (831) 637-7100.
- Laguna County Sanitation District, Santa Maria District Website: <https://www.countyofsb.org/1355/Laguna-Sanitation>, Phone: 805-803-8750.
- Los Osos Water Recycling Facility Waste Water Project Website: <https://www.slocounty.ca.gov/Departments/Public-Works/Committees-Programs/Los-Osos-Wastewater-System.aspx>, Email: [publicworks@co.slo.ca.us](mailto:publicworks@co.slo.ca.us), Phone: (805) 781-5252.
- PVWMA, Pajaro Valley Water Management Agency Recycle Water Website: <https://www.pvwater.org/recycled-water>, Email: [Info@PVWater.org](mailto:Info@PVWater.org), Phone: (831) 722-9292.
- Santa Cruz Davenport Reclamation Facility. Sanitation District Website: <https://dpw.co.santa-cruz.ca.us/Home/SewerWater/DavenportCountySanitationDistrict.aspx>, Email: [dpwsanitation@santacruzcounty.us](mailto:dpwsanitation@santacruzcounty.us), Phone: (831) 454-2160.
- SCRWA, Santa Clara Valley Water District and South County Regional Wastewater Authority, Gilroy, and Morgan Hill Recycled Water. Wastewater Authority (SCRWA) Website: <https://www.cityofgilroy.org/561/South-County-Regional-Wastewater-Authori>, Email: [scrwamail@ci.gilroy.ca.us](mailto:scrwamail@ci.gilroy.ca.us), Phone: (408) 848-0480.
- Trilogy Master Plan Community Reclaimed Water, Nipomo. Woodlands Water Recycling Facility Website: <http://woodlandsmwc.com/water-conservation/water-conservation-at-the-woodlands/>, Email: [lonnier@wallacegroup.us](mailto:lonnier@wallacegroup.us), Phone: (805) 540-5208.

General Categories include:

- Domestic Reclaimed Water with Secondary Treatment.
- Fruit and Vegetable Processing Facility (Recycled Water),
- Olive Processing Facility (Recycled Water),
- Winery Processing Facility (Recycled Water).

### **Total Nitrogen Concentration in Recycled / Reclaimed Water (mg/L)**

Contact the agency, community services, sanitation district, processing facility, or the city to obtain the total nitrogen concentration and volume of recycled or reclaimed water.

Contact the processing facility directly to obtain the Nitrogen concentration as NO<sub>3</sub>-N in the recycled water, and the community services, the sanitation district, or the city(ies) to obtain the Nitrogen concentration as NO<sub>3</sub>-N in reclaimed water. If the total nitrogen concentration as NO<sub>3</sub>-N is not available, you must sample the recycled/reclaimed water used to irrigate crops and report the total nitrogen concentration as NO<sub>3</sub>-N.

Growers must sample the recycled / reclaimed water used to irrigate crops to report the total nitrogen concentration when:

- 1) The agency, city, or facility sampling location of the total nitrogen concentration is upstream of the location where the grower, the agency, city, or facility blend the delivered water with water from another source (i.e., additional on-farm wells),
- 2) When the total nitrogen concentration is not available.

**Measured Total Volume of Recycled / Reclaimed Water Applied to Entire Reporting Acres During Reporting Period (gallons)**

Enter the measured total gallons of recycled or reclaimed water applied to the ranch during the period of January 1<sup>st</sup> to December 31<sup>st</sup>.

If the total volume of irrigation water applied from all sources during the reporting period is zero, you must provide an explanation in “Section IX: Explanations and Comments.”

Contact the corresponding agency or facility to verify the volume of recycled or reclaimed water delivered. The total measured volume of irrigation water applied should include water applied for leaching, runoff, backflush, operational spills, etc. Do not include rainwater.

**Section II-D: Nitrogen Applied**

**Nitrogen Applied with Irrigation Water (pounds/ranch-acre)**

This value corresponds to the sum of pounds of nitrogen applied with the water from the Well / City / Surface Water and the nitrogen applied with Recycled / Reclaimed Water to each ranch-acre (physical ranch-acres minus fallowed acres) during the reporting period. This corresponds to the acres that were not fallowed.

Section II-D will automatically calculate the nitrogen applied with irrigation water value. The nitrate concentration, the total nitrogen concentration, and the total measured volumes reported in “Section II-B: Well / City Water / Surface Water” and “Section II-C: Recycled / Reclaimed Water” are used to calculate the “Nitrogen Applied with Irrigation Water (lbs./ranch-ac)”.

Confirm that the following information has been reported correctly:

- 1) Physical Ranch-Acres Reporting and Fallow Acres (Section I),
- 2) The weighted nitrate concentration, the units of nitrate concentration (NO3 or NO3-N), and the measured total gallons of Well / City Water / Surface Water applied (Section II-B).
- 3) The weighted total nitrogen concentration, and the measured total gallons of Recycled / Reclaimed Water applied (Section II-C).

Growers must maintain all irrigation water sampling results and measured volumes of water applied to the ranch in the Farm Water Quality Control Plan (Farm Plan) and must be submitted to the Central Coast Water Board upon request.



## **Section II-E: Volume Check**

This value corresponds to the estimated average acre-feet of water applied to each crop-acre. The value is automatically calculated using information provided in “Sections I-IV.”

The value in this cell should be used to confirm the volume of water and the crop-acres were reported accurately.

### **Errors in Section II**

“Section II-A: Water Source(s)” is a required field.

“Section II-B” and/or “Section II-C”, weighted nitrate and nitrogen concentrations in irrigation water and total measured volume of water applied to the entire reporting acres during reporting period are required fields.

“Section II-E: Volume Check” background will be pink if the estimated acre-feet of water applied to each crop-acre is not typical for crops grown in the central coast region. Review all information reported in Sections I, II, and IV of the INMP Summary report to ensure the information in those sections is reported correctly.

### Section III: Nitrogen Applied with Compost and Other Materials

Report the nitrogen applied with compost, high carbon amendments, other amendments, woody mulch, and other materials.

#### Material Applied

Report information for compost, amendments, mulches, and other materials applied to the ranch during the reporting period. Select the type of material(s) applied from the dropdown menu. The dropdown list of materials to report includes “Compost”, “Mulch”, “Amendments (High Carbon)”, “Amendments (Other)”, “None”, and “Other”. If “Other” is chosen, a text field will appear, and you must provide a description of this material. Select “None” if no material was applied during the reporting period.

If the same type of material is applied more than once, their applications can be reported individually on separate rows or combined on one row. If combined, report the total pounds of nitrogen applied from all the applications, the total acres that received all the applications, and the weighted average for the C:N ratio, as applicable.

The C:N ratio is not required; it is an optional field.

#### Nitrogen Applied in Compost and Other Materials (total pounds)

Report in pounds the total nitrogen applied from compost, amendments, and all other nitrogen containing materials (such as compost teas, humic acids, bacterial extracts, soil enhancers). Note that the nitrogen applied with conventional and/or organic fertilizers must be reported in Sections IV-A and Section IV-B.

To determine the pounds of nitrogen applied in compost, amendments, and all other nitrogen containing materials, its necessary to know the percentage of nitrogen present in the material applied. The percentage of nitrogen present in the material applied is provided by the manufacturer, or by taking a sample to a lab. The lab will report the percentage of nitrogen. To report the total pounds of nitrogen applied in compost, amendment, and other materials, multiply the pounds applied by the percent nitrogen (N %) content.

#### Ranch Physical Acres Where Compost and Other Materials Were Applied

Report the total number of ranch acres (physical acres) where nitrogen applications from compost, amendments, mulches, and all other materials were made. To calculate and report the physical acres accurately refer to the examples below.

##### Example 1:

If a grower makes the following compost applications. First, the grower applies 20 pounds of nitrogen to 10 physical ranch-acres, then applies 30 pounds of nitrogen to 5 different physical ranch-acres, and finally applies 30 more pounds of nitrogen to other 10 physical ranch-acres.

Report 80 pounds of nitrogen ( $20+30+30=80$ ) to a total of 25 ranch-acres ( $10+5+10=25$ )

**Example 2:**

If a grower makes the following compost applications. First, the grower applies 20 pounds of nitrogen to 10 physical ranch-acres, then applies 30 pounds of nitrogen to those same 10 physical ranch-acres, and finally applies 30 more pounds to the same 10 physical ranch-acres.

Report 80 pounds of nitrogen ( $20+30+30=80$ ) to 10 ranch-acres

### **C: N Ratio of Compost and Other Materials**

The carbon-to-nitrogen ratio (C:N ratio) is a ratio of the mass of carbon to the mass of nitrogen in a substance. Reporting the C:N ratio is not required; it is an optional field.

#### **Errors in Section III**

If the reported ranch physical acres where compost or any other reported material was applied is higher than the physical ranch acres reported in Section I, the cell will be shown in yellow. Please verify that the reported number of physical acres where compost and other materials were applied, was calculated correctly.

## Section IV: Nitrogen Applied with Conventional and/or Organic Fertilizers

In this section, report crop information and all conventional and/or organic fertilizer applications. Growers must report the pounds of nitrogen applied to their crops in both conventional and organic fertilizers. Report the nitrogen applied with fertilizers containing urea, ammonia, ammonium, nitrate, and all other forms of molecular nitrogen<sup>4</sup>.

### Section IV-A: Nitrogen Applied with Conventional Fertilizers

In this section, report crop information and all conventional fertilizer applications.

#### Specific Crop(s) Grown During Report Period

Report information for each specific crop grown on the ranch during the reporting period. Select specific crop(s) from the dropdown menu. If the crop is not in the dropdown menu list, select “Other” and enter the specific crop name in the pop up text box.

If a short, intermediate-term, or a long-term crop with the Not Final Harvest selection was reported in the previous year, that crop will be auto populated in the following year’s report. When the short, intermediate-term, or long-term crop is harvested, update the Nitrogen Applied to reflect the total nitrogen applied throughout the entire growing cycle, and update the Crop Duration to the corresponding Final Harvest selection.

#### Crops Options

Strawberry crops. The drop-down menu includes a list of multiple strawberry crop options, with different growing duration and special cropping programs.

Bell pepper. Growers can indicate single-harvest or multiple-harvest.

Broccoli, cauliflower, and lettuce crops can be reported for the winter or summer seasons.

#### Multiple Crop Rotations (same specific crop)

If a specific crop is grown multiple times during the reporting period, each crop rotation can be reported separately (on more than one row). Water and fertilizer inputs are usually very different when the crops grow during different seasons. In this scenario, report information for lettuce crops on two reporting rows<sup>5</sup>. For example, water and fertilizer inputs might be different for lettuce crops grown in the winter versus the summer. The same applies to the crop’s evapotranspiration and the amount of crop material harvested.

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<sup>4</sup> Nitrogen applied in compost, amendments, manure, and all other materials containing nitrogen must be reported in “Section III: Nitrogen Applied with Compost and Other Materials.”

<sup>5</sup> The reporting of combined rotations of the same crop is acceptable but not advisable. We encourage growers to report each crop on its separate row, so the reported values correspond to that only crop and the calculation of weighted averages is not needed.

If a specific crop is grown multiple times during the year, all the crop rotations can also be combined and reported in a single row. All the nitrogen applications made to each crop rotation must be combined into a single row. In this case, calculate and report the total nitrogen fertilizer applications made to all the crops combined, the weighted average crop evapotranspiration of all the crops combined, and the total amount of nitrogen removed at harvest from all the crops combined.

### **Aggregated Crops (of the same or different specific crops)**

Different crops can be aggregated and reported on one row only if they were intermingled with individual plants of different specific crops growing next to each other, on the same field, at the same time, and received the same amount of water and fertilizer. See examples below to determine under what circumstances different crops can be aggregated and reported together, and when they cannot be aggregated.

- Combine mixes of different crops planted together: A mix of different specific crops grown together such as radicchio, escarole, and arugula, intermingled in the same row and receive the same amount of water and fertilizer can be reported on a single line as "spring mix" or "mixed greens".



- Combine mixes of lettuces planted together: Different varieties of lettuce grown together, such as red-leaf lettuce, green-leaf lettuce, and butter lettuce, intermingled on same row and/or field and receive the same amount of water and fertilizer can be reported on a single line as "lettuce, leaf".



- Separate mixes of different crops planted separately: Alternating rows of different crops, such as radicchio, arugula, escarole, and lettuce, that are grown on the same field but not on the same row must be reported on separate lines.



- Combine mixes of lettuces planted separately: If the alternating rows have different varieties of the same type of crop, such as red-leaf, green-leaf, and butter-head lettuces, they can be reported as "lettuce, leaf" as one crop.



### **Cover Crops**

All cover crops should be reported, including cover crops grown in between commercial crops production (in rotation) and cover crops grown in the fallowed acres (without commercial crops production in rotation). Select the correct cover crop option from the “Specific Crops Grown During Reporting Period” drop-down menu. Select either legume/non-legume or irrigated/non-irrigated. Report the cover crops acreage and the nitrogen applied as fertilizers (if any applications were made).

Optional reporting. The reporting of the amount of nitrogen removed when a cover crop is harvested is optional. However, if a cover crop is harvested, the nitrogen removed when the cover crop is harvested can be reported in “Section VII-A: Total Nitrogen Removed from the Field for Each Specific Crop Through Harvest or Sequestration”. To report the nitrogen removed when a cover crop is harvested, the cover crops’ Nitrogen Removal Conversion Coefficient must be determined by following the procedures specified in the Crop Nitrogen Removal Conversion Coefficient Standard Protocols., and the cover crop material removed must be reported in total pounds.

The reporting of a cover crop evapotranspiration (Etc) in “Section VI-B: Crop Evapotranspiration” is optional.

### **Crops with Multiple Cuttings**

Short-term and intermediate-term crops. Crops such as spinach, kale, and spring mix can be reported as crops with multiple cuttings. Select the “multiple cuttings” option from the drop-down menu.

If the short-term or intermediate-term crop had multiple cuttings, it must be reported as one crop in one row, even if it is harvested multiple times. In other words, multiple cuttings don’t represent multiple crops.

### **Crops with Annual Harvests**

Tree crops, such as avocados, vineyards, nuts, or citrus are long-term crops because they grow for more than 24 months. In some cases, they are not harvested for the first few years after planting. In the years when the crop is not harvested, select the “not final

or annual harvest” option from the Crop Duration dropdown menu. During the year(s) when the crops are harvested, select the “final or annual harvest” option from the Crop Duration dropdown menu.

### **Crops with Selective Harvesting**

Some short and intermediate-term crops are “Selectively Harvested”. A crop is selectively harvested when only portions of the plant/crop are removed from the field while the remaining tissues (such as stems and leaves) continue to grow. The green tissue(s) remaining in the ground, after the crop is selectively harvested, do not start a new crop. Most flower and herb crops are examples of selectively harvested crops.

For selectively harvested crops, the crop duration must be selected based on the length of time the entire crop (entire plant) remains in the ground until it is completely harvested, shipped or sold, at end of the crop life cycle or sale/shipment (each harvest does not represent a new crop).

### **Bulbed Crops**

Bulbed crops can regrow throughout the year(s). When all the green material is removed from the ground of a bulbed crop, it will regrow as a new plant/ crop and should be reported as a new crop in a separate row.

### **Total Crop Acres**

Report the crop-acres in each row for each specific crop reported. Each individual crop’s “Total Crop Acres” may be equal to, greater than, or less than the total acreage of the ranch, depending if the rotations of the same crop were combined and reported in a single row, or not.

If a specific crop is grown and harvested more than one time during the annual reporting period, and the crop rotations are combined and reported in a single row, the total crop acres of that crop is equal to the sum of acres planted each time (each rotation).

