Nitrogen Credits: Soil, water & organic amendments

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Credits = Supply nitrogen to crop

NITROGEN MANAGEMENT
Nitrogen Sources
9. Soil – Available N in Root Zone (Annualized, lbs/ac)
10. N in Irrigation Water* (Annualized, lbs/ac)
11. Organic Amendments* (Manure/Compost/Other, lbs/ac estimate)

Available N in soil

Irrigation water

Organic Amendments

+

Fertilizer

Credits+ Fertilizer = Total N applied

Credit 1: Soil - Available N in Root Zone

- Testing is recommended in row crops but not in permanent crops
  - (for annual systems enter 0 or N/A)
- Includes N mineralized:
  - from recent fertilizer or irrigations
  - mineralized from crop residues and soil organic matter
- Sample must be collected after the rainy season and just before or after planting
- To calculate the amount of nitrogen in the soil multiply the ppm (mg/kg) by 3-4 depending on the soil texture.
- Many factors effect the amount of nitrogen in the soil that will be available to the crop. Less than 100% of this nitrogen present in the soil at testing will be available.

Example: Calculating Soil N in Root Zone

20 mg/kg in 0-12” and 15 mg/kg in 12-24”

Remember: mg/kg =ppm

20 mg/kg * 3.6 = 72 lbs/acre * 50% available = 36 lbs/acre

15 mg/kg * 3.6 = 54 lbs/acre * 25% available = 13.5 lbs/acre

Sum = 36 + 13.5 = 50 lbs/acre

Determining N availability in soil can be tricky. Best practice is to run periodic in-season tissue analyses to insure adequate nutrition.

Credit 2: N in Irrigation Water

Nitrate in your water is the same as fertilizer N

Converting N in irrigation water to fertilizer N:
Nitrate-N (in ppm or mg/L) x (feet H_2O transpired) x (2.7) = **pounds N taken up by crop**

Example:
Lab reports 10 mg/L Nitrate-N and the crop's ET is 3 feet

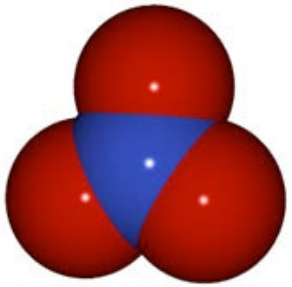
10 mg/L x 3 acre feet x 2.7 = **81 pounds of nitrogen**
(Some of this nitrogen may be "applied" when it can not be effectively utilized by the crop, thus an efficiency factor of 0.7-0.9 may be used)

Remember: mg/L=ppm

Converting between nitrate and nitrate-N

Measuring **Nitrate**:

45 ppm NO_3 (measure 1 **N** + 3 **O**)



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Measuring **Nitrate-N**:

10 ppm NO_3-N/ (measure 1 **N** only)

Preferred Measurement

To convert nitrate to nitrate-nitrogen:
Nitrate Nitrogen = Nitrate x 0.226

Potential savings when accounting for N in irrigation water

NO3-N ppm or mg/L	Pounds nitrogen acre-feet	Tomato ET is approximately 2 feet			Walnut ET is approximately 3 feet			Almond ET is approximately 3.5 feet		
		(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)
10	27	54	40.5	**$ 27**	81	60.75	**$ 41**	94.5	70.875	**$ 48**
15	40.5	81	60.75	**$ 41**	121.5	91.125	**$ 61**	141.75	106.313	**$ 71**
20	54	108	81	**$ 54**	162	121.5	**$ 82**	189	141.75	**$ 95**

(a) Pounds of nitrogen taken up by the crop.

(b) Due to nitrogen uptake timing, not all nitrogen in the water will be "useful" to the crop.
This example assumes that 75% of the applied N in irrigation water is effective.

(c) Potential saving per acre.

Credit 3: N Organic Amendments

Organic matter applied to the soil in-season, such as manure, compost, or cover crop residue will release N over time (mineralization)

- N released is dependent on soil temperature, moisture, C:N ratio of the amendment (lower C:N ratio will release more quickly), incorporation
- Calculations depend on whether is a one-time application or an annual application

Organic Nitrogen Mineralized in the Soil

Single application of organic matter

- N credits = dry lbs. OM x % N x % decomposition 1st year
- Laboratory analysis is needed to determine %N in the material

