

## Cost Effective Ways to Maximize Fertility Options

New England Vegetable & Fruit Conference - Tuesday December 15<sup>th</sup>

Derek Christianson - Brix Bounty Farm, Dartmouth, MA – [www.brixbounty.com](http://www.brixbounty.com)

*About Brix Bounty Farm: 7 acres of mixed veg in coastal, SE Massachusetts (zone 7a). All crops direct marketed through roadside stand, summer and winter CSA, and one farmers market. Secure leased land, we invest heavily in fertility, we are not certified organic – we don't spray any fungicides, herbicides, or pesticides on the farm (i.e. not even Pyganic or Entrust). Limited investments in irrigation, cold storage, and/or mechanized cultivation. Labor for 2016 growing season – 3 full time farmers (including myself), 1 seasonal, and 3 workshares. ~\$140K sales*

Are the minerals in the soil? Do we need importation or increased biological activity or both?

### Nutrient Budgets & Full Spectrum Fertility

Takeaways: On Small Acreage Vegetable Farms – Labor Costs are traditionally the greatest cost of production; while systems and mechanization can reduce labor costs at various stages of production, it is critical to examine factors impacting yield. Improving yield (quality and quantity) is essential to increasing profitability. At Brix Bounty Farm we believe that once our production systems are in place, and our cultivation practices are effective, the most critical factor to improving yield (including reducing crop loss due to pests and disease) is fertility.

### Fresh Market Onions for Enterprise Analysis – 2016 Production Plans ~1/10<sup>th</sup> of an Acre

Fresh Onions are marketed before curing – Ailsa Craig, Cabernet, & Sierra Blanca – filling niche between mini-onions and early fall onions – marketed between July 15<sup>th</sup> and end of August.

Sold by the quart at the stand or market and distributed by the pound through our CSA.

2015 prices \$5 per quart (~2.5 pounds) at stand = \$2/#, \$4 at Market (\$1.60/#), and valued at \$1.50 per # for our CSA... average marketing price of \$1.75 per pound.

4 beds (~1,000 sq. ft. each) – 3 rows per bed, 12'' in row – cluster planted 4 seeds per cell 98's or 128' (final density of ~9 onions per bed foot). For some storage onions and in high fertility fields we've moved to 8'' spacing in row (final density increased to ~13.5 onions per bed foot). This marginally increases transplant production and transplant labor cost, but may provide a hedge against strong root maggot pressure and in good years may increase yield per bed foot...

At Brix our base yield projection for fresh onions is 4# per bed foot or 4,000# for 1/10<sup>th</sup> acre, good yields ~6# per bed foot, top historical yields achieved >8# per bed foot (fresh weight).

Started in the GH in late Feb/early March, TP out in late April/early May. Drenched in GH as needed (using Hozon injector beginning in 2012)...

Row Cover to increase early season N release, establish strong root systems, and protect from onion maggot. We aren't mechanically cultivating so the use of row cover is quite practical for onions production. While many growers are using plastic and seeing good results, we continue to minimize the use of plasticulture at Brix Bounty Farm. Typically row cover remains on through 1 or 2 cultivations into mid-late May.... all about early season root growth.

**Labor Costs: costs below for 4 x 1,000 sq. ft. beds or 4,000 sq. ft. - to calculate per acre x10  
Estimated total labor ~55-60 hours for this block or 550-600 hours/per acre equivalent...**

Field Prep & Amendment Applications > 2 labor hours (plus 1 hour if "capital" rock picking)

\*Extra-Credit" Pre-Plant Fertility ~ 1 labor hour total for 4,000 sq ft. (or ~10 hours per acre)

- Boron Field Spray – simplest way to ensure uniform coverage of Boron for OG growers
- Cobalt, Moly, Selenium Spray – setting the table for soil biology and human health
- "Bio-Builder" Field Spray – liquid fish, sugar (molasses), inoculants, etc.
- Barrel Compost Field Spray – biodynamic inoculant

At Brix Bounty these 4 additional activities require ~60-80 hours of labor in March – April and are traditionally used as a method for introducing the crew to the field spaces on the farm...

Additionally, hand spreading extra N (i.e. alfalfa meal or blood meal/Chilean nitrate in a cool spring) will take just a few minutes per bed or less than 2 hours per acre; we have chosen to hand spread b/c this allows us to pinpoint additional fertility inputs where the return is the greatest – and we don't do this on all of our acreage.

GH Seeding ~4 hours for 30 flats

GH Care ~ 6 hours (to water flats, move, etc for the ~8 weeks they are in the GH)

TP ~4 hours (1 hour per bed which requires ~7 flats)

Cultivation ~16 hours (including 4-5 passes with the hoe and 3 handweeding sessions)

For example – TP 4.25.16, Cult 5.09.16, Cult 5.16.16, Cult + HW 5.23.16, Cult 6.06.16, Cult WT And HW 6.20.16, Final HW for August harvested crop only 7.04.16 – stale bedding an option in a warm spring...

\*Sidedressing & Foliar Spraying < 2 hours Foliar Spraying - multi-purpose crop monitoring tool!

