

Hop Nitrogen Fertility Trial – 2017
Revised (5/18/17)

Goals:

1. To evaluate effect of Nitrogen rate and timing on growth and cone yield of hop grown in Wisconsin.
2. Use nutrient composition data to inform future updates of hop nutrient application guidelines in UWEX publication A2809.

Experimental design: RCB with three replications per treatment.

Locations: (3 locations)

1. Tomah – Bob Conants
2. Rosholt – Peggy & Randy Urness (
3. Potosi – Dave Fritz (Fayette Silt loam)

Varieties to be sampled:

- 1 Centenial (Tomah & Rosholt)
2. Nuggett (Tomah & Rosholt)
3. Cascade (Tomah & Potosi)

Nitrogen Treatments:

Treatments will be applied to 5 plants in a randomized complete block design (see example plot layout).

1. Control (no N applied) – (white flags)
2. ½ N rate applied in early spring – (red flags)
3. Full N rate applied in early spring – (green flags)
4. Full N rate split-applied: half in early spring, half when bines reach top of wire. (pink flags)

Fertilizer sources:

Potosi

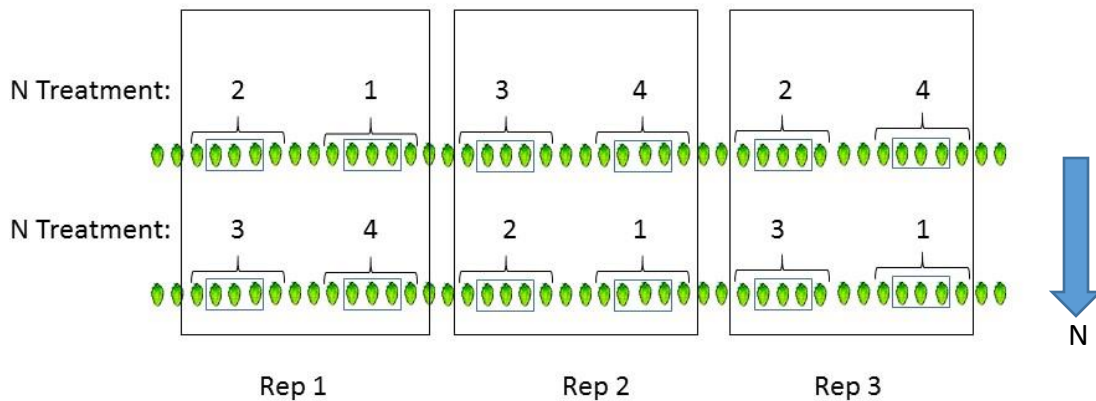
1. Ammonium sulfate (AMS) used as N source

100 lb N/acre rate is equivalent to 0.0109 lb AMS per square ft

200 lb N/acre rate is equivalent to 0.0218 lb AMS per square ft

2. Sulfate-S applied at 0.005 lb per square ft to control plots, ½ N rate plots received 0.0025 lbs per square ft. Cal-Sul (21% Ca, 17% S) used as the sulfate-S source at Potosi.

Example plot layout for Hop N rate study (repeated for each variety)



* Could also be replicated within row if three rows of the same variety are available.

Samples to collect: 3 replications per treatment per variety at each location = 48 samples

Petiole sampling

1. Collect when bines are ½-3/4 way up trellis.
2. Collect petioles from 30 mature leaves (10 per plant from middle three plants), 5-6 feet above ground.
3. Place in paper bag, send to Marshfield for analysis
4. Possibly do on-site petiole sap testing for comparison w/ lab analysis?

