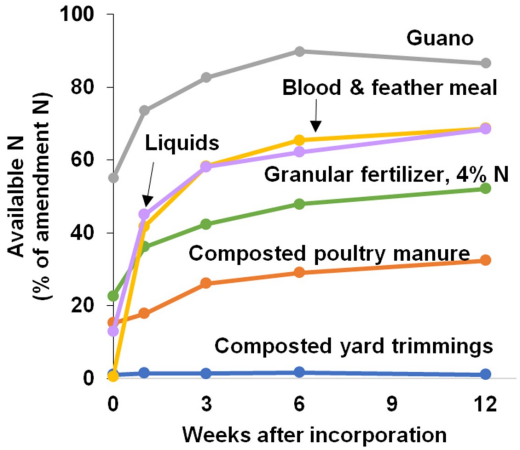
Amendment N release

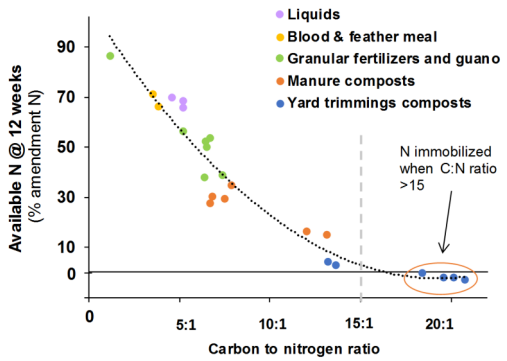


Incubations at optimum moisture and temperature show the amount of N which may become available during the growing season. Amendment types followed five patterns:

- Yard trimmings composts released little to no N. They contribute to long-term fertility but not the current crop demand.
- Poultry manure composts had 10-20% of their N available at application, and then slowly released over time. After 12 weeks, about 30% of their N was available.
- Granular fertilizers had 15-25% of their N available at the time of addition, and mineralized quickly for the first few weeks.
- Liquids and guano mineralized more quickly, and 65-100% N was potentially available.
- Blood and feather meal contained no available N initially, but mineralized very quickly when mixed with soil.

More details from this study can be found at https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=26596

Amendment carbon to nitrogen ratio predicts N availability



Potential N release had a strong relationship to C:N ratio. The graph above summarizes the N release of all the amendments tested.

Material	Typical C:N ratio	N available after 12 weeks	Releases in:
Municipal yard trimmings composts	13 - 20	-3% - 4%	Years
Poultry manure composts	6 - 8	30 - 35%	Weeks-months
Granular fertilizers	5 - 7	38 - 60%	Days-weeks
Blood & feather meal	3 - 4	65 - 70%	Days
Liquid fertilizers	4 - 6	65 - 70%	Days
Guano	3 - 4	80-90%	Days

Margaret Lloyd is the University of California Cooperative Extension Small Farms Advisor for the Capitol Corridor region. Learn more at http://ccsmallfarms.ucanr.edu/ , or check out her blog at https://ucanr.edu/blogs/capitolcorridorsmallorganicfarm/

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Nitrogen dynamics in field-grown organic heirloom tomatoes

Margaret Lloyd, Patricia Lazicki, Daniel Geisseler

Results of a two year field and lab study whose goal was to quantify the patterns of nitrogen availability and uptake for organically managed Brandywine tomatoes.

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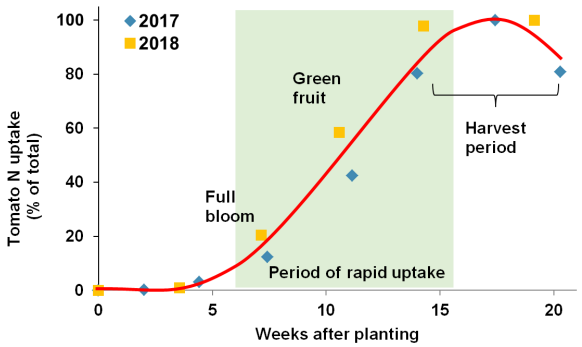
Matching soil N availability with crop demand

Nitrogen uptake rate

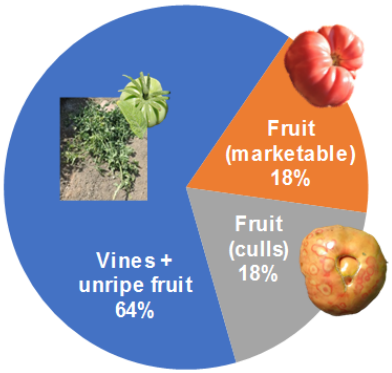
Brandywine tomatoes took up little N before flowering. On average 73% of the crop's total N was taken up between full bloom and the first harvest. Peak N uptake rates averaged 3-5 lbs N/acre/day.

