Garlic only needs 50 lb/A of nitrogen to be available in the spring when the crop begins to grow to significantly increase yields.

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VEGEdge

YOUR TRUSTED SOURCE FOR RESEARCH-BASED KNOWLEDGE

Volume 15 | Issue 04 | April 3, 2019

Photo: J. Reid

Cornell Cooperative Extension
Cornell Vegetable Program

Effect of Spring-Applied Nitrogen Fertilizer on Garlic Yield, 2017-2018 CCE Research Results Indicate 50 lb/A is Enough

Christy Hoepting, CCE Cornell Vegetable Program; Sandra Menasha, CCE Suffolk County; Crystal Stewart, CCE ENYCHP

50 lb/A is all that was needed!

In 100% of eight side-by-side comparisons, there were no differences in yield among 50 lb/A, 100 lb/A and 150 lb/A of spring-applied inorganic nitrogen in German hard neck garlic (Fig. 1 and 2). Trials encompassed two years of trials (2017, 2018), three trial sites, three planting configurations, three types of inorganic nitrogen fertilizer, three fertilizer application techniques, and different seed sources and sizes (Table 1). In the second year of study, 50 lb/A of spring-applied nitrogen significantly increased yield by 20% compared to 0 lb/A applied nitrogen. **These results suggest that garlic only needs 50 lb/A of nitrogen to be available in the spring when the crop begins to grow.**

This seems low! University recommendations state that garlic needs between 150 and 175 lb/A nitrogen. So, why did we NEVER see a yield response with greater than 50 lb/A of applied nitrogen? In Western NY, the garlic trials followed sod (Batavia 2017) and oat cover crop (Albion 2018). Additionally, liquid dairy manure was applied in the fall at the Albion site. The increased organic matter made available by turning in sod/cover crop and the manure application in western NY provided an unmeasured credit, which should be factored in. The Long Island site, however, only has about 2% organic matter, so should only receive a maximum nitrogen credit of 15 lbs/percent organic matter, or 30 lbs. If we use trial planting configuration to calculate yield per acre, actual laboratory results for % N in bulb tissue at harvest (Albion 2018 data), and assume that the bulbs are 36% dry matter, we can crudely estimate the amount of nitrogen taken up by the garlic bulbs harvested in our trial, which was roughly

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VegEdge newsletter is exclusively for enrollees in the Cornell Vegetable Program, a Cornell Cooperative Extension partnership between Cornell University and CCE Associations in 14 counties.

The newsletter is a service to our enrollees and is intended for educational purposes, strengthening the relationship between our enrollees, the Cornell Vegetable Program team, and Cornell University.

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Help us serve you better by telling us what you think. Email us at *cce-cvp@cornell.edu* or write to us at Cornell Vegetable Program, 480 North Main Street, Canandaigua, NY 14424.

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The next issue of VegEdge newsletter will be produced April 17, 2019.

Join the Women in Agriculture Discussion Group: First Meeting is April 8!

The CVP and CCE Erie County are holding a women's discussion group this summer!

Each month, an industry leading Farm-Her will provide an overview of her operation, lead a tour, and share her expertise. CCE & Cornell researchers will provide production tips & tricks.

Why join the discussion group?

1) Welcoming environment for peer-to-peer learning and networking
2) The latest research from CCE & Cornell experts
3) Get to see other farms
4) Free! Thanks to a generous grant from Farm Credit East's AgEnhancement program

Meetings will **usually take place on a Monday** evening from 6:30 - 8 pm.

This group is **open to anyone professionally farming,** including employees. Interested women are **encouraged to attend multiple meetings** to promote group continuity.

First Meeting:
Monday, April 8 | 6:30 - 8 pm
Agle's Farm Market, Eden, NY
Host: Karyn Sullivan
Commodity: ornamental & vegetable transplant production
Business Topics: farm stand & wholesale marketing, flexibility & diversification
Production Skill: Biocontrol & sanitation, greenhouse production
To register>> Call Elizabeth Buck at **585-406-3419**

55 to 85 lb/A. This does not include the amount of N that would have been left in the field in the foliage at the end of the season. Interestingly, the amount of available nitrate-nitrogen (NO_3-N) left in the soil at harvest in the Albion trial in 2018 (only time this data was collected) was 6, 22, 38 and 76 lb/A for the 0, 50, 100 and 150 lb/A rates of applied N, respectively (data not shown). These results are another indication that the garlic in these trials had taken up all of the nitrogen that they needed and that excessive nitrogen was applied.

