University of California
Agriculture and Natural Resources

NITROGEN BUDGET WORKSHEET FOR ORGANIC CROP PRODUCTION

Companion worksheet to "Building a Nitrogen Budget for Organic Crop Production"

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1. Crop N Uptake

Estimate the crop N demand

A. _____ lbs N/A **A. Total N value (or range) provided by a reliable source (Fig. 2)**

B. _____ Tons/A **B. Yield associated with the above N value (Fig. 2)**

C. _____ Tons/A **C. Your predicted yield**

D. [ ] lbs N/A **D. Total N demand based on your predicted yield**

$$\underset{\text{C.}}{\_\_\_\_\_} \times \frac{\_\_\_\_\_}{\text{total N uptake/T (Fig. 2)}} = \underset{\text{D.}}{\_\_\_\_\_}$$

Timing for N demand

- Consider soil moisture, soil temperature and timing of crop demand when deciding which materials will be added and when (Fig. 3).
- Become familiar with the crop uptake curve in order to understand the timing of N demand

2. Available N from Soil Organic Matter

A common rule of thumb is that during a summer growing season, about 2% of the total soil N becomes available (often ~50-100 lbs N/acre).

E. [ ] lbs/A **E. Estimated N from SOM** Reference figure 4. A typical release rate will likely be from 50-100 lbs N/acre/season in the top 1' of soil.

Estimate your SOM release based on the history of cover cropping, compost amendments and N management. For soils with a long history of building soil organic matter, estimate a higher N release and for those with a shorter history of soil building, estimate N release on the lower end. In addition, warm season production should have higher numbers than cool season production.

3. Available N from Cover Crops and Crop Residues

3.1 N fixation from leguminous cover crops

The amount of N legumes contribute depends on several factors including the species, how thick the stand is, and at what stage it is terminated.

F. _____ lbs/A **F. Estimate legume biomass dry weight**
Use your own information of biomass dry weight, or reference UC SAREP cover crop database. When referencing another source providing a range, consider your own scenario regarding crop density and crop height/maturity to select a number in the range. For example, if a crop is terminated earlier, at 50% of maturity, select a number on the lower end of the range. More dense and longer production times will likely fall on the higher end of the range.

G. _____ % **G. Percent N in cover crop**
Use your own information from a sample sent to a lab, or reference UC SAREP cover crop database.

H. _____ lb N/A **H. Total N from cover crop (Fig. 5)**

_____ x _____ = _____
F. G. H.

I. [ ] lbs N/A **I. Total N from cover crop available this season**
It's estimated that about 4-30% of cover crop N is directly used by the next crop. Use a lower % N when material is left on the surface and not incorporated or when the soil is drier. Use an intermediate % for legume-cereal mixes. Use a higher % when the cover crop is terminated at optimum growth.

_____ x _____ = _____
H. 4-30% I.

3.2 Available N from Previous Crop

This is only relevant for crops planted within ±4 weeks after previous crop termination and incorporation.

J. _____ Tons/A **J. Previous crop yield**

K. [ ] lbs N/A **K. Expected crop residue**
The amount of N expected to the be in the residues can be adjusted for the actual expected yield by multiplying the actual yield by the value in column 2, lbs N/ton yield (Fig. 6).

_____ x _____ = _____
J. lb N/ton K.

4. Available N from Organic Amendments

4.1 Compost
Most compost companies will provide an analysis of the compost material which will include the total % N and C:N ratio.

L. _____ C:N ratio **L. Identify the C:N ratio of the compost**

M. _____ % N **M. Total % N of compost**

N. _____ lbs/A **N. Application rate (1 T = 2000 lbs)**

O. _____ lbs N/A **O. Estimated total N from compost added to field**

_____ x _____ = _____
M. N. O.

P. [ ] lbs N/A **P. Estimated available N from compost**

Composts are estimated to release 0-30% of total N in the first year (Fig. 7). Plant based composts can initially tie up N whereas manure-based composts have more N available. Take a look at figure 8 to see the correlation between C:N ratio and available nitrogen.

_____ x _____ = _____
O. 0-30% P.

4.2 Granular fertilizers

Q. _____ % N **Q. Total N in product (ex. 5-8-0 is 5% N)**

R. _____ lbs/A **R. Application rate**

S. _____ lbs/A **S. Total N applied**

_____ x _____ = _____
Q. R. S.

T. [ ] lbs/A **T. Total available N**

Granular fertilizers with a low C:N (ex. 6:1 or lower) are estimated to release 40-90% of total N in a season (Fig. 7).

_____ x _____ = _____
S. 40-90% T.

4.3 Liquid fertilizers

U. _____ lbs/Gal **U. Fertilizer weight (water is 8 lbs/gal; many fertilizers are slightly more)**

V. _____ lbs N/lb **V. Percent N in product (3-0-0 = 3% = 0.03 lbs N/lb)**

W. _____ gal/A **W. Application rate**

X. [ ] lbs N/A **X. Total N contribution from liquid**

_____ x _____ x _____ = _____
U. V. W. X.

Liquid fertilizers are estimated to release all available N in the season, so an expected 100% availability (Fig. 7).

5. Interpreting Soil and Water Tests

5.1 Interpreting soil tests

The amount of N in lbs/acre can be calculated by multiplying this number by a factor of 3-4 for every foot of soil, depending on the soil density, with low values for very high organic matter and clay soils and higher values for more compacted or very sandy soils. A commonly used factor for agricultural soils is 3.6

Y. [ ] lbs N/A **Y. Currently available N at time of soil test**

A. If soil test is in NO_3, convert to NO_3-N: _____ppm / 4.42 = _____ppm
NO_3 NO_3-N

B. If soil test is in ppm, convert: _____ppm x ____3.6_____ = _____
NO_3-N adjust as desired Y.

5.2 Sampling water for testing

To convert NO_3-N concentration in the water to lbs N/acre, NO_3-N concentration reported in ppm is multiplied by 0.227 and by the number of acre-inches of water applied. For example, for 1 acre-inch of water containing 10 ppm nitrate-N: (10 ppm) x (1 acre-inch) x (0.227) = 2.27 lbs N are applied per acre.

Z. [ ] lbs/A **Z. Contribution from irrigation water based on water test result**

A. Convert ppm to lbs N/A _____ppm x 0.227 = _____lbs N/A
NO_3-N NO_3-N

B. Estimate total water use _____ acre-inches x _____ = _____
Water use lbs N/A Z.

THE BUDGET

DEMAND	**lbs N/ A**
D. Crop Demand	

BASELINE	**lbs N/ A**
E. SOM contributions	
I. Cover Crop	
K. Previous Crop	
Y. Residual soil N	
Z. Irrigation Water	

AMMENDMENT N CONTRIBUTIONS	**lbs N/ A**
P. Compost	
T. Granular fertilizer	
X. Liquid fertilizer	