*The reporting of combined rotations of the same crop is acceptable but not advisable. We encourage growers to report each crop on its separate row, so the reported values correspond to that only crop and the calculation of weighted averages is not needed.*

A grower grows a crop of head lettuce on 10 acres, then a crop of broccoli on 10 acres, and then a crop of head lettuce on 10 acres. The grower has the option to combine the lettuce crops.

Report 20 acres of head lettuce (10+10=20) and 10 acres of broccoli.

If the grower chooses to report their crops seasonally, such as reporting Lettuce (Spring/Summer) and Lettuce (Fall/Winter) on separate rows, then the crop-acres reported for each specific crop should correspond to the acres grown and harvested for that specific crop only. In the example above, the grower would report 10 acres of Lettuce, Head (Fall/Winter) and on another line would report 10 acres of Lettuce, Head (Spring/Summer).



## Greenhouse and Nursery Crops

To determine the acres of crops grown in container (or trays), calculate the general area where the containers or trays are in (not the pot diameter area). If the plants are produced in pots placed on 2 acres, the 2 acres are the crop acres.

When multiple plants pots/crops are produced multiple times during the annual reporting period, each time the pots/crops are brought-in and shipped-out, it must be accounted as new crops and the crop acres must be added up. In other words, the crop acres need to be accounted for each time a crop is harvested, or a pot is shipped/ moved out of the operation. For example, if pots are grown on a one-acre parcel but pots are brought-in and shipped-out twice that year, the grower should report 2 crop acres.

### **Nitrogen Present in Soil (pounds/crop-acre)**

Report the nitrogen present in the soil in pounds per crop-acre (lbs./crop-ac) for at least one crop, measured at least once per annual reporting period for the ranch. The objective of this requirement is to inform future nitrogen applications; therefore the nitrogen present in the soil should be accounted for as a source of nitrogen<sup>6</sup> prior to fertilizing.

If growers do not have a value to report on hand, they may use a placeholder of 0.001 with the expectation that they will update this to a value obtained from either a laboratory test or Nitrate quick test.

- a. To meet the requirement to report total nitrogen present in the soil, either take a soil sample for laboratory analysis, use a nitrate quick test, or use an alternative method to evaluate nitrogen content in soil, prior to planting, prior to seeding in the field, prior to pre-side dressing, or when appropriate to determine nitrogen available in the soil for the following crop.
- b. If a ranch has many small blocks then blocks can be grouped into a large management unit to comply with the soil measurement requirement.
- c. The method chosen to measure nitrogen content, the forms of nitrogen to measure (nitrate, urea, ammonia, all) and the effective rooting depth, should be decided when samples are taken. Unit conversions also apply, nitrogen in parts per million (ppm) in the effective root-zone must be converted to pounds of nitrogen per crop-acre.
- d. Reporting of available soil nitrogen content depends on the approach used to collecting the samples. If multiple soil samples are collected from different parts of the ranch, and then mixed into one composite sample to measure available nitrogen in the soil for the whole ranch, resulting in only one result from the lab, then report

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<sup>6</sup> The proper timing to measure soil nitrogen content in the soil depends on the crop growing cycles and fertilizer management. Measure nitrogen content in the soil when soil nitrogen content is high and must be accounted for as a source of crop nitrogen and prior to or when crop fertilizer application decisions are made. It is incorrect to measure nitrogen in the soil after the rainy season, when values are low, or at a time when no fertilizer application decisions are made. In the Salinas Valley, with multiple crop rotations, the appropriate time is between the first and second crops or in the spring. For strawberry crops, the appropriate measurement may be prior to slow-release fertilizer applications. Consult with a local crop advisor to determine the appropriate time to measure soil nitrogen content.

the soil nitrogen content on the line for each crop reported, as applicable. If multiple soil samples are collected to determine nitrogen availability by specific crop(s), field(s), or soil type(s), then report the average soil nitrogen content on the line for each crop reported, as applicable.

Note: Growers must maintain records of the amount(s) of nitrogen content in the soil, the date(s) of measurement, and justification for the timing of the measurements in the Irrigation and Nutrient Management Plan section of the Farm Water Quality Control Plan (Farm Plan).

### **Nitrogen Applied in Conventional Fertilizers (Total Pounds)**

In this column, growers must report the Nitrogen Applied in Conventional Fertilizers as Total Pounds and the value in the column “Nitrogen Applied in Conventional Fertilizers, as pounds/crop-acre” will be automatically calculated. Tip! Please refer to the “[Dry Fertilizer Nitrogen Applied](#)” tool to calculate Pounds of Nitrogen in Dry Fertilizers. Note: report a zero if conventional fertilizers were not applied to a crop during the reporting period.

Liquid fertilizers and other liquid materials applied through the irrigation system as fertigation must be included in this section and reported as total pounds of nitrogen applied. Tip! Please refer to the “[Liquid Fertilizer Nitrogen Applied](#)” tool to calculate Pounds of Nitrogen in Liquid Fertilizers.

To calculate the amount of nitrogen applied with conventional fertilizers, convert the fertilizer N-P-K % to pounds of nitrogen. To convert to pounds of nitrogen, multiply the percentage nitrogen content in the fertilizer by the total amount of fertilizer applied.

When multiple crop rotations of the same specific crop have been combined, report the total pounds of nitrogen applied in conventional fertilizers to all the crop-acres reported.

### **Nitrogen Applied in Conventional Fertilizers (pounds/crop-acre)**

After the total pounds of nitrogen in conventional fertilizers was reported as total pounds in the Nitrogen Applied in Conventional Fertilizers as Total Pounds column, the “Nitrogen Applied in Conventional Fertilizers (pounds/crop-acre)” column will auto calculate to reflect the amount of nitrogen applied to each crop acre.

#### **Long-term Crops**

For long-term crops, report the total amount of nitrogen applied during the 12-month reporting period.

#### **Multiple Crop Rotations**

When multiple crop rotations of the same specific crop, are combined and reported as one record in one row, growers must calculate and report the total pounds of nitrogen applied to all the crop-acre. Refer to the example below to correctly calculate the value to report.

A grower grows the first crop of head lettuce on 10 acres and applies conventional fertilizer nitrogen at 200 pounds/crop-acre, a second crop of head lettuce on 50 acres and applies conventional fertilizer nitrogen at 400 pounds/crop-acre, and a third crop of head lettuce on 100 acres and applies conventional fertilizer nitrogen at 300 pounds/crop-acre.

1) Calculate the total crop-acres:

$$10+50+100 = 160 \text{ crop-acres}$$

Report Total Crop Acres: 160

2) Calculate total pounds of nitrogen applied:

$$(10 \text{ crop-acres} \times 200 \text{ pounds/crop-acre}) + (50 \text{ crop-acres} \times 400 \text{ pounds/crop-acre}) + (100 \text{ crop-acres} \times 300 \text{ pounds/crop-acre}) = (2,000 + 20,000 + 30,000 = 52,000)$$

Total pounds of nitrogen applied = 52,000 pounds of nitrogen.

Tip! Growers can refer to the “[N from fertilizers](#)” Excel tool to calculate the weighted average amount of nitrogen fertilizer applied on all rotations of a same crop, to double check their calculations are correct.

### Fertilizers Type

Specify if the crop received only conventional fertilizers, only organic fertilizers, or both conventional and organic fertilizers. “Section IV-B: Nitrogen Applied with Organic Fertilizers” becomes active when the “Only Organic” or “Organic and Conventional” selections are made in this column. If “Only Organic” fertilizer is selected, you are reporting that you applied zero conventional fertilizers to the crop during the reporting period. Therefore, the Nitrogen Applied in Conventional Fertilizers (Total Pounds) and Nitrogen Applied in Conventional Fertilizers (lbs/crop-ac) fields in Section IV-A will auto-populate with a zero value. Conversely, by selecting “Only Conventional” you are reporting that you applied zero organic fertilizers to the crop during the reporting period.

### Crop Duration

Report the crop growing duration, or term duration: as short-term, intermediate-term or long-term. In addition, report if the short, intermediate, or long-term crops were harvested during the reporting period. Report as follows:

- SI-NFH, Short or Intermediate-term Crop (< 24 months long), NOT Final Harvest
- S-FH, Short-term Crop (< 12 months long)
- L-NFAH, Long-term Crop (> 24 months long), NOT Final or Annual Harvest
- L-FAH, Long-term Crop (> 24 months long), Final or Annual Harvest
- I-FH, Intermediate-term Crop (12 to 24 months long), Final Harvest

A short-term crop should be reported in the reporting year when it was harvested (finally harvested or killed). For example: if a lettuce crop is planted on December 2020 but

harvested in February of 2021, that lettuce crop must be included in the INMP 2021 summary Report, submitted on March 1<sup>st</sup> of 2022. The information must include all the nitrogen applied, the amount of nitrogen removed at harvest, and crop evapotranspiration during the entire crop growing cycle from December 2020 until its harvest in 2021. However, if the short-term crop was not harvested during the reporting period, select the SI-NFH option to reflect that the crop has not been harvested.

For intermediate-term crops, report if the crop has been harvested by the time the INMP Summary Report was submitted. Select the I-FH option if it has been harvested or the SI-NFH option if it has not been harvested. This would indicate if the nitrogen removed at harvest ( $R_{\text{HARVEST}}$ ) and the crop evapotranspiration values will be included in the current year INMP Summary Report. If the crop was not harvested during this reporting period, the nitrogen removed at harvest ( $R_{\text{HARVEST}}$ ) and the crop evapotranspiration values will be reported in the next year INMP Summary Report.

For long-term crops, report if the crop was harvested during the reporting period. Select the L-FAH option if it has been harvested or the L-NFAH if it has not been harvested. This would indicate if the nitrogen removed at harvest ( $R_{\text{HARVEST}}$ ) and the crop evapotranspiration values will be included in the current year INMP Summary Report.

#### **Additional information**

Report any additional information corresponding to the specific crop.

Nursery, greenhouses, and hydroponic operations must select the option that best describes how the crops were grown. Additional options for propagation crops (grown for transplant) and crops grown under hoop houses are also available.

Select "R" if the crop is grown as part of a research trial or study and: "not to maximize yields" or "not for human consumption."

Select "NY" (no yield) or "LY" (low yield) if applications of nitrogen were made to a crop, but all or a portion of the crop was lost, such as if the crop was "disked in" due to pests, disease, etc.

Note: All crops must be reported even if they have not been harvested, or otherwise crops that were disked in, left on field, terminated, or not harvested (but terminated) during the reporting period.

#### **Errors in Section IV-A**

Crop reporting must start at Crop Row # 1. All crop reporting must include acreage, nitrogen present in soil for at least one crop, nitrogen in fertilizers, crop duration, and type of fertilizers applied.

"Specific Crop" is a required field. At least one crop must be reported unless all acres were fallowed during the entire reporting period.

"Nitrogen Present in Soil" is a required field, for at least one crop in the Crop Row # 1 section. If the soil nitrogen content is not available, report it as 0.00001

“Nitrogen Applied in Conventional Fertilizers” as pounds/crop-acre” is a required field for all crops reported. If no applications were made report "0" (zero).

“Crop Duration” is a required field. Select the option that describes the crop duration.

“Fertilizer Type” is a required field for all crops reported.

## **Section IV-B: Nitrogen Applied with Organic Fertilizers**

In this section report the pounds of nitrogen applied as organic fertilizer and acreage that receive the applications.

### **Acres Receiving Organic Fertilizer**

Report the acres that receive nitrogen from each organic fertilizer applied. If no organic fertilizer was applied, report 0.

### **Nitrogen Applied in Organic Fertilizers (Total Pounds)**

In this column, growers must report the Nitrogen Applied in Organic Fertilizers as Total Pounds and the value in the column “Nitrogen Applied in Organic Fertilizers, as pounds/crop-acre” will be automatically calculated. Report a zero, if organic fertilizers were not applied to a crop during the reporting period. When the total pounds of nitrogen in organic fertilizers is reported in this column, the “Nitrogen Applied in Organic Fertilizers (pounds/crop-acre)” column will auto calculate to reflect the amount of nitrogen applied to each crop acre.

When multiple crop rotations of the same specific crop have been combined, report the total pounds of nitrogen applied in organic fertilizers to all the crop-acres reported.

### **Nitrogen Applied in Organic Fertilizers (pounds/crop-acre)**

After the total pounds of nitrogen in organic fertilizers was reported as total pounds in the Nitrogen Applied in Organic Fertilizers as Total Pounds column, the “Nitrogen Applied in Organic Fertilizers (pounds/crop-acre)” column will auto calculate to reflect the amount of nitrogen applied to each crop acre.

Liquid fertilizers and other liquid materials applied through the irrigation system as fertigation must be included in this section and reported as total pounds of nitrogen applied.

If a crop receives multiple applications from different organic fertilizers, the amount of nitrogen applied from each organic fertilizer can be reported one-by-one on separate lines, for up to 10 organic fertilizer types. To report the amount of nitrogen applied from multiple organic fertilizers one-by-one, click on the “Add additional fertilizer applications” button, located to the right of the column, and report the amount applied in pounds and the acreage that received each fertilizer. Note: the C:N ratio is not a required field.

In instances where multiple crop rotations of the same specific crop have been combined, report the nitrogen applied in organic fertilizers in pounds to all rotations and acres. Refer to the example below to correctly calculate and report the nitrogen applied in conventional and organic fertilizers.

A grower grows the first crop of head lettuce on 10 acres and applies conventional fertilizer nitrogen at 200 pounds/crop-acre, a second crop of head lettuce on 50 acres and applies conventional fertilizer nitrogen at 400 pounds/crop-acre, and a third crop of head lettuce on 100 acres and applies organic fertilizer nitrogen at 300 pounds/crop-acre in addition to conventional fertilizer nitrogen at 100 pounds/crop-acre.

1) Calculate the total crop-acres:  $10+50+100 = 160$  crop-acres

2) Calculate the total pounds of nitrogen applied in **conventional** fertilizers to the three (3) head lettuce crops:

$(10 \text{ crop-acres} \times 200 \text{ pounds/crop-acre}) + (50 \text{ crop-acres} \times 400 \text{ pounds/crop-acre}) + (100 \text{ crop-acres} \times 100 \text{ pounds/crop-acre}) = (2,000 + 20,000 + 10,000) =$

Total pounds of nitrogen applied in **conventional** fertilizers = 32,000 pounds of nitrogen

3) Calculate the total pounds of nitrogen applied in **organic** fertilizers to the three (3) head lettuce crops:

$(100 \text{ crop-acres} \times 300 \text{ pounds/crop-acre}) =$

Total pounds of nitrogen applied in **organic** fertilizers = 30,000 pounds of nitrogen

### C:N Ratio of Organic Fertilizers

The carbon-to-nitrogen ratio (C:N ratio) is a ratio of the mass of carbon to the mass of nitrogen in a substance. Please note that the C:N ratio is not a required field.

Growers must contact the manufacturer of the organic fertilizer to obtain the fertilizer C:N ratio.

## Section V: Exemptions

The Agricultural Order contains three provisions for certain exemptions from INMP Summary reporting. Exemptions must be approved by the Executive Officer. Refer to [Ag Order pages 27-28, paragraphs 22-24](#).

“Section V: Exemptions” will automatically display if the ranch has received approval for an exemption.

Please refer to the INMP Exemption(s) Technical Report Approval Process ( [English](#) | [Español](#) | [中文](#) ) for detailed information on how to apply for an exemption and the exemptions approval process.

Ranches that receive approval for an exemption based on condition 22 (No Threat to Surface Water or Groundwater Quality) are only required to submit the nitrogen application sections of the INMP Summary Report: Sections I, II, III, IV, VIII, IX, and X. They must also provide an annual exemption update report as specified for this approved exemption.