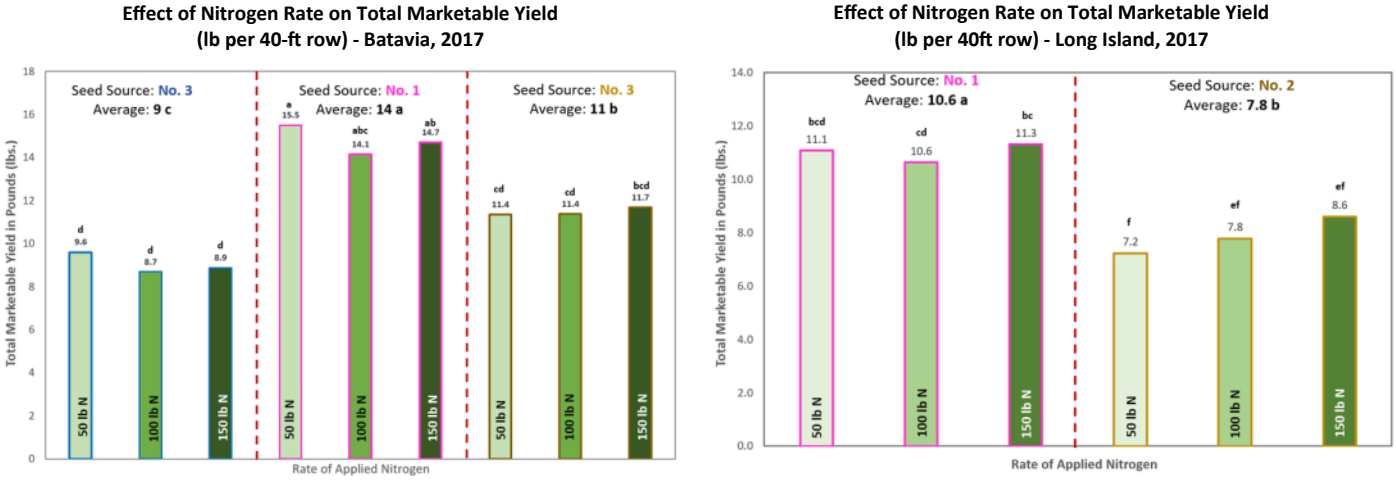


Figure 1. Effect of rate of spring-applied inorganic nitrogen on garlic yield of three seed sources in Batavia (left) and Long Island (right) in 2017. There was no difference in yield among 50, 100 and 150 lb/A in either location in either seed source. Seed source had greater impact on yield than nitrogen. Bars followed by the same number are not significantly different, Fisher's Protected LSD test ($p<0.05$).

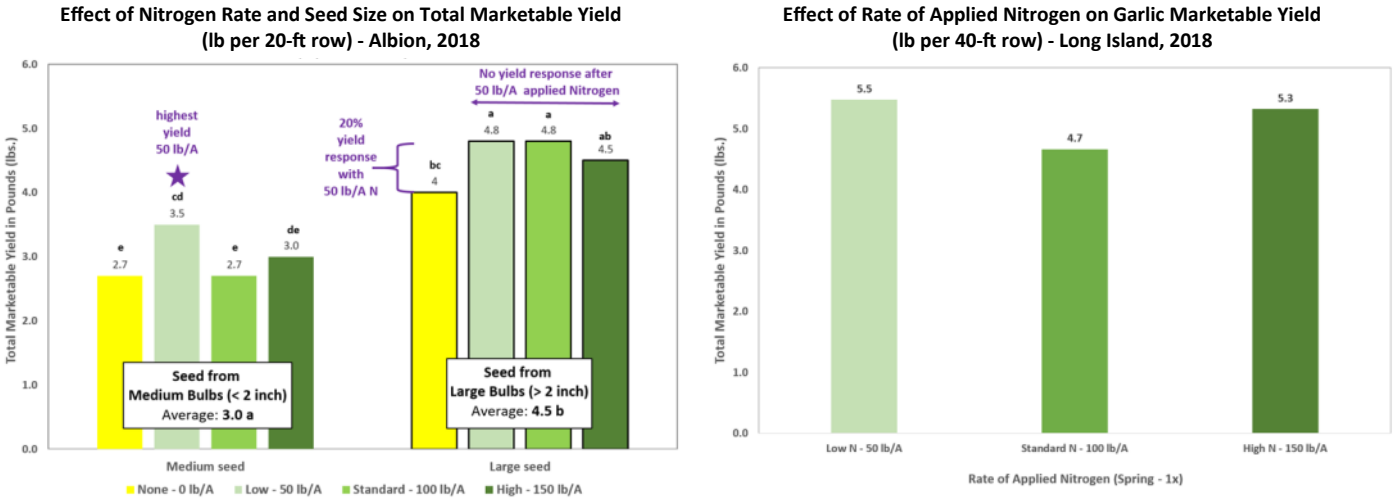
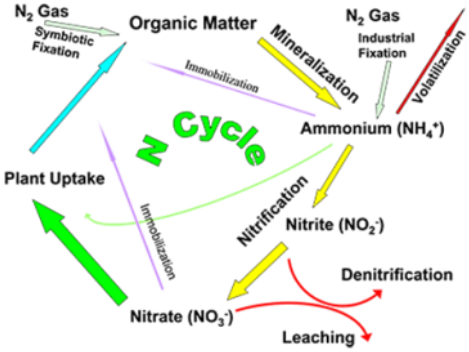


Figure 2. Effect of rate of spring-applied inorganic nitrogen on garlic yield of three seed sources in Albion (left) and Long Island (right) in 2018. There was no difference in yield among 50, 100 and 150 lb/A in either location in either seed source. Seed size had greater impact on yield than nitrogen. Bars followed by the same letter are not significantly different, Fisher's Protected LSD test ($p<0.05$).

Organic Growers who rely on fall applications of fertilizer will need to consider when the nitrogen sources they are using will become available, and likely need to use total higher rates because of this. Some organic matter is converted to available forms (mineralized) starting at 32 degrees, with rates of conversion being higher in soils with high biological activity and soil moisture at or below field moisture capacity. However, organic matter converts to available forms optimally at soil temperatures above 50 degrees. This is good news for holding onto organic matter over the winter, since it will not become soluble at cold temperatures. However, it leads to some lag in availability for the garlic crop, which starts growing at 40 degrees. Previous work using organic fertilizers has shown that the crop responds favorably up to 100 lbs of N, including soil credits from organic matter.



Simple diagram of nitrification process.
Source: Iowa State

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continued from pg 3 – Effects of Spring-Applied Nitrogen Fertilizer on Garlic Yield, 2017-2018 CCE Research Results Indicate 50 lb/A is Enough

Garlic has all nitrogen it needs by end of May.
We saw a slight and insignificant increase in leaf tissue % N between 50, 100 and 150 lb/A applied N rates at both May and June evaluation dates in the trials in Western NY. According to some published sufficiency tables, >3% N is considered excessive in garlic. Interestingly, there was no difference in tissue % N between 4 weeks post-N application (May) and during bulbing (June), especially for the 100 and 150 lb/A N rates (Fig. 3). **These results support previous work suggesting the garlic crop has accumulated all of the nitrogen that it needs by the end of May, and that application of additional nitrogen would be unnecessary, at least in situations when %N exceeds 3% by the end of May.**

Seed source/size most important determinant of yield.
In 2017, we had seed from three and two different sources in Batavia and Long Island, respectively, and in 2018, we planted seed from large (>2 inch) and medium/small (<2 inch) bulbs. In 2017, Seed Source No. 1 yielded significantly 27% and 36% more than Seed Source No. 2 in Batavia and Long Island, respectively. In Batavia, Seed Source No. 2 and No. 1 yielded 22% and 55% higher than Seed Source No. 3 (Fig. 1). In 2018, garlic of the same seed source grown from seed from large bulbs yielded 50% more than when it was grown from seed grown from small/medium bulbs (Fig. 2). **These results indicate that that clove size, as a measure of ability to supply nutrients to the developing seedling in the Fall is far more important than nitrogen availability during the following spring. In our trial, increased rate of applied nitrogen in the spring could not make up for smaller seed size.**