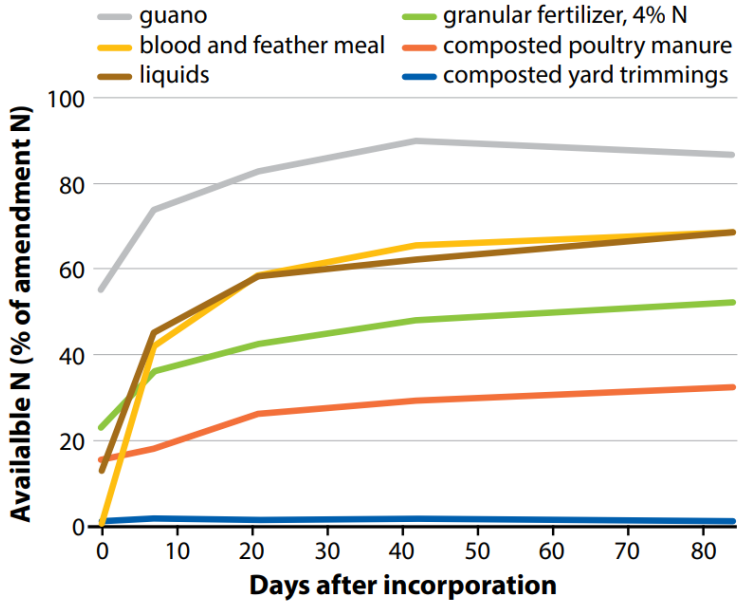

Figure 8. Predicted nitrogen release curves from different amendment types under warm, moist conditions (Lazicki et al. 2020).

First Year Decomposition Rates	
Cured Compost	5-10%
Dried Manure	20-30%
Cover Crop	10-35%
Lagoon Water	40-50%

Organic Nitrogen Mineralized in the Soil

- Consistent application OM or a growing of cover crop yearly
  - N Contribution = Dry lbs. OM x % N x 70%

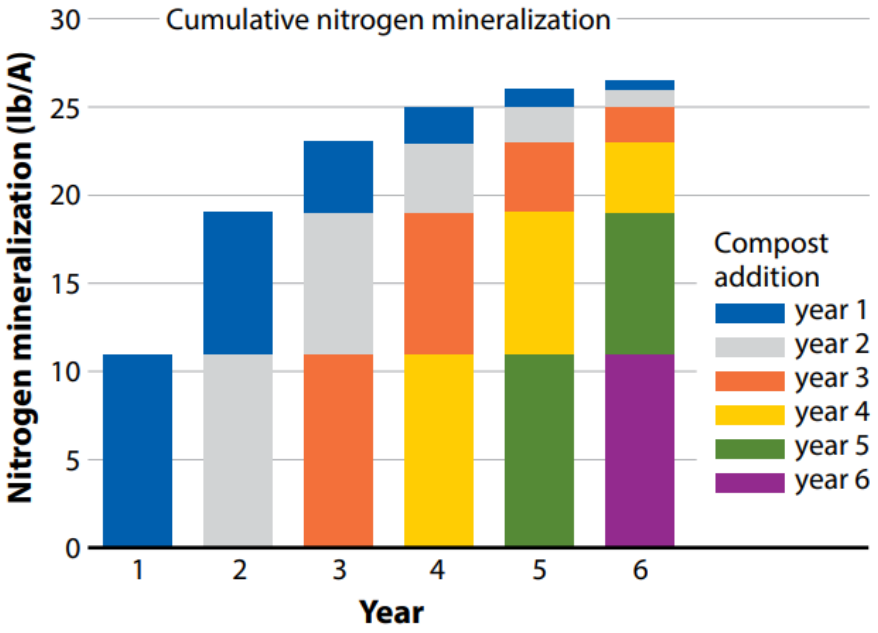

Figure 2. A model of available mineral nitrogen increasing and approaching a steady state after about 4 years, when receiving continual application of the same amount of organic nitrogen (43 lb N/acre) from a cover crop (Crohn 2004).

Whole Orchard Recycling

Proper nitrogen applications are important the first leaf after whole orchard recycling:

- 1/4 oz at planting
- 5 oz actual N per tree (45 lbs N/acre) during first leaf and apply early
- Apply N in small frequent doses, applying no more than one ounce per application or you can burn trees.
- Only a difference the first year, 2nd and 3rd leaf should receive standard nitrogen rate.

Resources on organic amendment N mineralization

Estimating Nitrogen Availability in Organic Annual Production
https://anrcatalog.ucanr.edu/Details.aspx?itemNo=8712

Article:	https://ucanr.edu/sites/SFA/files/322312.pdf
Worksheet:	https://ucanr.edu/sites/SFA/files/322313.pdf
Calculator:	http://geisseler.ucdavis.edu/Amendment_Calculator.html

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