Ranches that receive approval for exemption based on condition 23 (Achieving the Final Nitrogen Discharge Limits) are required to report the information in Sections I, II, III, IV, VI, VIII, IX, and X. They must also provide an annual exemption update report as specified for this approved exemption.

Ranches that receive approval for exemption based on condition 24 (Compliance Through Direct Monitoring of the Discharge), are required to report the information in Sections I, II, III, IV, VI, VIII, IX, and X. They must also provide an annual exemption update report as specified for this approved exemption.



## Section VI: Irrigation Management

The reporting of the crop evapotranspiration is required for crops that were harvested during the reporting period. Crops with the following crop duration selections (in Section IV-A: Nitrogen Applied with Conventional Fertilizers) were harvested during the reporting period: S, short-term, SI-FH, Intermediate-term Crop (12 to 24 months) Final Harvest, and L-FAH, Long-term crop (> 24 months long) Final or Annual harvest.

Ranches with an approved condition 22 exemption are not required to report the irrigation management information, so the section will be grayed out.

### Section VI-A: Irrigation Management (Surface Water)

Report the estimated volume of irrigation water discharged to surface water from the entire reporting acreage during the entire year. Report the total volume discharged through surface outflows, such as surface runoff or sheet flow, and/or comingled into ditches, canals, drains or other conveyances, including tile drains (the sum of the volume reported in Sections II-B and II-C). This information can be reported as a percentage of the total volume of water applied to the entire acreage or as a percentage of the volume of water applied per acre.

If there is no irrigation water discharge to surface waterbodies, you must enter a zero (0) and select one of the reporting units.

### Section VI-B: Crop Evapotranspiration

In this section report the crop evapotranspiration.

#### Reference Eto

The reference evapotranspiration (ET<sub>o</sub>) is not a required field but can be reported to automatically calculate the Crop ET<sub>c</sub>, information required for crops that were harvested during the reporting period. The reference evapotranspiration represents an estimate of the loss of water from plant transpiration and soil water evaporation measured by a reference crop, usually grass. The drivers of evapotranspiration are sunlight, wind, humidity, and temperature.

Report the total reference evapotranspiration (in inches of water evapotranspired) of the crops that were harvested during the reporting period. For short-term and intermediate-term crops, the evapotranspiration value must be the total amount evapotranspired during the duration of the crop. For long-term crops, the value of evapotranspiration represents the amount evapotranspired during the 12 months reporting period (the entire year).

#### Short-term Crops

The reference evapotranspiration is measured daily and can be provided for each month. For example: a crop was planted on February 15<sup>th</sup> and harvested on July 1<sup>st</sup>. The grower downloaded the [CIMIS](#) average monthly ET<sub>o</sub> data, given in inches, for each month the crop was grown. These values are shown in the chart below.

Month	Average Monthly ETo (inches)
February	2.04
March	3.29
April	4.68
May	6.39
June	7.92

In this example, since the crop was only grown for half of the month in February, divide 2.04 by two ( $2.04/2 = 1.02$ ). Provide the entire monthly value for the rest of the months because the crop was growing during those months entirely. In this example the total reference evapotranspiration during the duration of the crop is  $1.02 + 3.29 + 4.68 + 6.39 + 7.92 = 23.3$  inches.

### Long-term Dormant Crops

If a crop goes dormant for part of the reporting period of January 1<sup>st</sup> to December 31<sup>st</sup>, do not include the evapotranspiration values for the duration of its dormancy. For example, if a permanent crop of wine grapes emerged from dormancy on March 10 and went dormant again on December 10, calculate the annual reference evapotranspiration value for the 10 days in December and 21 days in March when the crop was still active. Include each average monthly ETo value for the months when the crop was active (April through November).

Example. The table below provides the entire year hypothetical ETo values of this example.

Month	Average Monthly ETo (inches)
January	2.31
February	2.02
March	2.60
April	3.64
May	4.21
June	5.64
July	6.65
August	7.89
September	6.45
October	4.35
November	2.36
December	1.99

The grower could follow the steps below to estimate ETo to exclude the crop's dormancy from the total reported ETo value.

- 1) Exclude the months when the crop was dormant for their entirety. (January and February)
- 2) Since the crop was active for 10 days in December, and there are 31 days in December, the grower should find the fraction value that represents the days when

the crop was active, over the days of the entire month. This crop was active for 10 days of the 31 days in the month of December, so  $10/31=0.32$ . Then, multiply  $0.32 \times 1.99 = 0.64$  inches for the December ETo value.

3) Since the crop was active for 21 days in March, and there are 31 days in March, the grower should find the fraction value:  $21/31=0.68$ . Then, multiply  $0.68 \times 2.60 = 1.77$  inches for the March ETo value.

4) Finally, calculate the adjusted total:

$$1.77+3.64+4.21+5.64+6.65+7.89+6.45+4.35+2.36+0.64 = 43.6 \text{ inches.}$$

### Multiple Crop Rotations

When multiple crop rotations of the same specific crop are planted during the year, the grower may choose to combine all the crop rotations and report them in a single row. Conversely, the grower has the option to report each crop separately in its own row. When multiple crop rotations of the same specific crop, are combined and reported as one record in one row, the correct value to report is the weighted average of the reference evapotranspiration in inches/crop-acre.

The grower must compute the weighted average reference evapotranspiration for all the months when the crop rotations occurred. Refer to the example below for information on how to correctly calculate the weighted average monthly reference evapotranspiration for all the months for all the crop rotations combined.

A grower in San Luis Obispo has a first crop of head lettuce on 10 acres in February, March, and April.

A second crop of lettuce on 50 acres in June, July, and August.

A third crop of lettuce on 100 acres in October, November, and December.

Steps to calculate the weighted average ETo for all crops:

1) Collect ETo data from CIMIS station (San Luis Obispo # 52):

Jan: 2.27, Feb: 2.6, March: 3.81, April: 4.89, May: 5.65, June: 6.13, July: 6.24, Aug: 5.78, Sept: 4.79, Oct: 3.96, Nov: 2.74, Dec: 2.16.

2) Calculate the weighted average ETo for all the lettuce crops:

First lettuce [(Feb 2.6" + March 3.81" + April 4.89") x 10 acres] + Second lettuce [(June 6.13" + July 6.24" + Aug 5.78") x 50 acres] + Third lettuce [(Oct 3.96" + Nov 2.74" + Dec 2.16") x 100 acres] / Sum of lettuce acres =  $110.9 + 907.5 + 886 = 1,904 / 160 = 11.90$  inches

Report the "Reference Evapotranspiration, Eto" = 11.9 inches.

## Crop Coefficient (Kc)

The crop coefficient (Kc) is not a required field but can be reported to automatically calculate the Crop ETc, which is required for crops that were harvested during the reporting period. The crop coefficient represents the specific amount of water demanded by each crop when compared to a reference crop (grass or alfalfa) planted to measure the reference evapotranspiration from the CIMIS weather stations.

Report the average crop coefficient for the entire duration of the crop. For example, if the crop is lettuce and the crop coefficients are as follows: middle Kc = 1, and end Kc = 0.95, calculate and report the average crop coefficient value. In this example, the average value is  $(1 + 0.95) / 2 = 0.975$ .

### Sources of Kc Values

Refer to Attachment C for the list of Crops with available Kc values. This list of Kc values is also available at the Food and Agriculture Organization of the United Nations (FAO), [Irrigation and drainage paper 56, Chapter 6](https://www.fao.org/3/X0490E/x0490e0b.htm) webpage available at <https://www.fao.org/3/X0490E/x0490e0b.htm>.

If a specific crop is not on the FAO list, consult with an irrigation specialist or certified crop advisor professional to select a coefficient of a similar crop to represent a similar water demand as the specific crop being reported. A list of Technical Assistance Provider or Consultants is available at this link: [Irrigated Lands Program \(ILP\) Technical Assistance](#).

## Crop Evapotranspiration (Crop ETc)

The crop evapotranspiration (ETc) represents the volume of water that evaporates and transpires from an area producing a crop (other than the reference crop, which is a value derived from a well irrigated grass or alfalfa field). The ETc is a required field for crops that were harvested during the reporting period. ETc is calculated by multiplying the reported reference evapotranspiration (ETo) by the specific crop coefficient (Kc). The ETc must be reported as inches of water lost by evapotranspiration. Note: The reporting of a cover crop evapotranspiration (ETc) is optional.

Growers have the option to report both the ETo and the Kc, and the form will automatically calculate the crop evapotranspiration or ETc.

Alternatively, growers can obtain both the ETo and the Kc, and calculate the ETc based on the formula:

$$ETc = ETo \times Kc$$

Using a calculation, growers only need to report their calculated ETc value for each specific crop, since ETo and Kc are not required fields.

For the lettuce example above, the calculation is:

$$ETc = 11.9 \text{ in} \times 0.975$$

ETc = 11.6025 inches

The ETo and ETcrop can be obtained from multiple sources; some are listed below:

- The California Irrigation Management Information System (CIMIS) weather stations network. Obtain the ETo information from the weather station closest to the reporting ranch. To retrieve the ETo data:
  - Create an account and log in. The first step is to locate the closest CIMS weather station by navigating to the location map <https://cimis.water.ca.gov/Stations.aspx>.
  - Click on data and select the station by name. Choose the report type as the monthly Avg ETo and the export as a CSV Report.
  - Click on “Run Report” and locate the file where the export table is saved. For more information, visit the CIMIS webpage at <https://cimis.water.ca.gov/>
- The CIMIS ETo values map: [https://cimis.water.ca.gov/App\\_Themes/images/etozonemap.jpg](https://cimis.water.ca.gov/App_Themes/images/etozonemap.jpg)
- CropManage<sup>7</sup> is a free software program developed by the University of California Cooperative Extension. It automatically imports reference evapotranspiration and precipitation data from the CIMIS weather stations operated by the California Department of Water Resources. CropManage can be accessed at: <https://cropmanage.ucanr.edu/et-calculator>
- FRET, Forecast Reference Evapotranspiration. The National Weather Service offers FRET data on the Graphical Forecasts page of their website. You can zoom in to find the ETo data for a field up to six days in the future. <https://digital.weather.gov/>
- IrriSAT Irrigation Decision Support System. It uses remote sensing to provide crop specific water management information, based on satellite imagery, estimates crop coefficients (Kc) at a 30 meter resolution. <https://www.irrisat.com/en/home-2>
- The California Polytechnic Irrigation and Training Research Center Evapotranspiration data webpage at <http://www.itrc.org/etdata/index.html>
- The Center for Irrigation Technology (CIT) is working to upgrade to a latest version of the Waterright software tool. You can contact CIT to inquire at (559) 278-2066.
- IrriQuest, calculator for crop evapotranspiration and various water use fractions. Satellite Data to Support Improvements in Irrigation and Groundwater Management in California<sup>8</sup>. [Download here](#).
- On-farm installed weather stations, ETGages (atmometers), and/or evapotranspiration sensors, such as [ET107: Evapotranspiration Monitoring Station](#), [Evapotranspiration Onset's HOBO](#), [LI-710 Evapotranspiration Sensor](#), and [EvapoTranspiration MiniMet](#).

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<sup>7</sup> To obtain the current list of crops included in CropManage contact Michael Cahn, Irrigation and Water Resources Advisor, UC Cooperative Extension, Monterey County, Phone Office 831-759-7377. Email [mdcahn@ucdavis.edu](mailto:mdcahn@ucdavis.edu).

<sup>8</sup> Developed through a partnership between NASA and the CA Department of Water Resources, the Satellite Irrigation Management Support (SIMS) framework integrates satellite data with information from agricultural weather networks to map crop canopy development and crop water requirements at the scale of individual fields.

Note: If the Crop ETC is reported as zero for a crop that was harvested during the reporting period, you must provide additional information about this crop in the “Additional Information” dropdown menu in “Section IV-A: Nitrogen Applied with Conventional Fertilizers” and an explanation in “Section IX: Explanations and Comments” (e.g., Crop ETC cannot be measured at this time ).”

### ***Actual Crop Evapotranspiration (ETa)***

Growers also have the option to report the crops “actual evapotranspiration”, or E<sub>ta</sub>, using the NASA-developed OpenET web tool. The E<sub>ta</sub> can be reported in the ETC field.

OpenET uses best available science to provide easily accessible satellite-based estimates of evapotranspiration (ET) for improved water management across the western United States. Using the Data Explorer, users can explore ET data at the field scale for millions of individual fields or at the original quarter-acre resolution of the satellite data. To access this software navigate to <https://openetdata.org/>.

### **Greenhouses and nursery crops.**

The crop’s evapotranspiration is a required field for all crops that were harvested (shipped/sold) during the reporting period. However growers may report a zero Etc value if they are unable to estimate it. A zero (0) Etc reported value is allowed for crops produced in greenhouses, nurseries, and hydroponic operations. If a zero Etc value is reported, include this information when submitting the INMP form:

1. A comment in “Section IX: Explanations and Comments”. Please describes the type of operation and explain why a zero (0) Etc value was reported, either because the evapotranspiration could not be estimated, or because the field data confirms the crops are not evapotranspiring. Keep all these records in the Farm Plan, including the rationale for why a zero Etc value was reported..
2. Report additional information about the crops, in “Section IV: Nitrogen Applied with Convectional Fertilizers” under the Additional Information column, select GC Greenhouse in container, GG Greenhouse in ground, HH Hoop house, HH Hydroponic, NC Nursery in container, NG Nursery in ground, P Propagation crop, or R Research, not for human consumption.

For assistance to estimate the crops evapotranspiration you may contact:

Gerardo (Gerry) Spinelli,

Production Horticulture Advisor for Nurseries, Floriculture and Controlled Environment Agriculture

University of California Cooperative Extension San Diego

9335 Hazard Way, Ste 201, San Diego CA, 92123

Phone: (530) 304-3738

Email: [gspinelli@ucdavis.edu](mailto:gspinelli@ucdavis.edu)

Website: <https://ucanr.edu/sites/floriculturenursery/>

YouTube Channel: <https://www.youtube.com/@gerardospinelli>

## **Errors in Section VI**

The ETc is a required field for crops that were harvested during the reporting period.

When the reported crop evapotranspiration value is not a typical value for most of the crops grown in the Central Coast region, the cell will be pink. If the cell is pink, the ETc or ETa value must be reviewed to confirm the reported crop evapotranspiration is correct.

Note: A typical crop evapotranspiration value for most of the crops grown in the region is less than 48 inches per year.



## Section VII: Total Nitrogen Removed from the Field

In this section report the pounds of nitrogen removed from the field through harvest, sequestration, treatment methods or technologies. The nitrogen removed from the field through harvest is a required field for crops that were harvested during the reporting period. Ranches that received approved exemption are not required to report this information and this section will be grayed out.

The nitrogen removed by treatment methods, or other methods and technologies is optional field.

### Section VII-A: Total Nitrogen Removed from the Field for Each Specific Crop Through Harvest or Sequestration

In Section VII-A, report the amount of nitrogen removed from the fields when the crops are harvested ( $R_{HARV}$ ) and the amount of nitrogen stored or sequestered in the woody tissue of permanent and semi-permanent crops ( $R_{SEQ}$ ) if applicable. The reporting of the amount of nitrogen removed from the fields is required for all crops that were harvested during the reporting period. To report the amount of nitrogen removed at harvest growers must submit each crop's nitrogen removal conversion coefficient and the amount of crop material removed from the field during harvest (or by other removal methods). The reporting of the amount of nitrogen stored or sequestered in the woody tissue is optional.

The term "harvested" refers to the removal of crops (or parts of a crop) from the ranch(es). Greenhouse and nursery crops produced in containers or trays, are not harvested in the traditional sense of the word, but rather moved or shipped out of the ranch(es). In these cases, the term "harvested" refers to moved or shipped.