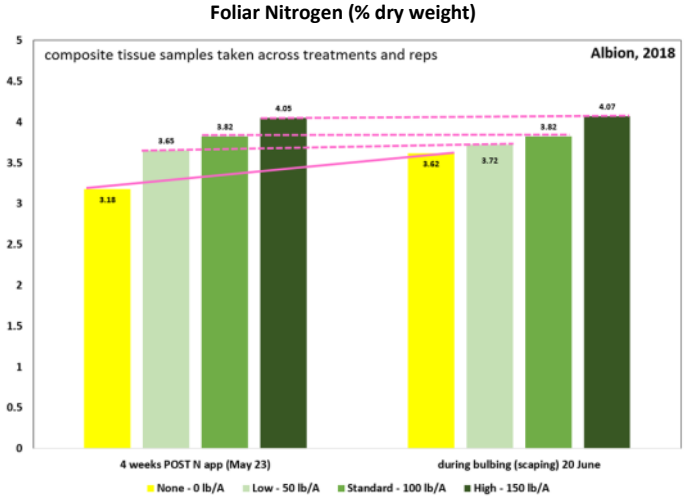


Figure 3. Effect of rate of spring-applied inorganic nitrogen on foliar tissue nitrogen in garlic, Albion, 2018. Tissue % N insignificantly increased as rate of applied N increased. There was no difference in % N between 4 weeks post-nitrogen application and during bulbing. This is an indication that garlic plant has all the N it needs before bulbing.

Table 1. Evaluation of spring-applied nitrogen on garlic yield: trial details, 2017 and 2018.

	Batavia 2017	Long Island 2017	Albion 2018	Long Island 2018
Soil type	Gravelly loam	Sandy loam	Hilton loam	Sandy loam
Previous crop	sod	Rye cover crop, turned over in spring	Oat cover crop	Sunflower windbreaks
Planting configuration	• 2 rows 15-inch apart per 5 ft • 6-inch plant spacing • Flat bed	• 2 rows 15-inch apart per 5.6 ft • 6-inch plant spacing • Flat bed	• 2 rows 7-inch apart per 2.5 ft • 6-inch plant spacing • Flat bed	• 2 rows 15-inches apart per 5.6 ft • 6-inch plant spacing • Flat
Nitrogen application	Urea (46-0-0) broadcast per area (Apr 13)	Ammonium Nitrate (34-0-0) Side-dressed at emergence and incorporated (Apr 10)	Urea (46-0-0) rate/A concentrated over rows (Apr 23)	(32-0-1) Side-dressed at emergence and incorporated
Other fertilizer	P & K according to soil test in fall	P & K according to soil test in fall	Dairy manure in fall; P & K in fall according to soil test	P & K according to soil test in fall
Seed Source(s) (all German hardneck)	1, 2 & 3	1 & 2	• Combo of healthy bulbs from 1 & 2 • Seed from large bulbs (> 2 inch) & small/ medium bulbs (< 2 inch)	Combo of bulbs from sources 1 & 2

Funding for this project was provided by:
- **Northeast Sustainable Research and Education (NE-SARE) Research and Education Grant**
- **New York State Specialty Crops Block Grant**

Early Season Weed Control in Peas

Julie Kikkert, CCE Cornell Vegetable Program

Ideally, weed control in peas and other vegetables should start several years before planting the crop. You'll get the best results by using good crop rotation, cover crops and other practices that suppress weeds. This is especially true for weeds that are problematic in peas such as corn chamomile ("daisy"), nightshades, and Canada thistle. Ideally, fall applications of herbicides would have been applied to control any daisy or thistle problems for the coming year. A comprehensive article on nightshade management can be found in the pea section of our website <<cvp.cce.cornell.edu>>.

For peas that haven't yet been planted, there are pre-plant incorporated (PPI) or pre-emergence (PreE) herbicides that can be used.

- Optill (*saflufenacil + imazethapyr*) can be used Pre-Plant, PPI or PreE. Its strengths are lambsquarters, pigweed, mustards, and both eastern black and hairy nightshade.
- Treflan HFP (*trifluralin*) and Prowl 3.3EC or H20 (*pendimethalin*) are applied PPI and have good annual grass activity. In addition, Prowl is effective against lambsquarters, purslane, pigweed and velvetleaf.
- Sharpen (*saflufenacil*) can be used PPI or PreE, but at the rate used in peas, provides only fair control of lambsquarters, pigweed, eastern black nightshade and velvetleaf.
- Pursuit (*imazethapyr*) can be used PPI or PreE. Its strengths are redroot pigweed, mustards and nightshades. When used PPI, it also has good activity against common lambsquarters.
- Dual Magnum (*s-metolachlor*) or Dual II Magnum (*s-metolachlor* + the safener *benoxacor*) – Pay special attention to the application method here! Do not incorporate Dual Magnum as it is only labeled pre-emergence after planting. If you are using Dual II Magnum, it can be used either PRE or PPI. If soils are wet and cold during emergence, Dual may delay maturity and/or reduce yields. Dual provides excellent control of annual grasses and yellow nutsedge. It is also good on several broadleaves including lambsquarters, purslane, pigweed, galinsoga, and eastern black nightshade. Dual is an excellent choice if you have the right soil moisture conditions.
- Command 3ME (*clomazone*) (PreE) has good activity against annual grasses and some broadleaves (esp. Velvetleaf). Be aware that peas will turn white in areas where the herbicide is overlapped. The peas will grow out of this and usually not be harmed.
- Reflex (fomesafen) is applied PreE to both the crop and weeds. Strengths are pigweed, mustard, galinsoga and Eastern black nightshade. Activity against hairy nightshade is only fair. Also has good activity on lambsquarters, purslane, and common ragweed.