The N uptake rate slowed during the harvest period.



Nitrogen partitioning at harvest

In our study, relatively little of the N taken up ended up in the marketable fruit. See next page for calculating N uptake and removal.



Predicting crop uptake

Given a marketable yield of 15 tons per acre, a cull rate of 45%, and N uptake of 6.5 lbs/ton of fruit produced

Step 1: Use marketable yield to calculate total yield

Total yield=(marketable yield)/(1-cull rate)

Total yield=(15 tons marketable fruit)/(1-0.45)=27.3 tons fruit

Step 2: Use an estimate of plant N uptake for each ton of yield to calculate plant uptake

*N uptake=Total yield*uptake per ton*

N uptake =(27.3 tons fruit)(6.5 lbs N uptake per ton fruit)*=**177 tons N/acre taken up by the crop**

Predicting N removed from the field

Given a marketable yield of 15 tons per acre, a cull rate of 45%, and 2.4 lbs N in each ton of fruit

Step 1: Calculate the N removed with the marketable yield

N removed=(marketable yield)(N per ton fruit)*

N removed=(15 tons marketable fruit/acre)(2.4 lbs N/ton)*

=36 lbs N/acre

Next, account for culls which may be removed from the field

Step 2: Calculate the weight of the culls leaving the field (estimate about 1/3 of the total culls)

*Culls leaving the field=((Marketable yield)/(1-cull rate))*cull rate*proportion culls leaving the field*

*Culls leaving the field=((15 tons per acre)/(1-0.45)) *0.45*0.33=4.1 tons culls/acre*

Step 3: Calculate the total N leaving the field

N removed=N in marketable fruit+N in culls leaving the field

*N removed=36 lbs N/ acre+(4.1 tons culls/acre*2.4 lbs N/ton)*

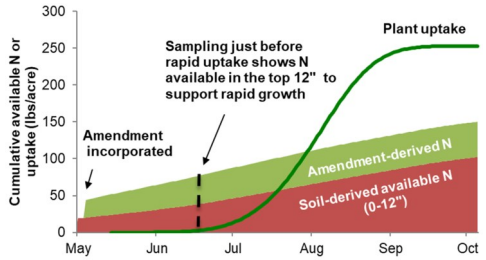
=45.8 lbs N/acre removed from the field

Average and range of yield and N uptake parameters from Yolo county field sites in 2017 and 2018

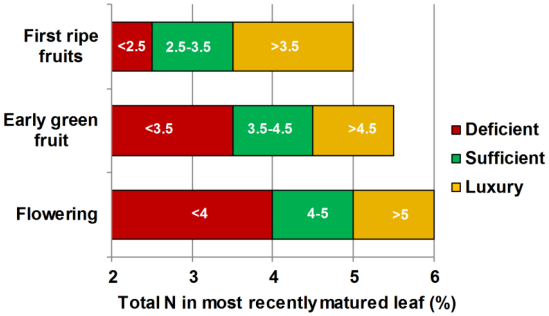
Parameter	Average	Minimum	Maximum
N uptake (lbs/acre)	202	58	391
Yields (tons/acre)	31	13	48
N in fruit (lbs/ton)	2.4	1.6	3.9
Cull rate (%)	51	23	78
Plant N uptake (lbs/ton fruit)	6.5	3.4	10.2

Monitoring soil and plant N

The most meaningful time to sample the soil for available N is a couple weeks before the period of rapid uptake. Samples taken at this stage will include the N from the soil organic matter, cover crops and amendments which the quickly growing crop will be able to use.



Nitrogen concentration in the most recently matured leaf wasn't a very sensitive indicator of N status. In this study, it had the best relationship to yield at green fruit stage. Broad ranges are shown below.



Observations were in line with values listed for fresh market tomatoes in the Western Fertilizer Handbook

Find out more about taking and interpreting soil nitrate tests online at: https://apps1.cdfa.ca.gov/FertilizerResearch/docs/Soil_Sampling_Nitrate.pdf and http://calag.ucanr.edu/archive/?article=ca.2016a0027