#### Crop Nitrogen Removal Conversion Coefficient

Report each crop nitrogen removal conversion coefficient. The crop conversion coefficient is the percent of nitrogen content in the fresh matter of the crop material<sup>9</sup>. The conversion coefficient values begin with a zero (0) followed by decimal numbers (e.g., 0.03585).

The crop conversion coefficient multiplied by the weight (in pounds) of the crop material removed from the field is used to calculate the nitrogen removed from the field through harvest or other removal methods.

#### Crops with a "determined or known" conversion coefficient

The crop nitrogen removal coefficient value will auto populate if the crop selected in "Section IV-A: Nitrogen Applied with Conventional Fertilizers" has a coefficient value established in the Ag Order. However, you can report a different coefficient value, by selecting "Other" to either select a coefficient value for a similar crop, or manually enter a coefficient value.

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<sup>9</sup> The crop-specific coefficient multiplied by the crop material removed, converts the reported pounds of crop material removed per acre to pounds of nitrogen removed per acre.

## Crops with “undetermined” conversion coefficients

If a coefficient value is not established in the Ag Order, select “Other” to either select a coefficient value for a similar crop, or manually enter a coefficient value. Refer to Attachment D of the INMP instructions (English | Español | 中文 ).

“[Attachment D: Crops with Known Nitrogen Removal Conversion Coefficients](#)” below includes a list of all the crops with determined conversion coefficients and the most up to date values.

Growers can develop their own crops conversion coefficients by following the approved procedures specified in [Crop Nitrogen Removal Conversion Coefficient Standard Protocols](#).

Note: Growers who reported “spring mix” and/or “green mix” in Section IV, must select a crop with a determined conversion coefficient that is included in the mix.

### Crop Material Removed (Total Pounds)

In this column, growers must report the total pounds nitrogen-containing material removed from the field through harvest or other methods of removal<sup>10</sup>. The reporting of the crop material removed is required for all the crops that were harvested during the reporting period.

To report the pounds of nitrogen-containing materials removed (yield) from the field, the material removed must be determined by weighing the harvested (fresh) material or employing other methods or information generated during harvest. The total amount of nitrogen removed at harvest must include all crop materials removed from the farm during the reporting period. This includes the weight (pounds) of crop material that is tossed out (culls) at a packing facility.

Growers must develop and implement a protocol to calculate the weight (in pounds) of the crop material being removed in the boxes or packing units, including crops that are picked and packed directly in the field, such as strawberries. Growers may consult a crop specialist or certified crop advisor to help them make all necessary measurements.

The table below provides common yield units for some crops.

Crop Name	Yield Unit	Approximate Net Weight in Lbs.
Artichoke, globe	Carton	20-25
Bean, lima, dry	Bushel	56
Bean, other, dry	Bushel	60
Bean, snap	Bushel	28-32
Broccoli	Wire-bound crate	20-25
Brussel sprouts	Carton, loose pack	25
Cabbage	Carton, place pack	53
Carrot	48 1-lb film bags	55

<sup>10</sup> All growers must monitor the total mass of each specific crop in pounds removed from the field at harvest or other crop material removing activities, during the reporting period.

Carrot without tops	Burlap sack	74-80
Cauliflower	W.G.A. crate	50-60
Garlic	Carton of 12 tubes	10
Lettuce iceberg	Carton, packed 24	43-52
Onio, dry	Sack	50
Pea dry	Bushel	60
Pea green	Bushel	28-30
Spinach	Bushel	18-20
Strawberry	12-pint crate	9-11
Tomato	Crate	60
	Lug Box	32
	2-layer flat	21
Tomato Hothouse	12-quart basket	20

For short, intermediate and long-term crops that were not harvested during the report period, select the “Not Final” or “Not Final or Annual Harvested” (NFH or NFAH) option in the crop duration column of Section IV-A. The  $R_{HARV}$ ,  $R_{SEQ}$ , and Crop Nitrogen Removal Conversion Coefficient will be grayed out for that crop. .

Report zero, if no crop material was removed from the field. Select “NY – No Yield” from the dropdown menu in Section IV-A in the “Additional Information” field, indicating that no material was removed or that the crop was not harvested. The Crop Nitrogen Removal Conversion Coefficient column for that crop will be greyed out. A pop-up message will appear, stating “If a zero value is entered for the crop material removed, you must select “NY - No Yield” from the dropdown menu in “Section IV-A Nitrogen Applied with Conventional Fertilizers” in the “Additional Information” field for that crop. You must provide an explanation in Section IX: Explanations and Comments”.

### Multiple Crop Rotations

When multiple crop rotations of the same specific crop, are combined and reported as one record in one row, the correct value to report is the total amount of crop material removed from the crop rotations combined.

The grower must compute the amount of crop material removed in pounds for all the crop rotations. Conversely, the grower has the option to report each crop separately in its own row. Refer to the example below for information on how to correctly calculate the amount of crop material removed for all the crop rotations combined.

A grower has a first crop of head lettuce on 10 acres in February, March, and April.

A second crop of lettuce on 50 acres in June, July, and August.

A third crop of lettuce on 100 acres in October, November, and December.

Steps to calculate the amount of crop material removed for all crops:

Measure the amount of crop material removed for each crop rotation in pounds per acre, that is the first lettuce (Feb-April), the second lettuce (June-Aug), and the third lettuce (Oct-Dec).

Pounds of crop material removed on first lettuce = 600,000

Pounds of crop material removed on second lettuce = 2,000,000

Pounds of crop material removed on third lettuce = 5,000,000

Report the "Crop Material Removed" = 7,600,000 total pounds

### **Crop Material Removed (pounds/crop acre)**

After the total amount of crop nitrogen-containing material removed from the field through harvest or other methods in total pounds was reported as total pounds in the Crop Material Removed (Total Pounds) column, the "Crop Material Removed (pounds/crop-acre)" column will auto calculate to reflect the amount of nitrogen removed from each crop acre.

### **Nitrogen Removed Through Harvest, RHARV (pounds/crop acre)**

RHARV is the amount of nitrogen removed from the fields when the crops are harvested. This cell will be automatically calculated after the crop's nitrogen removal conversion coefficient and the amount of crop material removed from the field during harvest have been reported.

### **Nitrogen Removed Through Sequestration, RSEQ (pounds/crop acre)**

RSEQ is the amount of nitrogen sequestered in woody plant tissues. This is not a required field, its optional. For instructions on how to report the nitrogen sequestered in woody plant tissues, refer to "Attachment C: Optional Reporting Sections". Select "Other" to select a RSEQ value for a similar crop or manually enter a value of the amount of nitrogen sequestered woody plant tissues during the reporting period.

## **Section VII-B: Total Nitrogen Removed at the Ranch Level through Treatment and/or Other Methods and Technologies**

The reporting of the amount of nitrogen removed from the ranch through treatment and/or other removal technologies or methods is an optional field. For instructions on how to report the nitrogen removed, refer to Attachment C: Optional Reporting Sections.

## **Section VII-C: Nitrogen Scavenged by Cover Crops**

Reporting the amount of nitrogen scavenged by cover crops is an optional field. For instructions on how to report the nitrogen scavenged by cover crops refer to Attachment C: Optional Reporting Sections.

## **Section VIII: Basis for the Amount of Total Nitrogen that Was Applied**

Select all the boxes that apply to identify the basis for total nitrogen applied. This refers to the source of the information you used to know the amount of nitrogen taken up and/or required by each crop to grow and produce a desired yield, and to guide fertilizer application decisions.

This is a required field, and it will prevent the form from being saved/submitted unless at least one option is selected.

## **Section IX: Explanations and Comments**

If the information on this form does not represent the entire 12-month reporting period, the reporting acreage is different than the ranch acreage (e.g., due to fallow acres), or if any section of the report is incomplete, please provide a brief explanation.

If an APN(s) is deselected during the reporting period, provide an explanation for why the total nitrogen applied is not being reported for that APN. Additional comments or explanations to assist with the processing of this form may also be included here.

## **Section X: Certification**

This report must be reviewed and certified by the list Operator/Responsible Party on the Operation enrollment form (eNOI) in GeoTracker. The RP must read to confirm the following statement is true, accurate, and complete: "I certify under penalty of perjury that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

### **Click on Save & Submit**

By clicking on this button, you declare that you have read, understand, and accept the terms described in the Water Code Section 13267.

## **Questions About the INMP Summary Report**

Please contact Irrigated Lands Program Staff:

By Email: [AgNOI@waterboards.ca.gov](mailto:AgNOI@waterboards.ca.gov)

By Phone: (805) 549-3148

By Mail: Irrigated Lands Program  
Central Coast Water Board  
895 Aerovista Place, Suite 101  
San Luis Obispo, California 93401

## Calculation and Conversions

### Calculate the Pounds of Nitrogen applied with the Irrigation Water

Multiply the nitrogen concentration of irrigation water by the total volume of water used (in acre-feet from above calculation) and use the appropriate conversion factor:

#### Nitrate concentration x Total volume water applied x Conversion factor

Choosing a correct conversion factor to use will depend on what units the lab used to report nitrate concentration. They typically use either Nitrate-Nitrogen (NO<sub>3</sub>-N) or Nitrate (NO<sub>3</sub>).

For nitrate-nitrogen (NO<sub>3</sub>-N) use the following formula:

$$\text{Lbs. N applied per ranch-acre} = \text{NO}_3\text{-N concentration} \times \text{ac-ft. water used per ranch-acre} \times 2.72$$

For nitrate-nitrate (NO<sub>3</sub>-NO<sub>3</sub>) use this formula:

$$\text{Lbs. N applied per ranch-acre} = \text{NO}_3\text{-NO}_3 \text{ concentration} \times \text{ac-ft. water used per ranch-acre} \times 0.62$$

Total volume of water = 1.41 acre-feet per ranch-acre

Average nitrate concentration = 20 mg/L as NO<sub>3</sub>

Conversion factor = 0.62

$$1.41 \text{ acre-feet/ranch-acre} \times 20 \text{ mg/L} \times 0.62 = 17.5 \text{ pounds of nitrogen / ranch-acre}$$

### Convert from Pounds of Fertilizer applied to Pounds of Nitrogen Applied

Dry fertilizer and its active ingredients, are expressed as weight per area. For example, 100 pounds of a 10-20-30 fertilizer-grade material contains 10 pounds of active ingredients nitrogen (N), 20 pounds of phosphorus (P<sub>2</sub>O<sub>5</sub>), and 30 pounds potassium (K<sub>2</sub>O), equaling 60 pounds total of active ingredients, while the remaining 40 pounds consist of inactive materials.

Example:

50 Pounds of fertilizer applied per acre

Fertilizer grade = 10-20-30

Percent nitrogen content in fertilizer =  $10/100 = 10\% = 0.1$

$$50 \text{ pounds fertilizer} \times 0.1 \text{ nitrogen} = 5 \text{ pounds of nitrogen applied per acre}$$

Liquid fertilizer active ingredients are expressed on a volume basis. Typically, the net volume and net weight of a liquid fertilizer are available on the label. The liquid density

can be calculated based on these values (divide the weight by the volume) and used to determine pounds of nitrogen. For a few examples visit the website on "[How to Convert Liquid Fertilizer into Dry Fertilizer in Fertigation for Commercial Vegetable and Fruit Crop Production](#)".

**Convert from Soil Nitrogen Content in parts per million (ppm) to Soil Nitrogen Content in pounds per crop-acre (lbs./crop-ac)**

N (lbs./acre) =

$$\text{NO}_3\text{-N concentration (ppm)} \times 2 \times \text{soil sample thickness (inches)} \div 6 \text{ (inches)}$$

Note: Assumes 2 million pounds of dry soil in the upper 6 inches/acre

Example:

NO<sub>3</sub>-N between 0 - 6 inches soil depth = 8 ppm and

NO<sub>3</sub>-N between 6 - 24 inches = 4 ppm

1) Pounds of nitrogen in 0 - 6-inches soil depth:

$$8 \text{ ppm} \times 2 \times 6 \text{ inches} \div 6 \text{ inches} = 16 \text{ pounds nitrogen/crop-acre}$$

2) Pounds nitrogen in 6 - 24-inches soil depth:

$$4 \text{ ppm} \times 2 \times 18 \text{ inches} \div 6 \text{ inches} = 24 \text{ pounds nitrogen/crop-acre}$$

3) Pounds nitrogen in 0 - 24-inches profile:

$$16 \text{ pounds} + 24 \text{ pounds} = \text{The total is 40 pounds of nitrogen/crop-acre}$$

## Attachment A- Drop Down Menu Selections

### Section I: General Ranch Information

***If ranch is a greenhouse, nursery, or hydroponic:***

Select the option that best describes how the irrigation water is managed, recycled, and discharged from this ranch:

1a	No recycling occurs; all excess water is captured and conveyed to a surface water ditch or stream.
1b	No recycling occurs; all excess water infiltrates into the ground.
1c	No recycling occurs; all excess water is captured and conveyed to a lined evaporation pond.
1d	No recycling occurs; some excess water is captured and conveyed to a surface water ditch or stream and some infiltrates into the ground.
1e	No recycling occurs; all excess water is captured and conveyed to a storm drain, sewer, or city channel collection system.
2a	All excess water is captured and recycled; brine/flush water is conveyed to a field or pond for percolation into the ground.
2b	All excess water is captured and recycled; brine/flush water is conveyed to a lined evaporation pond.
2c	All excess water is captured and recycled; brine/flush water is conveyed to a surface water ditch or stream.
2d	All excess water is captured and recycled; some brine/flush water is conveyed to a surface water ditch or stream, and some is conveyed to a field or pond for percolation into the ground.
2e	All excess water is captured and recycled; brine/flush water is conveyed to a storm drain, sewer, or city channel collection system.
2f	All excess water is captured and recycled; the only waste is dry material, which is properly disposed of.
2g	All excess water is captured and recycled; brine/flush water is conveyed to a pond and used to irrigate other crops on the ranch.