Cultivation isn't used much by processing growers because they want a uniform field surface for harvesting. However, a flex-tine weeder or harrow may be a useful way to manage weeds in peas for organic processing growers or for fresh market peas. Processing peas will tolerate a light rolling to press down rocks after tine-weeding.

PPI and PreE herbicides won't provide complete control of weeds alone. You'll need to be scouting and managing weeds well into the season. Look for follow-up information in VegEdge on how to manage those pesky weeds once your peas are growing.

Farm Food Safety Training for Farm Workers and Wash/Pack Operational Management Assistance

The Cornell Vegetable Program will be offering farm food safety training for workers and supervisors. GAPs and HGAPs focus attention on the role workers play with farm food safety. The FSMA regulations have hugely emphasized the training of workers as the first line of defense for food safety practices. The CVP will be offering morning or afternoon training classes for groups of produce farm workers in areas that request it. The program would run approximately 2.5 hours. We would like to do this for small groups of 10-24 workers, farm crew managers, and farm owners. Nearby farms could combine staff together for the trainings. Contact Robert Hadad, CVP, rgh26@cornell.edu or call 585-739-4065 for more information.

Assistance available for Wash/Pack facility food safety design and operation. Are you thinking about upgrading your wash/pack facility? Looking to build new facility? Have questions about how to integrate food safety into the design? Have questions about how to clean produce wash equipment to minimize microbial contamination risk? We have the information. Contact Robert Hadad, CVP, rgh26@cornell.edu or call 585-739-4065 for more information.

EverGol Prime, Trigard, FI500 Onion Seed Treatments – What Needs to Go in the Furrow?

Christy Hoepting, CCE Cornell Vegetable Program

In light of the new seed treatment registration of EverGol Prime for onion smut and Cornell's recommendation to take a break from FI500 and revert back to Trigard for insecticide resistance management of onion maggot, muck onion growers may have a whole bunch of new and different combinations in 2019 growing season. Pro Gro needs help from mancozeb in-furrow for best control of onion smut and damping off, but does EverGol Prime? Table 1 includes a summary of all of the seed and in-furrow treatments commonly used in onion, and their activity on onion smut, damping off and onion maggot.

Table 1. Common seed and in-furrow treatments in muck-grown onions: Pest control activity of their active ingredients.

Tradename	Active Ingredient(s)	Type of Pesticide	FRAC/ IRAC[1] Group	Activity on Target Pest		
				Onion Maggot	Onion Smut	Damping Off[2]
Seed Treatments:						
FI500	thiamethoxam	Insecticide	4	Some	X	X
	spinosad	Insecticide	5	Yes	X	X
	mefanoxam	Fungicide	4	X	X	*Phythium* spp.
	fludioxonil	Fungicide	12	X	X	*Rhizoctonia* spp. *Fusarium* spp.
	azoxystrobin	Fungicide	11	X	X	Rhizoctonia spp.
Pro Gro	thiram	Fungicide	M3	X	Yes	Some
	carboxiin	Fungicide	7	X	Yes	X
EverGol Prime	penflufen	Fungicide	7	X	Yes	X
Thiram	thiram	Fungicide	M3	X	Some	Some
Trigard	cyromazine	Insecticide	17	X	X	X
In-Furrow Treatments:						
Dithane, Manzate, Roper, etc.	mancozeb	Fungicide	M3	X	Yes	Some
Ridomil, Ultra Flourish	mefanoxam	Fungicide	4	X	X	*Phythium* spp.
Lorsban	chlorpyrifos	Insecticide	1B	Yes	X	X

[1]**FRAC:** Fungicide Resistance Action Committee; **IRAC:** Insecticide Resistance Management Committee. Products belonging to different FRAC/IRAC groups have different modes of action and kill pests differently. [2]Most common pathogens that cause damping off in onion in New York are *Phythium* species. **Green highlights** indicate activity.

ONION SMUT

- **Pro Gro Seed treatment – Mancozeb necessary in-furrow for onion smut control**

Pro Gro alone is mediocre at best for controlling onion smut. In 15 trials that I conducted from 2002 to 2014 where incidence of onion smut averaged 38% in the untreated check, Pro Gro resulted in only 35-40% control of onion smut (data not shown). Addition of mancozeb in-furrow increased average % control of onion smut to 59%. In my Master's thesis research, I found that Lorsban also helped to control onion smut a little bit (10-50%) (as crazy as that sounds!). Between Pro Gro + mancozeb + Lorsban, smut control is usually about 75 to 85%. In 2017 fungicide trials, Pro Gro + mancozeb resulted in 81% and 31% control of onion smut under low (15.2%) and high (57.2%) pressure, respectively (Table 2). The high pressure trial was under water for a week prior to onion emergence, and some of these fungicides may have leached. Note, that the "untreated" controls in these trials had either thriam or FI500 alone, neither of which appeared to have much activity on onion smut.

Table 2. Comparison of Pro Gro + mancozeb and EverGol Prime ± mancozeb for control of **Onion smut**: Field trials, Elba, NY, 2017 (Hoepting).

Seed Treatment		In-Furrow Treatment		Trial 1		Trial 2	
1	2	1	2	% Onion Smut	% OS Control	% Onion Smut	% OS Control
Thiram[2]				15.2 a[1]	UNT	57.2 a	UNT
Thiram	Pro Gro	mancozeb	Ridomil	2.0 b	81%	39.2 a	FAIL!
	EverGol Prime			2.4 bc	84%	2.2 b	96%
Thiram	EverGol Prime	mancozeb		0.0 c	100%	10.2 b	82%
P value (α = 0.5)				*<0.0001*		*0.0003*	
FI500				10.8 a	UNT	47.4 a	UNT
FI500	Pro Gro	mancozeb	Ridomil	4.5 b	58%	43.7 a	FAIL
FI500	EverGol Prime			0.8 c	93%	0.9 b	98%
FI500	EverGol Prime	mancozeb		1.4 bc	87%	1.4 b	97%
P value (α = 0.5)				*0.0001*		*<0.0001*	

[1] Numbers in a column followed by the same letter are not significantly different, Fisher's Protected LSD test ($p<0.05$). [2] First four treatments included Sepresto seed treatment for onion maggot control. Lorsban was not used in-furrow. **Yellow highlights** indicate control failures. **Green highlights** indicate 80% or greater % control of onion smut.