Plant sample collection:

1. Collect samples just prior to harvest.
2. Note average in row and between row spacing for each variety as well as how many strings per plant in each hop yard.
3. Select middle three plants of treatment for one sample (replication).
 - a. Cut all bines 2" above the soil surface.
 - b. Remove bines from strings.
 - i. Weigh bines.
 - c. Remove cones from bines. Mechanical cone removal will be used.
 - i. Weigh cones.
 - ii. Thoroughly mix cones and take a representative subsample.
 - iii. Weigh the subsample of cones.
 - iv. Dry subsample of cones.
 - v. Weigh dried subsample of cones.
 - d. Chop bines & leaves/petioles.
 - i. Thoroughly mix chopped bines and take a representative subsample.
 - ii. Weigh the subsample of bines.

- iii. Dry subsample of bines.
- iv. Weigh dried subsample of bines.

Soil sample collection:

1. Collect ten 6" soil cores from within 12" of each plant (5 cores on each side of row). Composite cores from each N rate plot to make one sample per plot.
2. This sampling will result in 12 samples per variety and 48 samples total.

Sample labeling scheme:

1. Petiole samples: Location-Variety-Petioles-N treatment-Rep
 - a. Location: Rosholt=R, Tomah=T, etc.
 - b. Variety: Cascade=Nug, Sterling=Str, etc.
 - c. N-treatment: 1=control, 2= ½ N rate applied in early spring, 3=Full N rate applied in early spring, 4=Full N rate split-applied
 - d. Replication: 1, 2, or 3
 - e. Example: R-Str-Pet-1-1 is the 1st rep of Sterling petioles from the control N treatment collected in Rosholt.
2. Plant samples:
 - a. Bine/leaves/petiole subsample: Location – Variety – Bines –N treatment-Rep
 - i. Variety: Nugget=nug, Sterling=Str, etc.
 - ii. N-treatment: 1=control, 2= ½ N rate applied in early spring, 3=Full N rate applied in early spring, 4=Full N rate split-applied
 - iii. Replication: 1, 2, or 3
 - iv. Example: R-Nug-bines-2-3 is the 3rd rep of Nugget bines from the ½ N rate treatment collected in Rosholt.
 - b. Cones subsample: Location – Variety – Cones-N treatment– Rep
 - i. Location: Rosholt=R, Tomah=T, etc.
 - ii. Variety: Nugget=nug, Sterling=Str, etc.
 - iii. N-treatment: 1=control, 2= ½ N rate applied in early spring, 3=Full N rate applied in early spring, 4=Full N rate split-applied
 - iv. Replication: 1, 2, or 3
 - v. Example: T-Nug-cones-3-2 is the 2nd rep of Nugget cones from the Full N rate treatment collected in Tomah.
3. Soil samples
 - a. Location – Variety - N treatment– Rep
 - b. Location: Rosholt=R, Tomah=T, etc.
 - c. Variety: Cascade=Nug, Sterling=Str, etc.
 - d. N-treatment: 1=control, 2= ½ N rate applied in early spring, 3=Full N rate applied in early spring, 4=Full N rate split-applied
 - e. Replication: 1, 2, or 3
 - f. Example: T-Str-4-2 is the 2st rep of soil samples from the split-applied Full N rate treatment collected in Tomah.

Data Collection Sheet

Please note units (g, kg, lb, inches, feet) for each item

Location:						
	Variety	In row spacing	Between row spacing	Strings/plant		
	Units →					

Variety:

N treatment	Rep	Whole plant fresh weight	Cone fresh weight	Cone subsample fresh weight	Cone subsample dry weight	Bine/leaves subsample fresh weight	Bine/leaves subsample dry weight
		Units →					
1	1						
1	2						
1	3						
2	1						
2	2						
2	3						
3	1						
3	2						
3	3						
4	1						
4	2						
4	3						

Variety:

N treatment	Rep	Whole plant fresh weight	Cone fresh weight	Cone subsample fresh weight	Cone subsample dry weight	Bine/leaves subsample fresh weight	Bine/leaves subsample dry weight
Units →							
1	1						
1	2						
1	3						
2	1						
2	2						
2	3						
3	1						
3	2						
3	3						
4	1						
4	2						
4	3						