## **Section II-A: Nitrogen Applied with Irrigation Water**

### **Section II-A: Water Source(s)**

#### **Well / City / Surface Water**

- Well / City Water
- Pond Water
- Mixed water from containment structure
- Stormwater captured and redelivered
- Diverted from surface water body
- Recycled and reused water from adjacent land

#### **Recycled / Reclaimed Water**

##### **Blue Valve**

- Blue Valve (San Benito County Water District Delivered Water)

##### **Recycled/ Reclaimed**

- CSIP (Monterey County Water Resources Agency, Castroville Seawater Intrusion Project/Salinas Valley Reclamation Project)
- Hollister Project (Hollister Tertiary Treated Recycled Water)
- Laguna County Sanitation District Project (Santa Maria)
- Los Osos Water Recycling Facility Project (Los Osos)
- PVWMA (Pajaro Valley Water Management Agency, Watsonville Area Water Recycling Project)
- Santa Cruz Davenport Reclamation Facility Project
- SCRWA (Santa Clara Valley Water District and South County Regional Wastewater Authority, Gilroy, and Morgan Hill Recycled Water Project)
- Trilogy Master Plan Community Reclaimed Water (Nipomo)

##### **General Categories**

- Domestic Reclaimed Water with Secondary Treatment
- Fruit and Vegetable Processing Facility (Recycled Water)
- Olive Processing Facility (Recycled Water)
- Winery Processing Facility (Recycled Water)
- Another source of irrigation water from recycled/reclaimed project, currently not on the list

## Section III: Nitrogen Applied with Compost and Other Materials

### ***Material Applied***

- Amendments (High Carbon)
- Amendments (Other)
- Compost
- Mulch
- None
- Other

### ***Section III: C:N Ratio of Compost and Other Materials***

- 1:1
- 2:1
- 3:1
- 4:1
- 5:1
- 6:1
- 7:1
- 8:1
- 9:1
- 10:1
- 11:1
- 12:1
- 13:1
- 14:1
- 15:1
- 16:1
- 17:1
- 18:1
- 19:1
- 20:1
- 21:1
- 22:1
- 23:1
- 24:1
- 25:1
- 26:1
- 27:1
- 28:1
- 29:1
- $\geq 30:1$

<b>Section IV-A: Nitrogen Applied with Conventional Fertilizers</b>
---

***Specific Crops Grown During Reporting Period***

Alfalfa	Blueberry	Celeriac
Alfalfa – Hay	Bok Choy	Celery
Alfalfa – Silage	Bok Choy, Baby	Chamaecyparis
Alocacia	Borage	Chard, Green
Amaranth	Boysenberry	Chard, Red
Anise	Broccollette	Chard, Swiss
Apples	Broccoli	Cherimoya
Apricots	Broccoli (Fall/Winter)	Cherries – Sweet
Artichoke, Annual	Broccoli (Spring/Summer)	Cherry
Artichoke, Perennial	Broccoli, Rabe	Chicory
Artichoke, Seed	Broccoli, Seed	Chile
Arugula	Broccolini	Chinese Greens (A Choy)
Arugula, Baby	Brussels Sprouts	Chinese Greens (Bok Choy)
Arugula, Wild	Cabbage	Chinese Greens (Bok Choy, Baby)
Asparagus	Cabbage, Chinese	Chinese Greens (Bun Choy)
Avocado	Cabbage, Green	Chinese Greens (Gai Choy)
Barley – Grain	Cabbage, Napa	Chinese Greens (Gai Lan)
Barley – Straw	Cabbage, Red	Chinese Greens (On Choy)
Beans	Cabbage, Savoy	Chinese Greens (Shanghai Bok Choy)
Basil	Cactus Pear	Chinese Greens (Snow Pea Tips)
Beans	Calathea	Chinese Greens (Tong Ho)
Beans, Dry	Calla Lily	Chinese Greens (Yam Leaves)
Beans, dry – Blackeye	Cantaloupe	Chinese Greens (Yu Choy)
Beans, dry – Garbanzo	Carrots	Chives
Beans, dry – Lima	Carrots, Baby	Cilantro
Beans, green (snap beans)	Carrots, Full-Sized	Cilantro, Bunch
Beans, Lima	Cauliflower	Cilantro, Clip
Beans, Seed	Cauliflower (Fall/Winter)	Coffee
Beet	Cauliflower (Spring/Summer)	Collard Greens
Blackberry	Cauliflower, Seed	Corn

Corn – Grain  
 Corn – Silage  
 Corn, Sweet  
 Cover Crop, Legume (Irrigated)  
 Cover Crop, Legume (Non-Irrigated)  
 Cover Crop, Non-Legume (Irrigated)  
 Cover Crop, Non-Legume  
 (Non-Irrigated)  
 Cover Crop, RSCAVENGE (Irrigated)  
 Cover Crop, RSCAVENGE (Non-  
 irrigated)  
 Cress  
 Croton  
 Cucumber  
 Daikon  
 Dandelion Greens  
 Dill  
 Eggplant  
 Endive  
 Escarole  
 Fennel  
 Ferns  
 Ficus  
 Figs  
 Frisee  
 Garlic  
 Gladiolus  
 Grapefruit  
 Grapes, Table  
 Grapes, Wine  
 Hemp  
 Herb Savory  
 Hoya  
 Hydrangea  
 Ivy

Jalapeno  
 Kalanchoe  
 Kale  
 Kale (multiple cuttings)  
 Kale, Baby  
 Kale, Baby (multiple cuttings)  
 Kalettes  
 Kentucky Bluegrass  
 Kohlrabi  
 Leek  
 Lemon  
 Lemon Cypress  
 Lettuce, Baby  
 Lettuce, Baby (Fall/Winter)  
 Lettuce, Baby (Spring/Summer)  
 Lettuce, Head  
 Lettuce, Head (Fall/Winter)  
 Lettuce, Head (Spring/Summer)  
 Lettuce, Iceberg  
 Lettuce, Iceberg (Fall/Winter)  
 Lettuce, Iceberg (Spring/Summer)  
 Lettuce, Leaf  
 Lettuce, Leaf (Fall/Winter)  
 Lettuce, Leaf (Spring/Summer)  
 Lettuce, Romaine  
 Lettuce, Romaine (Fall/Winter)  
 Lettuce, Romaine (Spring/Summer)  
 Lettuce, Romaine Hearts  
 Lettuce, Romaine Hearts (Fall/Winter)  
 Lettuce, Romaine Hearts  
 (Spring/Summer)  
 Lime  
 Loganberry  
 Mache  
 Malabar

Mango  
 Marigold  
 Marjoram  
 Melon  
 Mint  
 Mixed Greens  
 Mixed Greens, Baby  
 Mizuna  
 Monstera  
 Mustard  
 Mustard, Baby  
 Nectarine  
 Oat Hay  
 Olive  
 Onions, Dry  
 Onions, Green  
 Orach  
 Orange  
 Orchids  
 Oregano  
 Oriental Lily  
 Other  
 Papaya  
 Parsley  
 Parsnip  
 Peach  
 Pear  
 Peas  
 Peas, Seed  
 Peas, Snap or Sugar  
 Peperomia  
 Peppers, Bell  
 Peppers, Bell (Multiple Harvest Variety)  
 Peppers, Bell (Single Harvest Variety)  
 Peppers, Chili

Persimmon  
Philodendron  
Pimiento  
Pineapple  
Pistachio  
Plum  
Poinsettia  
Potato  
Prune  
Pumpkin  
Radicchio  
Radish  
Rapini  
Raspberry  
Rosemary  
Roses  
Ryegrass, Winter  
Safflower  
Seed Crops  
Shallots

Sorrel  
Spinach, Baby  
Spinach, Baby (multiple cuttings)  
Spinach, Bunch  
Spinach, Bunch (multiple cuttings)  
Spinach, Clip  
Spinach, Clip (multiple cuttings)  
Spring Mix  
Spring Mix (multiple cuttings)  
Spring Mix, Baby  
Spring Mix, Baby (multiple cuttings)  
Sprouts  
Squash, Summer  
Squash, Winter  
Strawberry  
Strawberry, 2<sup>nd</sup> year  
Strawberry, 2-step program, 1st step  
Strawberry, 2-step program, 2nd step  
Strawberry, Greater than 12-months  
variety

Strawberry, Up to 12-months variety  
Tangerine  
Thyme  
Tomatillo  
Tomato  
Tomato, Fresh Market  
Tradescantia  
Tulip  
Turf (sod/grass)  
Turnip  
Walnuts  
Watercress  
Watermelon  
Wheat  
Wheat, Common – Grain  
Zucchini  
Zygocactus

### **Fertilizer Type**

- Organic and Conventional
- Only Organic
- Only conventional

### **Crop Duration**

SI-NFH	Short or Intermediate-term Crop (< 24 months long), NOT Final Harvest
S-FH	Short-term Crop (< 12 months long), Final Harvest
L-NFAH	Long-term Crop (> 24 months long), NOT Final or Annual Harvest
L-FAH	Long-term Crop (> 24 months long), Final or Annual Harvest
I-FH	Intermediate-term Crop (12 to 24 months long), Final Harvest

### **Additional Information**

N/A	None Apply
GC	Greenhouse in container
GG	Greenhouse in ground
HH	Hoop house
HY	Hydroponic
LY	Low yield
NC	Nursery in container
NG	Nursery in ground
NY	No yield
P	Propagation crop
R	Research, not for human consumption

## **Section IV-B: Nitrogen Applied with Organic Fertilizers**

### **C:N Ratio of Organic Fertilizer**

<1.5:1	6.0:1	11.0:1
1.5:1	6.5:1	11.5:1
2.0:1	7.0:1	12.0:1
2.5:1	7.5:1	12.5:1
3.0:1	8.0:1	13.0:1
3.5:1	8.5:1	13.5:1
4.0:1	9.0:1	14.0:1
4.5:1	9.5:1	14.5:1
5.0:1	10.0:1	>=15.0:1
5.5:1	10.5:1	

<b>Section VII-A: Total Nitrogen Removed from the Field for Each Specific Crop Through Harvest or Sequestration</b>
---

***Crop Nitrogen Removal Conversion Coefficients***

Alfalfa - Hay	0.03115	Corn - Silage	0.00378	Peppers, Bell	0.00185
Alfalfa - Silage	0.01200	Corn - Sweet	0.00359	Pistachios	0.02800
Almonds	0.06800	Cucumbers	0.00108	Plums	0.00142
Apples	0.00050	Figs	0.00127	Potatoes	0.00310
Apricots	0.00280	Garlic	0.00760	Pumpkin	0.00368
Asparagus	0.00293	Grapefruit	0.00150	Ryegrass, Perennial - Hay	0.02745
Avocados	0.00220	Grapes - Table	0.00113	Safflower	0.02840
Barley - Grain	0.01680	Grapes - Wine	0.00131	Spinach, Bunch	0.00371
Barley - Straw	0.00770	Kale, Baby	0.00504	Spinach, Clip	0.00427
Beans, dry - Blackeye	0.03650	Lemons	0.00154		
Beans, dry - Garbanzo	0.03360	Lettuce, Baby	0.00376	Squash, Winter	0.00184
Beans, dry - Lima	0.03615	Lettuce, Iceberg	0.00132	Strawberry	0.00133
Beans, green (snap beans)	0.00289	Lettuce, Romaine	0.00181	Tangerines	0.00127
Broccoli	0.00460	Melon, Cantaloupe	0.00240	Tomatoes, Fresh Market	0.00130
Brussels Sprouts	0.00649	Melon, Watermelon	0.00070	Walnuts, English	0.01590
Cabbage Green	0.00218			Wheat, Common - Grain	0.00690
Cabbage Red	0.00224	Mizuna	0.00405	Other	0.0XXXX
Carrots	0.00160	Oat Hay	0.01085	Selecting a coefficient for a similar crop	
Cauliflower	0.00288	Olives	0.00314	Manually enter a coefficient value (refer to INMP instructions)	
Celery	0.00120	Onions, dry	0.00197		
Cherries - Sweet	0.00220	Oranges	0.00150		
Cilantro	0.00605	Peaches	0.00113		
Corn - Grain	0.01200	Pears	0.00065		

***R*<sub>SEQ</sub> (Lbs/acre)**

Almonds

1 yr 30

2 yrs 55

3 yrs 65

4 yrs 55

5 yrs 45

6 yrs 40

7-15 yrs 40

16-25 yrs 30

Avocados 25

Grapes 10

Lemon 30

Other

- Selecting *R*<sub>SEQ</sub> for a similar crop
- Reporting *R*<sub>SEQ</sub> determined based on research or ranch crop monitoring and analysis



<b>Section VII-B: Total Nitrogen Removed at the Ranch Level through Treatment (<math>R_{TREAT}</math>) and/or Other Methods and Technologies (<math>R_{OTHER}</math>)</b>
---

**$R_{TREAT}$  Location of the Treatment**

- Inside the ranch boundary
- Outside ranch boundary, neighboring land
- Outside ranch boundary, in watershed
- Outside ranch boundary, county land
- Other

**$R_{TREAT}$  Timing of Treatment, Months or Seasons**

- January
- February
- March
- April
- May
- June
- July
- August
- September
- October
- November
- December
- Winter
- Spring
- Summer
- Fall

**$R_{TREAT}$  Duration of Treatment**

- 1 to 10 days per month
- 11 to 20 days per month
- 21 to 31 days per month

**$R_{TREAT}$  Input Flow Type**

- Average Daily Flow (gallons/day)
- Total Daily Flow (gallons)
- Average Monthly Flow (gallons/month)
- Total Monthly Flow (gallons)

**$R_{TREAT}$  Output Flow Type**

- Average Daily Flow (gallons/day)
- Total Daily Flow (gallons)

- Average Monthly Flow (gallons/month)
- Total Monthly Flow (gallons)

***R<sub>TREAT</sub> Daily Average Nitrogen Input Concentration (mg/l)***

- As Nitrate-Nitrogen
- NO<sub>3</sub>-N, As Ammonia
- As Dissolved Inorganic Nitrogen, DIN
- As Total Nitrogen

***R<sub>TREAT</sub> Daily Average Nitrogen Output Concentration (mg/l)***

- As Nitrate-Nitrogen
- NO<sub>3</sub>-N, As Ammonia
- As Dissolved Inorganic Nitrogen, DIN
- As Total Nitrogen

***R<sub>OTHER</sub> Location of the Technology***

- Inside the ranch boundary
- Outside ranch boundary, neighboring land
- Outside ranch boundary, in watershed
- Outside ranch boundary, county land
- Other

***R<sub>OTHER</sub> Timing of Technology, Months or Seasons***

- January
- February
- March
- April
- May
- June
- July
- August
- September
- October
- November
- December
- Winter
- Spring
- Summer
- Fall

***R<sub>OTHER</sub> Duration of Technology***

- 1 to 10 days per month
- 11 to 20 days per month
- 21 to 31 days per month

***ROTHER Input Flow Type***

- Average Daily Flow (gallons/day)
- Total Daily Flow (gallons)
- Average Monthly Flow (gallons/month)
- Total Monthly Flow (gallons)

***ROTHER Output Flow Type***

- Average Daily Flow (gallons/day)
- Total Daily Flow (gallons)
- Average Monthly Flow (gallons/month)
- Total Monthly Flow (gallons)

***ROTHER Daily Average Nitrogen Input Concentration (mg/l)***

- As Nitrate-Nitrogen
- NO<sub>3</sub>-N, As Ammonia
- As Dissolved Inorganic Nitrogen, DIN
- As Total Nitrogen

***ROTHER Daily Average Nitrogen Output Concentration (mg/l)***

- As Nitrate-Nitrogen
- NO<sub>3</sub>-N, As Ammonia
- As Dissolved Inorganic Nitrogen, DIN
- As Total Nitrogen

## Section VII-C: Nitrogen Scavenged by Cover Crops

### Cover Crop(s) Name

- Merced Rye
- Pacheco Triticale

### Cover Crop C:N Ratio and Percent N Concentration

#### Merced Rye

C:N 10:1 - 4.2 %N
C:N 11:1 - 3.6 %N
C:N 14:1 - 3.1 %N
C:N 20:1 - 2.2 %N
C:N 27:1 - 1.6 %N
C:N 29:1 - 1.4 %N
C:N 31:1 - 1.4 %N
C:N 32:1 - 1.3 %N
C:N 33:1 - 1.3 %N

#### Pacheco Triticale

C:N 11:1 - 3.8 %N
C:N 14:1 - 3.0 %N
C:N 20:1 - 2.2 %N
C:N 30:1 - 1.5 %N
C:N 31:1 - 1.5 %N
C:N 32:1 - 1.4 %N
C:N 33:1 - 1.4 %N
C:N 35:1 - 1.3 %N
C:N 36:1 - 1.3 %N
C:N 46:1 - 1.0 %N
C:N 47:1 - 0.9 %N