- **EverGol Prime Seed treatment – All you need for onion smut control**

EverGol Prime is the best seed treatment that we have ever evaluated for controlling onion smut. It is an A to A+ product, resulting in at least 80% control and usually much more. In 2017 trial, EverGol Prime alone resulted in 84 to 98% control, even in Trial 2, which flooded – very impressive! (Table 2). Addition of mancozeb in-furrow to EverGol Prime seed treatment was not significantly different than EverGol Prime alone in all four side-by-side comparisons (Table 2).

continued on next page

ARE IN-FURROW FUNGICIDE DRENCHES NEEDED FOR CONTROL OF DAMPING OFF?

This is where my data and results need to be taken with a grain of salt, because it is actually very tricky to identify the cause of seedling mortality in the loop through flag-leaf stages of onion. It could be caused by damping off, onion smut, sunscald or wind-whipping. Fortunately, Spring 2017 was cool and wet, and seedling mortality was most likely caused by soilborne disease(s) in these trials. There were no significant differences in seeding emergence, except in the FI500 treatments of Trial 2, where the treatments with EverGol Prime + mancozeb or Ridomil or both had significantly greater than 50% emergence, while the other treatments had significantly less emergence (Table 3). Poor emergence in Trial 2 was very likely due to the standing water prior to seedling emergence. Interestingly, in Trial 2, post-emergent seedling mortality was significantly the highest in the thiram (24%) and FI500 (27%) treatments, which suggests that neither of these seed treatments should not be used alone without in-furrow supplements. Thiram/FI500 + Pro Gro + mancozeb + Ridomil had significantly less seedling mortality than thiram and FI500 alone by 38% and 61%, respectively. Interestingly, in Trial 2, all of the treatments with EverGol Prime used with or without mancozeb/Ridomil in-furrow drenches had significantly less seedling mortality by 64 to 93% (Table 3). Since EverGol Prime is not supposed to have any activity on damping off pathogens and there was no difference between EverGol Prime alone or FI500 (which should have activity on damping off), these results could suggest that at least some of the seedling mortality was caused by onion smut. In Trial 1, EverGol Prime alone had the same amount of post-emergent seedling mortality as thiram alone with all other treatments with in-furrow drenches having significantly less seedling mortality by 45 to 78% (Table3). This dataset suggests that EverGol Prime does not have any activity on damping off pathogens.

Based on 2017 trial results and known activity of the different fungicides used in-furrow and as seed treatments, the following in-furrow drenches should be included for adequate protection against damping off:

- **EverGol Prime + Trigard Seed treatment – Add mancozeb <u>with or without</u> Ridomil for damping off**
- **EverGol Prime + FI500 Seed treatment – <u>May</u> want to add mancozeb <u>or</u> Ridomil* for damping off.** FI500 should be okay; in my trials, I could not tell whether seedling mortality was caused by damping off or smut).

*Remember, mancozeb is not needed with EverGol Prime for onion smut, so Ridomil could be used instead and the clogging/settling issues of mancozeb could be avoided for a stress-free planting experience.

- **Pro Gro + Trigard Seed treatment – Add mancozeb <u>with or without</u> Ridomil for onion smut and damping off**
- **Pro Gro + FI500 Seed treatment – Add mancozeb for onion smut.**

Did not see difference between Pro Gro + mancozeb with and without Ridomil for % emergence or % seedling mortality in 2017 trials (data not shown).

LORSBAN IN-FURROW FOR ONION MAGGOT CONTROL?

- **FI500 Seed treatment – No Lorsban in-furrow EXCEPT in <u>high</u> pressure fields**
- **Trigard Seed treatment – Add Lorsban in-furrow EXCEPT in <u>low</u> pressure fields**

Recently, Brian Nault pooled 26 datasets from onion maggot trials that he conducted in all muck onion regions across the state from 2002 to 2016. He found no difference in control of onion maggot (~66%) between Lorsban (1 qt/A) and Trigard seed treatment, but Trigard + Lorsban was significantly better than either alone (~81% control). Similarly, when he pooled 5 datasets from trials in Wayne and Oswego counties from 2012 to 2016, FI500 (81% control) was significantly better than Lorsban (63% control) and there was no significant difference between FI500 and FI500 + Lorsban (~86% control). For resistance management to ensure useful longevity of insecticides for long-term onion maggot control, growers should rotate FI500 and Trigard + Lorsban annually, and ideally not use any insecticide consecutively.

Table 3. Comparison of EverGol Prime with and without mancozeb and Ridomil for control of **Damping off:** Field trials, Elba, NY, 2017 (Hoepting).

Seed Treatment		In-Furrow Treatment		Trial 1		Trial 2	
1	2	1	2	% Emergence	% Seedling Mortality[1]	% Emergence	% Seedling Mortality
Thiram				58	8.4 a	39	23.9 a
Thiram	Pro Gro	mancozeb	Ridomil	57	3.4 b	39	14.7 b
	EverGol Prime			69	10.3 a	51	6.6 b
Thiram	EverGol Prime	mancozeb		72	3.3 b	44	8.5 b
Thiram	EverGol Prime		Ridomil	67	2.3 b	50	7.1 b
Thiram	EverGol Prime	mancozeb	Ridomil	56	4.6 ab	37	6.6 b
P value (α = 0.5)				*0.2086*	*0.0232*	*0.8350*	*0.0051*
FI500				62	4.9	27.5 a	33 c
FI500	Pro Gro	mancozeb	Ridomil	63	1.9	10.7 b	39 bc
FI500	EverGol Prime			66	3.5	2.5 c	34 c
FI500	EverGol Prime	mancozeb		55	3.1	4.4 c	54 ab
FI500	EverGol Prime		Ridomil	62	3.4	1.9 c	61 a
FI500	EverGol Prime	mancozeb	Ridomil	55	3.6	4.3 c	55 a
P value (α = 0.5)				*0.7731*	*0.4052*	*<0.0001*	*0.0007*

[1]Cause of post-emergent seedling mortality between loop and flag-leaf stages can be difficult to distinguish between damping off, onion smut, wind-whipping and sunscald. Because it was a cool and wet spring, we believe that seedling mortality was caused by soilborne diseases in these trials. [2]Numbers in a column followed by the same letter are not significantly different, Fisher's Protected LSD test (p<0.05). **Yellow highlights** indicate control failures and poor results. **Green highlights** indicate results as good as best treatment.