Harvesting and "processing" ~20 hours = ~200 pounds per hour to harvest, trim, & spray > box...

### **Keys to Profitability**

Soil fertility and cultivation of course...

Early season growth (strong transplants, sometimes use row cover to push early growth).

Managing pests & diseases – Onions Root Maggot, Thrips, Alternaria, etc...

**Full Spectrum Fertility for Fresh Onion Production – Brix Bounty Farm – 2016 ...** start with field history and soil tests to ascertain nutrient deficiencies and include projected yields in consideration as you develop nutrient budgets. Nitrogen Budget – See Worksheet on next page.

Phosphorous - early season P availability is critical for vigorous early season growth. We typically apply a starter P for onions regardless of soil test P levels – banding is preferred method for starter applications, some OG approved options include

- 5-10 gal. liquid fish (stabilized w/ phosphoric acid –may increase onion maggot pressure)
- 200# bone char (0-16-0) good option if your pH is below 7- will also supply Ca
- 200-400# soft rock phosphate (0-3-0) – will also supply Ca

Potassium – application rates depend on soil test. If soil K is really low we like to balance a heavy K application with Mg & Ca – for example on a low K soil, recommended application rates of K<sub>2</sub>O are 150# per acre (note we don't recommend wood ash a K source – too caustic):

- 200# of Potassium Sulfate will supply ~ 100# of Potash, 200# of sul-po-mag will supply 44# of potash while also adding magnesium.

Calcium – calcium is essential for strong cell wall development, cellular nutrition, etc. We don't skimp on calcium anywhere on the farm; key is to increase soil holding capacity and increase Ca levels while maintaining a balance of other minerals. Availability of Ca is key – roots are the best indicator of Ca levels – we like strong pearly white roots... and at Brix we are using Solucal (enhanced hi-cal lime) annually on our fields. Additional sources of Ca as well, gypsum, etc.

Magnesium – in our situation we are cropping soils which have a long history of dolomitic lime applications and as a result have excessive Magnesium levels. Even so we do typically apply just a bit of soluble Mg to ensure availability, see sul-po-mag application above. If your potassium and calcium levels are above optimum than Epsom salts (magnesium sulfate - 50#/ac) is one option for Mg – though not suitable to address large deficiencies because of cost.

Sulfur – sulfur impacts pungency in alliums, if marketing mild types it is best to reduce sulfur application rates. At Brix Bounty we grow full-strength onions – by supplying adequate sulfur to our crops. The potential benefits may also include better protein synthesis in the crop reducing free amino acids (which may attract insects). Broadcast a sulfate form of another major nutrient (e.g. calcium, magnesium, potassium). For onions we like gypsum (calcium sulfate) at 200#-400# per acre or Solucal-S (enhanced gypsum) at 100-200# per acre. Elemental Sulfur is 90% S and a good choice to address large S deficiencies, but its availability is dependent on microbial activity and soil temperature – not a good choice for early season S. Limit 50#/ac. Tiger-90.

Boron, Copper, Iron, Manganese, Zinc... Cobalt, Molybdenum, Selenium, Silicon – as needed... dry forms when appropriate to build up soil levels, pH may impact availability, important to maintain balance and mitigate short-term deficiencies. Foliar sprays may be more cost effective.

## Nitrogen Recommendations

### From 2014-15 NE Veg Guide

Crop	Nitrogen
	<i>Lbs/Ac</i>
Basil	115-130
Beans, Snap	50
Beets/Chard	105-130
Cabbage	160
Carrots/Parsnips	110-150
Celery	180
Corn, Sweet	100-130
Cucumbers, Melons	110-130
Eggplant	80-100
Lettuce	80-125
Mesclun	50-80
Onions	130-150
Pea	50-75
Peppers	140
Potatoes	120-180
Pumpkins & Squash	110-140
Radish	50
Rutabaga & Turnip	50
Spinach	90-110
Sweet Potato	50-75
Tomatoes	140-160

## Nitrogen Nutrient Budget Worksheet

(December 2015 v.2)



FRESH VEGETABLES & COMMUNITY EDUCATION

## What is the Amount of Nitrogen Needed for Your Crop?

Type of Nitrogen? Nitrate / Ammonium

Anticipated Yields? - Heavy

Length & Timing of Season?

**Crop:** Fresh Onions (late July > Aug)

**Seeding/TP Date:** late April or early May

**Growing Days:** ~84-105 days

**Harvest Date:** late July - Aug

**Cultural Notes:** row cover at planting

**Total Nitrogen Needed = 150 # N**

Organic Matter Credits = minus 50#N

(~15# per % OM) we have ~5% OM at Brix

~10# per % OM for non-irrigated conditions

Cover Crop Credits = minus 0#

Crop Residue/Carry Over = minus 0#

Soil Biology Credits = minus 0#

**Nitrogen Needed to Import = 100#**

Pre-Plant – 1,200# Kreher's Sunrise Poultry

(5-4-3) x 1200# = 60#

Alfalfa Meal "Spike" 760# at 2.6%N = 20#

Sidedress #1 760# alfalfa meal = 20#

Sidedress #2 = *avoid late N for onions*

Fertigation (if) = *not in '16 for onions*