### **Cover Crop Height (in) and Predicted Biomass (Lbs/crop-acre)**

#### **Merced Rye**

Height 20 (in) - Biomass 2560 Lbs  
Height 20.5 (in) - Biomass 2654 Lbs  
Height 21 (in) - Biomass 2748 Lbs  
Height 21.5 (in) - Biomass 2842 Lbs  
Height 22 (in) - Biomass 2936 Lbs  
Height 22.5 (in) - Biomass 3030 Lbs  
Height 23 (in) - Biomass 3124 Lbs  
Height 23.5 (in) - Biomass 3218 Lbs  
Height 24 (in) - Biomass 3312 Lbs  
Height 24.5 (in) - Biomass 3406 Lbs  
Height 25 (in) - Biomass 3500 Lbs  
Height 25.5 (in) - Biomass 3594 Lbs  
Height 26 (in) - Biomass 3688 Lbs  
Height 26.5 (in) - Biomass 3783 Lbs  
Height 27 (in) - Biomass 3877 Lbs  
Height 27.5 (in) - Biomass 3971 Lbs  
Height 28 (in) - Biomass 4065 Lbs  
Height 28.5 (in) - Biomass 4159 Lbs  
Height 29 (in) - Biomass 4253 Lbs  
Height 29.5 (in) - Biomass 4347 Lbs  
Height 30 (in) - Biomass 4441 Lbs  
Height 30.5 (in) - Biomass 4535 Lbs  
Height 31 (in) - Biomass 4629 Lbs  
Height 31.5 (in) - Biomass 4723 Lbs  
Height 32 (in) - Biomass 4817 Lbs  
Height 32.5 (in) - Biomass 4911 Lbs  
Height 33 (in) - Biomass 5005 Lbs  
Height 33.5 (in) - Biomass 5099 Lbs  
Height 34 (in) - Biomass 5194 Lbs  
Height 34.5 (in) - Biomass 5288 Lbs  
Height 35 (in) - Biomass 5382 Lbs

Height 35.5 (in) - Biomass 5476 Lbs  
Height 36 (in) - Biomass 5570 Lbs  
Height 36.5 (in) - Biomass 5664 Lbs  
Height 37 (in) - Biomass 5758 Lbs  
Height 37.5 (in) - Biomass 5852 Lbs  
Height 38 (in) - Biomass 5946 Lbs  
Height 38.5 (in) - Biomass 6040 Lbs  
Height 39 (in) - Biomass 6134 Lbs  
Height 39.5 (in) - Biomass 6228 Lbs  
Height 40 (in) - Biomass 6322 Lbs  
Height 40.5 (in) - Biomass 6416 Lbs  
Height 41 (in) - Biomass 6511 Lbs  
Height 41.5 (in) - Biomass 6605 Lbs  
Height 42 (in) - Biomass 6699 Lbs  
Height 42.5 (in) - Biomass 6793 Lbs  
Height 43 (in) - Biomass 6887 Lbs  
Height 43.5 (in) - Biomass 6981 Lbs  
Height 44 (in) - Biomass 7075 Lbs  
Height 44.5 (in) - Biomass 7169 Lbs  
Height 45 (in) - Biomass 7263 Lbs  
Height 45.5 (in) - Biomass 7357 Lbs  
Height 46 (in) - Biomass 7451 Lbs  
Height 46.5 (in) - Biomass 7545 Lbs  
Height 47 (in) - Biomass 7639 Lbs  
Height 47.5 (in) - Biomass 7733 Lbs  
Height 48 (in) - Biomass 7827 Lbs  
Height 48.5 (in) - Biomass 7922 Lbs  
Height 49 (in) - Biomass 8016 Lbs  
Height 49.5 (in) - Biomass 8110 Lbs  
Height 50 (in) - Biomass 8204 Lbs  
Height 50.5 (in) - Biomass 8298 Lbs  
Height 51 (in) - Biomass 8392 Lbs

Height 51.5 (in) - Biomass 8486 Lbs  
Height 52 (in) - Biomass 8580 Lbs  
Height 52.5 (in) - Biomass 8674 Lbs  
Height 53 (in) - Biomass 8768 Lbs  
Height 53.5 (in) - Biomass 8862 Lbs  
Height 54 (in) - Biomass 8956 Lbs  
Height 54.5 (in) - Biomass 9050 Lbs  
Height 55 (in) - Biomass 9144 Lbs  
Height 55.5 (in) - Biomass 9239 Lbs  
Height 56 (in) - Biomass 9333 Lbs  
Height 56.5 (in) - Biomass 9427 Lbs  
Height 57 (in) - Biomass 9521 Lbs  
Height 57.5 (in) - Biomass 9615 Lbs  
Height 58 (in) - Biomass 9709 Lbs  
Height 58.5 (in) - Biomass 9803 Lbs  
Height 59 (in) - Biomass 9897 Lbs  
Height 59.5 (in) - Biomass 9991 Lbs  
Height 60 (in) - Biomass 10085 Lbs  
Height 60.5 (in) - Biomass 10179 Lbs  
Height 61 (in) - Biomass 10273 Lbs  
Height 61.5 (in) - Biomass 10367 Lbs  
Height 62 (in) - Biomass 10461 Lbs  
Height 62.5 (in) - Biomass 10555 Lbs  
Height 63 (in) - Biomass 10650 Lbs  
Height 63.5 (in) - Biomass 10744 Lbs  
Height 64 (in) - Biomass 10838 Lbs  
Height 64.5 (in) - Biomass 10932 Lbs  
Height 65 (in) - Biomass 11026 Lbs  
Height 65.5 (in) - Biomass 11120 Lbs  
Height 66 (in) - Biomass 11214 Lbs  
Height 66.5 (in) - Biomass 11308 Lbs  
Height 67 (in) - Biomass 11402 Lbs

Height 67.5 (in) - Biomass 11496 Lbs  
Height 68 (in) - Biomass 11590 Lbs  
Height 68.5 (in) - Biomass 11684 Lbs  
Height 69 (in) - Biomass 11778 Lbs  
Height 69.5 (in) - Biomass 11872 Lbs

Height 70 (in) - Biomass 11967 Lbs  
Height 70.5 (in) - Biomass 12061 Lbs  
Height 71 (in) - Biomass 12155 Lbs  
Height 71.5 (in) - Biomass 12249 Lbs  
Height 72 (in) - Biomass 12343 Lbs

Height 72.5 (in) - Biomass 12437 Lbs  
Height 73 (in) - Biomass 12531 Lbs  
Height 74 (in) - Biomass 12719 Lbs  
Height 74.5 (in) - Biomass 12813 Lbs  
Height 75 (in) - Biomass 12907 Lbs

## **Pacheco Triticale**

Height 20 (in) - Biomass 2639 Lbs  
Height 20.5 (in) - Biomass 2761 Lbs  
Height 21 (in) - Biomass 2886 Lbs  
Height 21.5 (in) - Biomass 3014 Lbs  
Height 22 (in) - Biomass 3143 Lbs  
Height 22.5 (in) - Biomass 3275 Lbs  
Height 23 (in) - Biomass 3410 Lbs  
Height 23.5 (in) - Biomass 3546 Lbs  
Height 24 (in) - Biomass 3685 Lbs  
Height 24.5 (in) - Biomass 3826 Lbs  
Height 25 (in) - Biomass 3970 Lbs  
Height 25.5 (in) - Biomass 4116 Lbs  
Height 26 (in) - Biomass 4264 Lbs  
Height 26.5 (in) - Biomass 4415 Lbs  
Height 27 (in) - Biomass 4568 Lbs  
Height 27.5 (in) - Biomass 4723 Lbs  
Height 28 (in) - Biomass 4881 Lbs  
Height 28.5 (in) - Biomass 5041 Lbs  
Height 29 (in) - Biomass 5203 Lbs  
Height 29.5 (in) - Biomass 5367 Lbs  
Height 30 (in) - Biomass 5534 Lbs  
Height 30.5 (in) - Biomass 5704 Lbs  
Height 31 (in) - Biomass 5875 Lbs  
Height 31.5 (in) - Biomass 6049 Lbs  
Height 32 (in) - Biomass 6225 Lbs  
Height 32.5 (in) - Biomass 6404 Lbs  
Height 33 (in) - Biomass 6585 Lbs  
Height 33.5 (in) - Biomass 6768 Lbs  
Height 34 (in) - Biomass 6954 Lbs  
Height 34.5 (in) - Biomass 7141 Lbs  
Height 35 (in) - Biomass 7332 Lbs  
Height 35.5 (in) - Biomass 7524 Lbs

Height 36 (in) - Biomass 7719 Lbs  
Height 36.5 (in) - Biomass 7916 Lbs  
Height 37 (in) - Biomass 8116 Lbs  
Height 37.5 (in) - Biomass 8318 Lbs  
Height 38 (in) - Biomass 8522 Lbs  
Height 38.5 (in) - Biomass 8729 Lbs  
Height 39 (in) - Biomass 8937 Lbs  
Height 39.5 (in) - Biomass 9149 Lbs  
Height 40 (in) - Biomass 9362 Lbs  
Height 40.5 (in) - Biomass 9578 Lbs  
Height 41 (in) - Biomass 9796 Lbs  
Height 41.5 (in) - Biomass 10017 Lbs  
Height 42 (in) - Biomass 10240 Lbs  
Height 42.5 (in) - Biomass 10465 Lbs  
Height 43 (in) - Biomass 10692 Lbs  
Height 43.5 (in) - Biomass 10922 Lbs  
Height 44 (in) - Biomass 11154 Lbs  
Height 44.5 (in) - Biomass 11389 Lbs  
Height 45 (in) - Biomass 11626 Lbs  
Height 45.5 (in) - Biomass 11865 Lbs  
Height 46 (in) - Biomass 12106 Lbs  
Height 46.5 (in) - Biomass 12350 Lbs  
Height 47 (in) - Biomass 12596 Lbs  
Height 47.5 (in) - Biomass 12845 Lbs  
Height 48 (in) - Biomass 13096 Lbs  
Height 48.5 (in) - Biomass 13349 Lbs  
Height 49 (in) - Biomass 13604 Lbs  
Height 49.5 (in) - Biomass 13862 Lbs  
Height 50 (in) - Biomass 14122 Lbs  
Height 50.5 (in) - Biomass 14385 Lbs  
Height 51 (in) - Biomass 14650 Lbs  
Height 51.5 (in) - Biomass 14917 Lbs  
Height 52 (in) - Biomass 15186 Lbs

## Attachment B- Available Crops Kc Values

The table includes the list of Kc values available at the Food and Agriculture Organization of the United Nations (FAO), [Irrigation and drainage paper 56, Chapter 6](#) webpage also available at <https://www.fao.org/3/X0490E/x0490e0b.htm>.

Crop	K <sub>C</sub> INI <sup>1</sup>	K <sub>C</sub> MID	K <sub>C</sub> END
<b>a. Small Vegetables</b>	0.7	1.05	0.95
Broccoli		1.05	0.95
Brussel Sprouts		1.05	0.95
Cabbage		1.05	0.95
Carrots		1.05	0.95
Cauliflower		1.05	0.95
Celery		1.05	1
Garlic		1	0.7
Lettuce		1	0.95
Onions			
- dry		1.05	0.75
- green		1	1
- seed		1.05	0.8
Spinach		1	0.95
Radish		0.9	0.85
<b>b. Vegetables - Solanum Family (<i>Solanaceae</i>)</b>	0.6	1.15	0.8
Egg Plant		1.05	0.9
Sweet Peppers (bell)		1.052	0.9
Tomato		1.152	0.70-0.90
<b>c. Vegetables - Cucumber Family (<i>Cucurbitaceae</i>)</b>	0.5	1	0.8
Cantaloupe	0.5	0.85	0.6
Cucumber			
- Fresh Market	0.6	1.002	0.75
- Machine harvest	0.5	1	0.9
Pumpkin, Winter Squash		1	0.8
Squash, Zucchini		0.95	0.75
Sweet Melons		1.05	0.75
Watermelon	0.4	1	0.75
<b>d. Roots and Tubers</b>	0.5	1.1	0.95
Beets, table		1.05	0.95



Cassava			
- year 1	0.3	0.803	0.3
- year 2	0.3	1.1	0.5
Parsnip	0.5	1.05	0.95
Potato		1.15	0.754
Sweet Potato		1.15	0.65
Turnip (and Rutabaga)		1.1	0.95
Sugar Beet	0.35	1.2	0.705
<b>e. Legumes (Leguminosae)</b>	0.4	1.15	0.55
Beans, green	0.5	1.052	0.9
Beans, dry and Pulses	0.4	1.152	0.35
Chick pea		1	0.35
Fababean (broad bean)			
- Fresh	0.5	1.152	1.1
- Dry/Seed	0.5	1.152	0.3
Garbanzo	0.4	1.15	0.35
Green Gram and Cowpeas		1.05	0.60-0.35 <sup>6</sup>
Groundnut (Peanut)		1.15	0.6
Lentil		1.1	0.3
Peas			
- Fresh	0.5	1.152	1.1
- Dry/Seed		1.15	0.3
Soybeans		1.15	0.5
<b>f. Perennial Vegetables (with winter dormancy and initially bare or mulched soil)</b>	0.5	1	0.8
Artichokes	0.5	1	0.95
Asparagus	0.5	0.957	0.3
Mint	0.6	1.15	1.1
Strawberries	0.4	0.85	0.75
<b>g. Fiber Crops</b>	0.35		
Cotton		1.15-1.20	0.70-0.50
Flax		1.1	0.25
Sisal <sup>8</sup>		0.4-0.7	0.4-0.7
<b>h. Oil Crops</b>	0.35	1.15	0.35
Castorbean ( <i>Ricinus</i> )		1.15	0.55
Rapeseed, Canola		1.0-1.15 <sup>9</sup>	0.35
Safflower		1.0-1.15 <sup>9</sup>	0.25
Sesame		1.1	0.25
Sunflower		1.0-1.15 <sup>9</sup>	0.35

<b>i. Cereals</b>	0.3	1.15	0.4
Barley		1.15	0.25
Oats		1.15	0.25
Spring Wheat		1.15	0.25-0.4 <sup>10</sup>
Winter Wheat			
- with frozen soils	0.4	1.15	0.25-0.4 <sup>10</sup>
- with non-frozen soils	0.7	1.15	0.25-0.4 <sup>10</sup>
Maize, Field (grain) ( <i>field corn</i> )		1.2	0.60-0.35 <sup>11</sup>
Maize, Sweet ( <i>sweet corn</i> )		1.15	1.0512
Millet		1	0.3
Sorghum			
- grain		1.00-1.10	0.55
- sweet		1.2	1.05
Rice	1.05	1.2	0.90-0.60
<b>j. Forages</b>			
Alfalfa Hay			
- averaged cutting effects	0.4	0.9513	0.9
- individual cutting periods	0.4014	1.2014	1.1514
- for seed	0.4	0.5	0.5
Bermuda hay			
- averaged cutting effects	0.55	1.0013	0.85
- Spring crop for seed	0.35	0.9	0.65
Clover hay, Berseem			
- averaged cutting effects	0.4	0.9013	0.85
- individual cutting periods	0.4014	1.1514	1.1014
Rye Grass hay			
- averaged cutting effects	0.95	1.05	1
Sudan Grass hay (annual)			
- averaged cutting effects	0.5	0.9014	0.85
- individual cutting periods	0.5014	1.1514	1.1014
Grazing Pasture			
- Rotated Grazing	0.4	0.85-1.05	0.85
- Extensive Grazing	0.3	0.75	0.75
Turf grass			
- cool season <sup>15</sup>	0.90	0.95	0.95
- warm season <sup>15</sup>	0.80	0.85	0.85
<b>k. Sugar Cane</b>	0.4	1.25	0.75
<b>l. Tropical Fruits and Trees</b>			
Banana			
- 1 <sup>st</sup> year	0.5	1.1	1