Growing Degree Days Part II: Example Tools Developed for NY Agriculture

Elizabeth Buck, CCE Cornell Vegetable Program

In the February 4, 2019 issue of VegEdge, I introduced growing degree days as a biologically sensible way to measure the developmental time required for pests, weeds, and crops to reach certain life stages. Growing degree days tally up the length of time spent within optimum temperature ranges for growth. The coarsest measurements use the daily average temperature, while the most refined use hourly, local weather station data and accommodate both minimum and maximum temperature thresholds for growth. As a reminder, those thresholds differ for species. The minimum temperature is more important and is referred to as the "base" temperature.

Now that the refreshers are out of the way, let's take a look at a growing degree day (GDD) tool developed and managed here in NY.

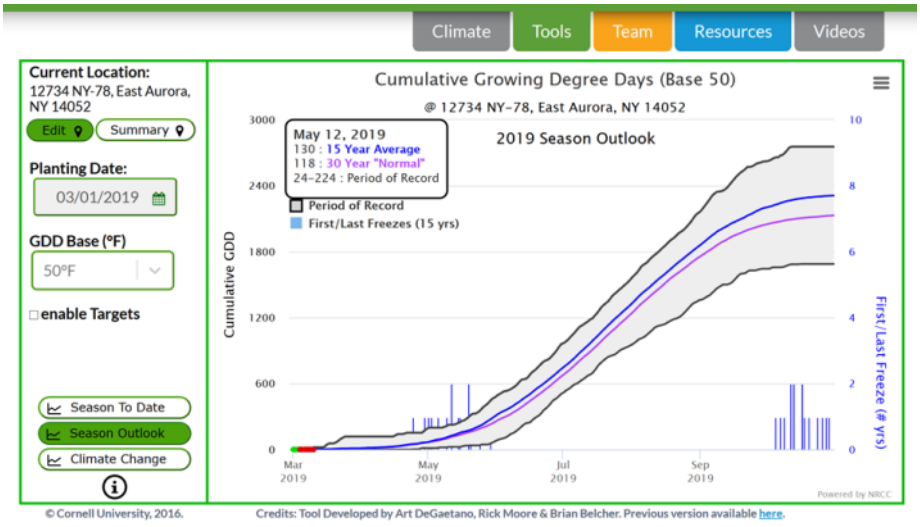
Climate Smart Farming's Growing Degree Day Calculator <<http://climatesmartfarming.org/tools/csf-growing-degree-day-calculator/ >>

I like this tool for 3 reasons:

1) Tracks weather conditions on a highly refined 2 mile grid
2) Provides a historical recap of the GDD accumulation and first/last frost dates for that location
3) **Predicts GDD accumulation to help schedule and monitor crop/pest development**

Section 1 – Site Selection and Orientation

Start off by **selecting your field** location. You can save multiple locations, which makes this tool ideal for folks managing crops in more than one town or county. Next, select your base temperatures. CSF's tool allows you to **pick any temperature between 32 and 50 degrees**, which it will use to calculate GDDs using sine method calculations. It also **offers the cut-off method at** the specific **50/86 temperature** values. The availability of the cut-off method is a great feature that they are looking into expanding, and it is particularly useful for chill-sensitive crops that originated in areas with high elevation, like beans.



Climate Smart Farming's Growing Degree Day Calculator showing historical data at base 50 (upper) and base 50/86 (lower) for East Aurora, NY. Note that the 50/86 method will have lower accumulated GDD for a given date because it eliminates time units with temperatures over 86 degrees.

You'll first see the historical data for your location. The highest and lowest GDD years ever recorded are the black lines, so the gray area is the possible range of accumulations. The purple line is the GDD average over the past 30 growing seasons. **The blue line is the GDD accumulation averaged over the last 15 seasons**. You'll notice that the last 15 years are always running warmer than the broader 30 year period because the climate is warming. Therefore, it is **far more useful to use the blue 15 year average as a target when scheduling crops or estimating when to look at pests.** The observed last and first date of frost are indicated by the short, vertical blue lines. The taller the bar, the more times the last/first frost occurred on that date within the past 15 years.

Section 2 – GDD targets for crop scheduling/pest monitoring

There is an **enable targets check box** under the base temperature box. Click it and **you can set a target GDD accumulation by 25 degree increments**. A 25 degree increment is quite good enough for scheduling and monitoring purposes. I suggest rounding down to the lower 25 degree mark for a given pest GDD count as it is better to start looking early rather than too late. I'll spend discuss that further in my next article.

If you have not set a planting date, you will see **the predicted date on which you'll accumulate the target GDD from the date of last frost (green line)**. The range of dates on which the target GDD has been historically obtained is in the green band. **Once a planting date is set, you will see the target accumulated from the date of planting.** Because the tool is relying on current weather station data to model out this year's information, you cannot select a planting date in the future. It is an unfortunate feature, but one easily worked around.

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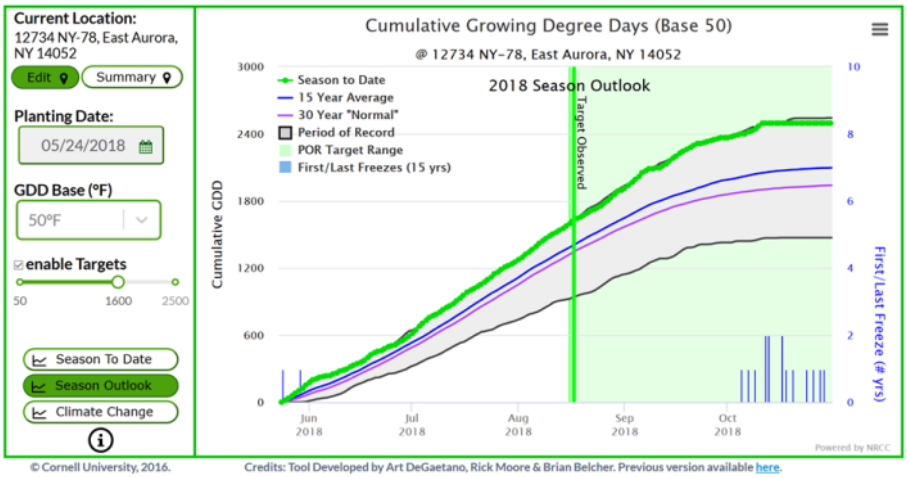


2018 and historical data for sweet corn with an approximate maturity of 1600 GDD planted May 24.

For scheduling purposes, set the planting date you want, but change the year to 2018. The observed GDDs will show up as a series of green dots. In East Aurora, 2018 was pretty close to the highest GDD accumulating year ever observed. You can play around with the target box and then mouse over the green band to see when the target was achieved that year.

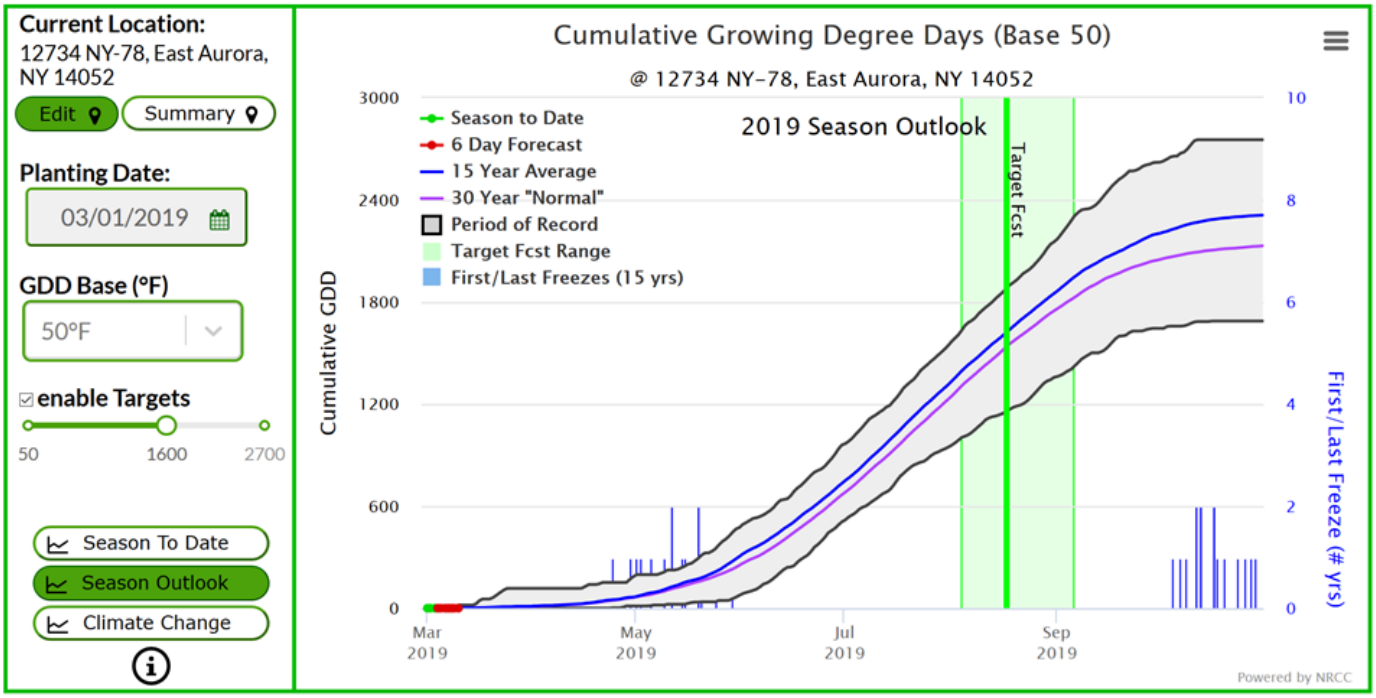
Ok, but 2018 was a hot year. How much good is it for an average year, or a cool year?

I've played around with the tool and I've settled in on using 2018 regardless. Here's why:

- 2018 was, in many areas, one of the highest GDD accumulators observed. By looking at the upper range of what is currently possible, you will see the shortest developmental times.
- Looking at 2018 will let you jot down calendar reminders for scouting your field early, which is less risky than being late.
- The 15 year historical average has, in the last several seasons, been a good stand-in for a cool year. Again, this is because the climate is warming. Double check me, look at 2017 (a recent cool, wet year) at your location.
- This is only a rough indication at this point in time. Unless the days to harvest given on your seeds is specific to our latitude and elevation, the GDD approximation will give you as good or better estimates of crop maturity windows.

Section 3 – What to expect in-season

Once you've planted your field, go back and set the date in the GDD tool. Now you will see a similar target band based on historical information, just as you did in the planning stages. As the season progresses, the tool refines and narrows the band based on current GDD accumulations and the 6 day forecast. As you progress in crop development, you will get better and better estimates of your target date. While it may seem silly to use the GDD tool to give a target harvest date 3 weeks out from maturity (because you can walk the crop), it can be very useful to predict key developmental stages of crops and pests earlier in the year. I'll discuss this in GDD Part III in the next issue of VegEdge.



Current estimate (based on historical data) for the accumulation of 1600 GDD in the 2019 season. This target range will shift based on your initial planting date, and narrow as the season progresses.

Respirator Fit Testing Clinics in WNY/Finger Lakes 2019

The New York Center for Agricultural Medicine and Health (NYCAMH) and HealthWorks Occupational Health Services are providing a series of respirator fit testing clinics in our region. During the clinics NYCAMH will provide medical evaluations, respirator fit tests, and WPS compliant trainings on how to properly inspect, put on, take off, fit, seal check, use, clean, maintain, and store respirators. A respirator fit test ensures that a particular make, model, and size of respirator fits the wearer's face and will meet the wearer's needs. A fit test is specific to the make, model, and size of respirator.