- 2 <sup>nd</sup> year	1	1.2	1.1
Cacao	1	1.05	1.05
Coffee			
- bare ground cover	0.9	0.95	0.95
- with weeds	1.05	1.1	1.1
Date Palms	0.9	0.95	0.95
Palm Trees	0.95	1	1
Pineapple <sup>16</sup>			
- bare soil	0.5	0.3	0.3
- with grass cover	0.5	0.5	0.5
Rubber Trees	0.95	1	1
Tea			
- non-shaded	0.95	1	1
- shaded <sup>17</sup>	1.10	1.15	1.15
<b>m. Grapes and Berries</b>			
Berries (bushes)	0.3	1.05	0.5
Grapes			
- Table or Raisin	0.3	0.85	0.45
- Wine	0.3	0.7	0.45
Hops	0.3	1.05	0.85
<b>n. Fruit Trees</b>			
Almonds, no ground cover	0.4	0.9	0.6518
Apples, Cherries, Pears <sup>19</sup>			
- no ground cover, killing frost	0.45	0.95	0.7018
- no ground cover, no frosts	0.6	0.95	0.7518
- active ground cover, killing frost	0.5	1.2	0.9518
- active ground cover, no frosts	0.8	1.2	0.8518
Apricots, Peaches, Stone Fruit <sup>19, 20</sup>			
- no ground cover, killing frost	0.45	0.9	0.6518
- no ground cover, no frosts	0.55	0.9	0.6518
- active ground cover, killing frost	0.5	1.15	0.9018
- active ground cover, no frosts	0.8	1.15	0.8518
Avocado, no ground cover	0.6	0.85	0.75
Citrus, no ground cover <sup>21</sup>			
- 70% canopy	0.70	0.65	0.7
- 50% canopy	0.65	0.6	0.65
- 20% canopy	0.50	0.45	0.55
Citrus, with active ground cover or weeds <sup>22</sup>			
- 70% canopy	0.75	0.7	0.75
- 50% canopy	0.80	0.8	0.8
- 20% canopy	0.85	0.85	0.85
Conifer Trees <sup>23</sup>	1	1	1

Kiwi	0.4	1.05	1.05
Olives (40 to 60% ground coverage by canopy) <sup>24</sup>	0.65	0.7	0.7
Pistachios, no ground cover	0.4	1.1	0.45
Walnut Orchard <sup>19</sup>	0.5	1.1	0.6518
<b>o. Wetlands - temperate climate</b>			
Cattails, Bulrushes, killing frost	0.3	1.2	0.3
Cattails, Bulrushes, no frost	0.6	1.2	0.6
Short Veg., no frost	1.05	1.1	1.1
Reed Swamp, standing water	1	1.2	1
Reed Swamp, moist soil	0.9	1.2	0.7
<b>p. Special</b>			
Open Water, < 2 m depth or in subhumid climates or tropics		1.05	1.05
Open Water, > 5 m depth, clear of turbidity, temperate climate		0.6525	1.2525

<sup>1</sup> These are general values for  $K_{c\ ini}$  under typical irrigation management and soil wetting. For frequent wettings such as high frequency sprinkle irrigation or daily rainfall, these values may increase substantially and may approach 1.0 to 1.2.  $K_{c\ ini}$  is a function of wetting interval and potential evaporation rate during the initial and development periods and is more accurately estimated using the dual  $K_{cb\ ini} + K_e$ .

<sup>2</sup> Beans, Peas, Legumes, Tomatoes, Peppers and Cucumbers are sometimes grown on stalks reaching 1.5 to 2 meters in height. In such cases, increased  $K_c$  values need to be taken. For green beans, peppers and cucumbers, 1.15 can be taken, and for tomatoes, dry beans and peas, 1.20. Under these conditions  $h$  should be increased also.

<sup>3</sup> The midseason values for cassava assume non-stressed conditions during or following the rainy season. The  $K_{c\ end}$  values account for dormancy during the dry season.

<sup>4</sup> The  $K_{c\ end}$  value for potatoes is about 0.40 for long season potatoes with vine kill.

<sup>5</sup> This  $K_{c\ end}$  value is for no irrigation during the last month of the growing season. The  $K_{c\ end}$  value for sugar beets is higher, up to 1.0, when irrigation or significant rain occurs during the last month.

<sup>6</sup> The first  $K_{c\ end}$  is for harvested fresh. The second value is for harvested dry.

<sup>7</sup> The  $K_c$  for asparagus usually remains at  $K_{c\ ini}$  during harvest of the spears, due to sparse ground cover. The  $K_{c\ mid}$  value is for following regrowth of plant vegetation following termination of harvest of spears.

<sup>8</sup>  $K_c$  for sisal depends on the planting density and water management (e.g., intentional moisture stress).

<sup>9</sup> The lower values are for rainfed crops having less dense plant populations.

<sup>10</sup> The higher value is for hand-harvested crops.

<sup>11</sup> The first  $K_{c\ end}$  value is for harvest at high grain moisture. The second  $K_{c\ end}$  value is for harvest after complete field drying of the grain (to about 18% moisture, wet mass basis).

<sup>12</sup> If harvested fresh for human consumption. Use  $K_{c\ end}$  for field maize if the sweet maize is allowed to mature and dry in the field.

<sup>13</sup> This  $K_{c\ mid}$  coefficient for hay crops is an overall average  $K_{c\ mid}$  coefficient that averages  $K_c$  for both before and following cuttings. It is applied to the period following the first development period until the beginning of the last late season period of the growing season.

<sup>14</sup> These  $K_c$  coefficients for hay crops represent immediately following cutting; at full cover; and immediately before cutting, respectively. The growing season is described as a series of individual cutting periods.

<sup>15</sup> Cool season grass varieties include dense stands of bluegrass, ryegrass, and fescue. Warm season varieties include Bermuda grass and St. Augustine grass. The 0.95 values for cool season grass represent a 0.06 to 0.08 m mowing height under general turf conditions. Where careful water management is practiced and rapid growth is not required,  $K_c$ 's for turf can be reduced by 0.10.

<sup>16</sup> The pineapple plant has very low transpiration because it closes its stomates during the day and opens them during the night. Therefore, the majority of  $ET_c$  from pineapple is evaporation from the soil. The  $K_c$

$K_{c\ mid} < K_{c\ ini}$  since  $K_{c\ mid}$  occurs during full ground cover so that soil evaporation is less. Values given assume that 50% of the ground surface is covered by black plastic mulch and that irrigation is by sprinkler. For drip irrigation beneath the plastic mulch,  $K_c$ 's given can be reduced by 0.10.

<sup>17</sup> Includes the water requirements of the shade trees.

<sup>18</sup> These  $K_{c\ end}$  values represent  $K_c$  prior to leaf drop. After leaf drop,  $K_{c\ end} \approx 0.20$  for bare, dry soil or dead ground cover and  $K_{c\ end} \approx 0.50$  to  $0.80$  for actively growing ground cover.

<sup>19</sup> Refer to footnotes 21 and 22 for estimating  $K_c$  for immature stands.

<sup>20</sup> Stone fruit category applies to peaches, apricots, pears, plums and pecans.

<sup>21</sup> These  $K_c$  values can be calculated from Eq. 98 for  $K_{c\ min} = 0.15$  and  $K_{c\ full} = 0.75, 0.70$  and  $0.75$  for the initial, mid-season and end of season periods, and  $f_{c\ eff} = f_c$  where  $f_c$  = fraction of ground covered by tree canopy (e.g., the sun is presumed to be directly overhead). The values listed correspond with those in Doorenbos and Pruitt (1977) and with more recent measurements. The midseason value is lower than initial and ending values due to the effects of stomatal closure during periods of peak ET. For humid and subhumid climates where there is less stomatal control by citrus, values for  $K_{c\ ini}$ ,  $K_{c\ mid}$ , and  $K_{c\ end}$  can be increased by 0.1 - 0.2, following Rogers et al. (1983).

<sup>22</sup> These  $K_c$  values can be calculated as  $K_c = f_c K_{c\ ngc} + (1 - f_c) K_{c\ cover}$  where  $K_{c\ ngc}$  is the  $K_c$  of citrus with no active ground cover (calculated as in footnote 21),  $K_{c\ cover}$  is the  $K_c$  for the active ground cover (0.95), and  $f_c$  is defined in footnote 21. The values listed correspond with those in Doorenbos and Pruitt (1977) and with more recent measurements. Alternatively,  $K_c$  for citrus with active ground cover can be estimated directly from Eq. 98 by setting  $K_{c\ min} = K_{c\ cover}$ . For humid and subhumid climates where there is less stomatal control by citrus, values for  $K_{c\ ini}$ ,  $K_{c\ mid}$ , and  $K_{c\ end}$  can be increased by 0.1 - 0.2, following Rogers et al. (1983).

For non-active or only moderately active ground cover (active indicates green and growing ground cover with LAI > about 2 to 3),  $K_c$  should be weighted between  $K_c$  for no ground cover and  $K_c$  for active ground cover, with the weighting based on the "greenness" and approximate leaf area of the ground cover.

<sup>23</sup> Conifers exhibit substantial stomatal control due to reduced aerodynamic resistance. The  $K_c$ , can easily reduce below the values presented, which represent well-watered conditions for large forests.

<sup>24</sup> These coefficients represent about 40 to 60% ground cover. Refer to footnotes 21 and 22 for estimating  $K_c$  for immature stands. In Spain, Pastor and Orgaz (1994) have found the following monthly  $K_c$ 's for olive orchards having 60% ground cover: 0.50, 0.50, 0.65, 0.60, 0.55, 0.50, 0.45, 0.45, 0.55, 0.60, 0.65, 0.50 for months January through December. These coefficients can be invoked by using  $K_{c\ ini} = 0.65$ ,  $K_{c\ mid} = 0.45$ , and  $K_{c\ end} = 0.65$ , with stage lengths = 30, 90, 60 and 90 days, respectively for initial, development, midseason and late season periods, and using  $K_c$  during the winter ("off season") in December to February = 0.50.

<sup>25</sup> These  $K_c$ 's are for deep water in temperate latitudes where large temperature changes in the water body occur during the year, and initial and peak period evaporation is low as radiation energy is absorbed into the deep water body. During fall and winter periods ( $K_{c\ end}$ ), heat is released from the water body that increases the evaporation above that for grass. Therefore,  $K_{c\ mid}$  corresponds to the period when the water body is gaining thermal energy and  $K_{c\ end}$  when releasing thermal energy. These  $K_c$ 's should be used with caution.

## Attachment C- Optional Reporting Sections

The following list is the information that may be reported in the INMP Summary Report, but it's not required (its optional).

The carbon to nitrogen ratio (C:N) of compost, high carbon amendments, and woody mulch materials;

The C:N ratio of planted cover crops;

The C:N ratio of organic fertilizers;

The nitrogen sequestered in the woody plant tissue of permanent or semi-permanent crops;

The nitrogen removed by treatment methods, or other methods and technologies,

The biomass, height, C:N ratio, and percent nitrogen concentration of Pacheco triticale and Merced rye cover crops.

### 1. C:N Ratio of Compost, High Carbon Amendments & Woody Mulch Materials

In “Section III: Nitrogen Applied with Compost and Other Materials”, growers are required to report the nitrogen applied in compost, high carbon amendments, and woody mulch. To report this information select the type of material applied, the ranch physical acres where it was applied, and the amount of nitrogen applied.

In this section, growers can also report the C:N Ratio of compost, high carbon amendments, and mulches. The reporting of the materials C:N Ratio is optional. The carbon to nitrogen (C:N) ratio is the ratio of the mass of carbon to the mass of nitrogen in a substance.

To determine the C:N ratio of compost, amendments, mulches, or other materials, contact an agricultural laboratory and inquire about this testing. The following laboratories provide this service:

- Dellavalle Laboratory Inc  
<https://dellavallelab.com/agricultural-services/>
- ALC Consolidated  
<https://aglaboratory.com/services/plant-analysis>
- FGL Agricultural Lab  
[https://fglinc.com/fee\\_schedule/?division=Ag](https://fglinc.com/fee_schedule/?division=Ag)

### 2. C:N Ratio of Planted Cover Crops

All cover crops<sup>11</sup> should be reported in “Section IV: Nitrogen Applied with Conventional and/or Organic Fertilizers”. Select the cover crop corresponding option from the

<sup>11</sup> This includes cover crops grown in the same area than the commercial crops (or between rows) and cover crops grown in areas without commercial crop production (or fallowed acres).

dropdown menu in the “Specific Crops Grown During Reporting Period” column and provide the cover crop acreage. Select the corresponding cover crop option without the RSCAVENGE words at the end.

Report the number of acres where the cover crop was planted, and the amount of nitrogen applied to it from conventional and/or organic fertilizers. If organic fertilizers were applied to the cover crop, report these nitrogen applications in “Section IV-B Nitrogen Applied in Organic Fertilizers”. If nitrogen in conventional and/or organic fertilizers was not applied, enter zero.

### **3. C:N Ratio of Organic Fertilizers**

The reporting of the C:N Ratio of organic fertilizers is not required but can be reported in “Section IV-B: Nitrogen Applied in Organic Fertilizers”.

### **4. Nitrogen Sequestered in Woody Plant Tissues**

The reporting of the nitrogen sequestered in woody plant tissues is optional but can be reported in “Section VII-A: Total Nitrogen Removed from the Field for Each Specific Crop Through Harvest or Sequestration”.

To report the amount of nitrogen sequestered in woody plant tissues ( $R_{SEQ}$ ) select the crop name listed of the drop-down in the RSEQ column. The drop-down includes a list of crops with available information of the amount of nitrogen sequestered.

If the crop reporting on is not available in the drop-down menu, select “Other” and select the RSEQ for a similar crop, or report the RSEQ determined based on research on the ranch crop monitoring and analysis.

To determine the RSEQ values contact your County Crop Advisor and inquiry about the available<sup>12</sup> monitoring and analysis protocols they could provide. To contact a County Crop Advisor, navigate to this webpage: [UCANR Staff Directory](#). Under Title/Specialty type “Advisor”. Finally, click on “SEARCH.”

### **5. Nitrogen Removed through Treatment Methods and/or Other Methods and Technologies**

The reporting of the nitrogen removed by treatment methods, or other removal methods and technologies is optional but can be reported in “Section VII-B: Nitrogen Removed at the Ranch Level through Treatment and Other Methods and Technologies”. In this section respond to all the questions and report the pounds of nitrogen removed from the nitrogen discharged from the ranch by implementing treatment systems ( $R_{TREAT}$ ) or other removal methods and technologies ( $R_{OTHER}$ ).

The treatments, removal methods, or technologies may be installed in the ranch or be part of a collective treatment program that treats the discharge from multiple ranches.

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<sup>12</sup> Consider this research paper as a guidance document with established procedures to develop the amounts of nitrogen sequestered in woody crops: [Nutrient Storage in the Perennial Organs of Deciduous Trees and Remobilization in Spring – A Study in Almond](#).

### ***Method used to remove Nitrogen from the ranch through $R_{TREAT}$ or $R_{OTHER}$***

Report the total nitrogen removed from the ranch through treatment or another method by selecting: “Quantifiable Treatment Method” if nitrogen was removed through the implementation of a quantifiable treatment method  $R_{TREAT}$ . Select “Other Method / Technology” if nitrogen was removed through implementation of another type of quantifiable removal method or technology  $R_{OTHER}$ .

### ***Nitrogen removed from Surface or Groundwater Discharge***

Select the type of discharge treated by the quantifiable treatment system, method or technology, installed or implemented.

Select “Removed from surface water discharge” if the nitrogen is removed from water discharged horizontally to the surface of the land. Surface discharge is the water that drains on the surface outside the ranch in conveyances such as ditches, canals, and/or buried pipes or tile drains. The discharge may be released into a canal, a stormwater drain, a surface water body, or to the surface of the land. For example, select “Removed from surface water discharge” if the treatment is a wood chip bioreactor installed on ditches, and/or wetlands.

Select “Removed from groundwater discharge” if the nitrogen is removed from water discharged vertically towards groundwater. For example, select this option if the treatment is a wood chip bioreactor installed below ground, below the soil root zone, or underneath a managed recharge pond.

Select “Removed from surface water and groundwater discharge” if the nitrogen is removed from both surface water and groundwater discharges.

### ***Quantifiable Treatment Method $R_{TREAT}$***

The monitoring and reporting of the nitrate concentrations (inflow and outflow), and the volume of water (input and output) are required to quantify the nitrogen removed by the treatment method,  $R_{TREAT}$ .

Note: All the records must be maintained in the Farm Plan and submitted to the Central Coast Water Board upon request. At a minimum, the following records must be maintained: monitoring results, rationale, calculations, and formulas used to determine the amount of nitrogen removed by the quantifiable treatment method.

### **Treatment System Description**

In the open box, provide the name of the treatment system, and a brief explanation of the treatment process. For example, for a wood chips bioreactor treatment system, you may explain that the nitrogen is removed by the naturally occurring denitrifying microbes.<sup>13</sup>

### **Treatment System Location**

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<sup>13</sup> The denitrifying microbes reduce the nitrate into an inert di-nitrogen gas during their respiration processes.



From the drop-down select the option that best describes the location of the treatment. If none of the options apply, select "Other" and provide a brief explanation of the treatment location.

**Treatment Area (acres)**

Report the size of the treatment system, so the number of acres it occupies.

**Area Contributing Discharge that is Treated (acres)**

Report the number of acres producing the discharged water treated by the treatment system.

**Timing of the Treatment, months or seasons**

From the drop-down menu select the months and/or seasons when the treatment is removing nitrogen from the discharged water. Timing refers to the months or seasons when there is water released from the contributing discharge area, or when the system is operating (i.e., turned on).

**Duration of Treatment (days per month the treatment is operating)**

Select the number of days per month when the treatment is operating (turned on) and removing nitrogen from the discharged water.

**Input Flow and Input Flow Type**

Report the numeric input flow value in the blank cell. From the drop-down menu select the units used to measure and report the input of flow entering the treatment. Select the units as: average daily gallons per day, average gallons per month, total daily gallons, or total monthly gallons.

**Output Flow and Output Flow Type**

Report the numeric output flow value in the blank cell. From the drop-down menu select the units used to measure and report the output of flow released from the treatment. Select the units as: average daily gallons per day, average gallons per month, total daily gallons, or total monthly gallons.

**Hydraulic Retention Time (HRT) in minutes**

The hydraulic retention time (HRT) is the ratio between a reactor volume and the input flow rate. The HRT represents the average time the molecules and substrates stay inside the reactor. Report the HRT numeric value in the blank cell.

**Daily Average Nitrogen Input Concentration (mg/L)**

Report the numeric concentration value in the blank cell. From the drop-down menu select the measurement units of the average daily nitrogen concentration of the water entering the system prior to treatment.

### **Daily Average Nitrogen Output Concentration (mg/L)**

Report the numeric concentration value in the blank cell. From the drop-down menu select the measurement units of the average daily nitrogen concentration of the water released after treatment.

### **Total Pounds of Nitrogen Removed from the Ranch by the Treatment (lbs.)**

Report the total pounds of nitrogen removed from the ranch by this treatment in the blank cell. Select the units as annual average pounds of nitrogen removed from the discharge (lbs) or as the annual average nitrogen removed from the discharge per ranch acre (lbs/ranch-acre). (Note: ranch-acres refers to the acres of the ranch, not to the acres of the area contributing to the discharge).

### ***Other Method or Technology ROTHER***

The monitoring and reporting of the nitrate concentrations (inflow and outflow), and the volume of water (input and output) are required to quantify the nitrogen removed by other methods or technologies, R<sub>OTHER</sub>.

Note: All the records must be maintained in the Farm Plan and submitted to the Central Coast Water Board upon request. At a minimum, the following records must be maintained: monitoring results, rationale, calculations, and formulas used to determine the amount of nitrogen removed by the method or technology.

### **Method or Technology Description**

In the open box, provide the name of the method or technology, and a brief explanation of the treatment process.

### **Method or Technology Location**

From the drop-down select the option that best describes the location of the method or technology. If none of the options apply, select "Other" and provide a brief explanation of the treatment location.

### **Method or Technology Area (acres)**

Report the size of the method or technology system, so the number of acres it occupies.

### **Area Contributing Discharge that is Treated (acres)**

Report the number of acres producing the discharged water treated by the method or technology.

### **Timing of the Method or Technology, months or seasons**

From the drop-down menu select the months and/or seasons when the method or technology is removing nitrogen from the discharged water. Timing refers to the months or seasons when there is water released from the contributing discharge area, or when the method or technology is operating (i.e., turned on).

### **Duration of Treatment (days per month the method or technology is operating)**

Select the number of days per month when the method or technology is operating (turned on) and removing nitrogen from the discharge water.

### **Input Flow and Input Flow Type**

Report the numeric input flow value in the blank cell. From the drop-down menu select the units used to measure and report the input of flow entering the method or technology. Select the units as: average daily gallons per day, average gallons per month, total daily gallons, or total monthly gallons.

### **Output Flow and Output Flow Type**

Report the numeric output flow value in the blank cell. From the drop-down menu select the units used to measure and report the output of flow released from the method or technology. Select the units as: average daily gallons per day, average gallons per month, total daily gallons, or total monthly gallons.

### **Daily Average Nitrogen Input Concentration (mg/L)**

Report the numeric concentration value in the blank cell. From the drop-down menu select the measurement units of the average daily nitrogen concentration of the water entering the method or technology prior to treatment.

### **Daily Average Nitrogen Output Concentration (mg/L)**

Report the numeric concentration value in the blank cell. From the drop-down menu select the measurement units of the average daily nitrogen concentration of the water released after treatment.

### **Total Pounds of Nitrogen Removed from the Ranch by the Method or Technology (lbs.)**

Report the total pounds of nitrogen removed from the ranch by the method or technology in the blank cell. Select the units as annual average pounds of nitrogen removed from the discharge (lbs) or as the annual average nitrogen removed from the discharge per ranch acre (lbs/ranch-acre). (Note: ranch-acres refers to the acres of the ranch, not to the acres of the area contributing to the discharge).

<h3><b>6. Biomass, Height C:N Ratio, and Percent Nitrogen Concentration of Pacheco Triticale and Merced Rye Cover Crops</b></h3>
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In "Section VII-C: Nitrogen Scavenged by Cover Crops" report the cover crop biomass, height, C:N ratio, and percent nitrogen concentration of the Pacheco Triticale or Merced Rye cover crops. Select from the drop-down menus the cover crop name, the C:N Ratio with the predicted percent nitrogen concentration, and the cover crop height (in inches) with the corresponding predicted biomass in pounds per crop acre (lbs./cr-ac).

The reporting of this information is not required.

## Attachment D- Crops Nitrogen Removal Conversion Coefficients

This table was last updated on April 3, 2024. The table contains a list of the mean nitrogen removal conversion coefficient values and their sources. For crops that do not have a known nitrogen removal conversion coefficient, growers can use the coefficient of a similar crop.

Specific Crop	Product	Ag Order, Table MRP-4	GPN: 20- 0250 <sup>14</sup> 2023 Update	GPN: 20- 0250 <sup>15</sup> 2024 Update
A choy	Fresh Market			0.00269
Alfalfa - Hay		0.03115		
Alfalfa - Silage		0.012		
Amaranth	Fresh Market			0.00613
Annual Artichoke	Fresh Market			0.00382
Apples		0.0005		
Apricots		0.0028		
Artichoke, Annual			0.00382	
Arugula	Bulk		0.0058	0.0058
Asparagus		0.00293		
Avocados		0.0022		
Barley - Grain		0.0168		
Barley - Straw		0.0077		
Beans, dry - Blackeye		0.0365		
Beans, dry - Garbanzo		0.0336		
Beans, dry - Lima		0.03615		
Beans, green (snap beans)		0.00289	0.00304	
Beans, Green (Snap)	Fresh Market			0.00328
Beet	Fresh Market		0.00305	0.00305
Beet (with tops)	Fresh Market			0.00305
Berries, black	Fresh Market			0.00223
Berries, raspberry	Fresh Market			0.0018
Blackberry	Fresh Market			0.00223
Blueberry	Fresh Market			0.00078
Bok Choy			0.00179	
Bok Choy, baby	Fresh Market			0.00209
Bok Choy, Full size	Fresh Market			0.00178

<sup>14</sup> The nitrogen removal conversion coefficients values were developed by [Grant Project No: 20-0250: Assessment of Nitrogen Content of the Harvested Portion of Specialty Crops to Estimate Crop Nitrogen Removal and Improve Nitrogen Management in Crops](#).

<sup>15</sup> The nitrogen removal conversion coefficients values were developed by [Grant Project No: 20-0250: Assessment of Nitrogen Content of the Harvested Portion of Specialty Crops to Estimate Crop Nitrogen Removal and Improve Nitrogen Management in Crops](#).

<b>Specific Crop</b>	<b>Product</b>	<b>Ag Order, Table MRP-4</b>	<b>GPN: 20- 0250<sup>14</sup> 2023 Update</b>	<b>GPN: 20- 0250<sup>15</sup> 2024 Update</b>
Broccoli	Fresh Market	0.0046	0.00466	0.00463
Broccolini	Fresh Market		0.0052	0.0052
Brussels Sprouts	Bulk/Fresh Market	0.00649	0.00629	0.00628
Cabbage Green		0.00218	0.00219	
Cabbage Green - Bulk Cored			0.00183	
Cabbage Green - Bulk Whole			0.00174	
Cabbage Red	Fresh Market	0.00224	0.00199	0.00201
Cabbage Red	Bulk Cored		0.00205	0.00205
Cabbage, Green	Bulk Whole			0.00173
Cabbage, Green	Bulk Cored			0.00183
Cabbage, Green	Fresh Market			0.00221
Carrots		0.0016		
Cauliflower	Fresh Market	0.00288	0.00279	0.00283
Celery	Processing		0.00099	0.001
Celery	Fresh Market	0.0012	0.00106	0.00106
Chayote tips	Fresh Market			0.00542
Cherries - Sweet		0.0022		
Chinese Celery	Fresh Market		0.00301	0.00301
Cilantro	Bunch		0.00426	0.00413
Cilantro	Clip	0.00605	0.00578	0.00595
Corn - Grain		0.012		
Corn - Silage		0.00378		
Corn - Sweet		0.00359		
Cucumbers	Fresh Market	0.00108	0.00111	0.00114
Edible Pod Pea			0.00472	
Endive	Fresh Market		0.00274	0.00274
Escarole	Fresh Market		0.00242	0.00242
Fennel	Fresh Market		0.00202	0.00202
Figs		0.00127		
Flower, Gerbera	Fresh Market			0.00325
Flower, Snapdragon	Fresh Market		0.00234	0.00239
Flower, Status	Fresh Market		0.00328	0.00327
Gai Choy	Fresh Market		0.00354	0.0036
Gailan	Fresh Market			0.00425
Garlic		0.0076		
Grapefruit		0.0015		
Grapes - Table		0.00113		

<b>Specific Crop</b>	<b>Product</b>	<b>Ag Order, Table MRP-4</b>	<b>GPN: 20- 0250<sup>14</sup> 2023 Update</b>	<b>GPN: 20- 0250<sup>15</sup> 2024 Update</b>
Grapes - Wine		0.00131		
Kale, Baby		0.00504	0.00705	
Kale, Baby Curled Leaf	Bulk			0.00631
Kale, Baby Lacinato	Bulk			0.00705
Kale, Multi Pick	Retail		0.00544	0.00548
Kale, Multi Pick	Fresh Market			0.00548
Leek	Fresh Market			0.00213
Leek	All		0.00226	0.00231
Leek	Bulk			0.00235
Lemons		0.00154		
Lettuce, Baby		0.00376		
Lettuce, Baby Green	Bulk		0.00342	0.00338
Lettuce, Baby Red	Bulk		0.00347	0.00356
Lettuce, Butter	Fresh Market		0.00199	0.00199
Lettuce, Green Leaf	Fresh Market		0.00207	0.00207
Lettuce, Iceberg	Bulk Cored		0.0012	0.0012
Lettuce, Iceberg	Mean			0.00125
Lettuce, Iceberg	Fresh Market			0.00127
Lettuce, Iceberg	Fresh Market All	0.00132	0.00128	0.00128
Lettuce, Iceberg	Fresh Market			0.00129
Lettuce, Red Leaf	Fresh Market		0.00224	0.00224
Lettuce, Romaine	Bulk Whole		0.0015	0.00149
Lettuce, Romaine	All bulk	0.00181	0.00184	0.0015
Lettuce, Romaine	Bulk Tops & Tails		0.00152	0.00152
Lettuce, Romaine	Fresh Market			0.00184
Lettuce, Romaine	Mean F. Market			0.00186
Lettuce, Romaine	Hearts		0.00188	0.00188
Malabar spinach	Fresh Market			0.0024
Melon, Cantaloupe		0.0024		
Melon, Watermelon		0.0007		
Mizuna	Bulk	0.00405	0.00546	0.00548
Napa Cabbage	Fresh Market		0.00183	0.00181
Oat Hay		0.01085		
Olives		0.00314		
Onion, Dry Red	Bulk		0.00126	0.00126
Onion, Dry Yellow	Bulk	0.00197	0.00164	0.00164
Oranges		0.0015		

<b>Specific Crop</b>	<b>Product</b>	<b>Ag Order, Table MRP-4</b>	<b>GPN: 20- 0250<sup>14</sup> 2023 Update</b>	<b>GPN: 20- 0250<sup>15</sup> 2024 Update</b>
Parsley	Fresh Market All			0.00438
Parsley, All	Mean F. Market			0.00438
Parsley, Curly	Fresh Market		0.0045	0.0044
Parsley, Italian	Fresh Market		0.00436	0.00436
Pea tips	Fresh Market			0.00727
Pea, Edible Pod	Fresh Market			0.00472
Peaches		0.00113		
Pears		0.00065		
Pepper, Red Bell	Fresh Market	0.00185	0.00194	0.00194
Pistachios		0.028		
Plums		0.00142		
Potatoes		0.0031		
Pumpkin		0.00368		
Radicchio	Bulk			0.00216
Radicchio	All		0.00233	0.00233
Radicchio	Fresh Market			0.00235
Radish, Red	Bulk		0.00167	0.00167
Radish, Red (no tops)	Bulk			0.00167
Radish, Red (with tops)	Fresh Market		0.00248	0.00248
Rapini	Fresh Market		0.00605	0.00605
Raspberry	Fresh Market			0.0018
Ryegrass, Perennial - Hay		0.02745		
Safflower		0.0284		
Shallot	Bulk		0.00251	0.00241
Spinach, Bunch		0.00371		
Spinach, Clip	Bulk	0.00427	0.00484	0.00484
Squash Crookneck	Fresh Market			0.00182
Squash Zucchini	Fresh Market			0.00191
Squash, Summer Crookneck	Fresh Market			0.00182
Squash, Summer Zucchini	Fresh Market		0.00192	0.00191
Squash, Winter		0.00184		
Strawberry		0.00133		
Tangerines		0.00127		
Tomatoes, Fresh Market		0.0013		
Tong Ho	Fresh Market		0.00344	0.00344
Walnuts, English		0.0159		

<b>Specific Crop</b>	<b>Product</b>	<b>Ag Order, Table MRP-4</b>	<b>GPN: 20- 0250<sup>14</sup> 2023 Update</b>	<b>GPN: 20- 0250<sup>15</sup> 2024 Update</b>
Water Spinach (Ong Choy)	Fresh Market			0.0035
Wheat, Common - Grain		0.0069		
Yam Leaves	Fresh Market		0.0051	0.0051
Yu choy	Fresh Market			0.00352