If a worker wears more than one style of respirator, including filtering facepieces, they must be fit-tested for each one. Please keep in mind that a clean-shaven face is necessary for masks to be effective and for fit-testing to be possible.

Clinic appointments are 1 hour long, and groups of 4 workers can be seen at a time. Medical evaluations, fit tests, and trainings are available in both English and Spanish. Fees range from $25-$65 per person/per mask: please ask for details when scheduling an appointment.

To schedule an appointment please call the NYCAMH office during the date ranges listed below for each event and ask to speak with the farm respirator clinic scheduler. Appointments are scheduled on a first-come, first-served basis. The office can be reached at 607-547-7014 or toll-free at 800-343-7527, Monday-Friday, 8:00 AM-4:30 PM, and ask for the "farm respirator clinic scheduler". When calling to schedule an appointment please have the following information available:

- *Total number of people attending from your farm*
- *Name of each person being scheduled*
- *Language spoken by each attendee*
- *Make and model of each respirator to be tested*

If you are unable to attend the clinic in your area you may schedule an appointment at another location.

Western New York/Finger Lakes:
April 23rd: CCE Orleans County, 12690 State Route 31, Albion, NY 14411
Scheduling appointments: March 25th-April 19th, 2019

April 24th: CCE Niagara County, 4487 Lake Avenue, Lockport, NY 14094
Scheduling appointments: March 25th-April 19th, 2019

May 14th: Amos Zittel & Sons, 3275 Webster Road, Eden, NY 14057
Scheduling appointments: April 8th-May 10th, 2019

May 15th-16th: CCE LERGP, 6592 West Main Road, Portland, NY 14769
Scheduling appointments: April 8th-May 10th, 2019

For more information and programs provided by NYCAMH, visit http://www.nycamh.org/ or provided by Bassett Healthcare Network visit https://www.bassetthealthworks.org/

Spring 2019 CleanSweepNY will target NYSDEC Region 9:

Allegany, Cattaraugus, Chautauqua, Erie, Niagara and Wyoming Counties

Tuesday, April 30 – Gowanda
Wednesday, May 1 – Warsaw
Thursday, May 2 – Lockport

CleanSweepNY is an Environmental Benefit Project that provides for the environmentally safe and economic collection and disposal of canceled, unwanted, unusable, or otherwise obsolete pesticides and other chemicals from agricultural or non-agricultural business activities. The collections are scheduled and organized by NYSDEC with the collaboration of NYSDOT who generously provide sites for the collection of these unwanted chemicals. (Please do not contact NYSDOT for CleanSweepNY information.)

CleanSweepNY services are provided to farmers and owners of former farms, all categories of NYS certified pesticide applicators, cemeteries, golf courses, marinas, and other entities possessing unwanted or unusable pesticides and other waste chemicals. Each participant is responsible for transporting their materials to the collection site. *These services are NOT available to homeowners.*

CleanSweepNY is supported by Cornell Cooperative Extension, the Agricultural Container Recycling Council, Soil and Water Conservation Districts, New York Farm Bureau, and related grower associations.

Pre-registration is required by April 12 so please request and send in completed registration form quickly. Interested individuals should call 877-793-3769 to obtain a signup packet or e-mail info@cleansweepny.org.

For more information about this program, visit http://www.cleansweepny.org.

Upcoming Events

continued...

Women in Ag Discussion Group Meeting

April 8, 2019 | 6:30 - 8:00 PM
Agle's Farm Market, 7952 Gowanda State Rd, Eden, NY 14057

Host: Karyn Sullivan

Commodity: ornamental & vegetable transplant production

Business Topics: farm stand & wholesale marketing, flexibility & diversification

Production Skill: Biocontrol & sanitation, greenhouse production

To register>> Call Elizabeth Buck at **585-406-3419**

2019 DEC Special Permit Training

April 9, 2019 | English 8:30 AM registration, 9:00 AM - 12:30 PM; Spanish 1:00 PM registration, 1:30 PM - 5:00 PM
CCE Wayne Co, 1581 Route 88N, Newark, NY 14513

April 10, 2019 | English and Spanish 8:00 AM registration, 8:30 AM - 12:00 Noon
Orleans Co. Cooperative Extension Fairgrounds Trolley Bldg, 12690 Rt 31, Albion, NY 14411

Same program format as in 2016-2018. **Special Permits (SP) will only be issued for 11 specific pesticide labels** and **SP trainees will have to pass a test.** This will relieve the certified pesticide applicator from "on-site within voice contact" supervision of non-certified pesticide applicators when they are handling federally-restricted-use pesticides for which they hold a Special Permit. The labels that will be covered include **Lorsban Advanced, Endigo ZC, Warrior II with Zeon Technology, Agri-Mek SC, Beseige, Gramoxone SL 2.0, Leverage 360, Danitol 2.4EC, Mustang Maxx, Asana XL, and Lannate LV.**

New York DEC notes that the **Special Permit process is intended for farm workers with English language skills that are not adequate to pass the DEC private applicators exam.** All others are encouraged to apply for their private applicators license via taking the certification exam.

Workers requiring **general pesticide training/Agricultural Worker Protection Standard Handler training who do not need special permits** are welcome to take the class; they will not be tested and will receive a course participation certificate.

$20 per DEC Special Permit / General Pesticide Training. Pre-registration required by April 5, 2019; After April 5, a late fee of $20 will be required for each registration. Call Kim Hazel, 585-798-4265 x26 to register. Download a registration form at cvp.cce.cornell.edu

Farm Food Safety Training with GAPs

April 10 - 11, 2019 | W 8:30 AM - 4:30; Th 9:00 AM - 3:00 PM
Steuben Co. Civil Defense Ctr, 7220 NY-54, Bath, NY 14810

This two-day course is intended to improve your understanding of GAPs to guide assessment of risks and implementation of practices to reduce risks on fresh produce farms. Day 1 will provide a background on GAPs and Harmonized GAPs; Day 2 participants will begin writing a food safety plan. A laptop computer is required for Day 2.

More info at https://cvp.cce.cornell.edu/event.php?id=1145.
Brought to you by CCE Steuben County, the Cornell Vegetable Program, and NYS Department of Agriculture & Markets.

Cornell Cooperative Extension
Cornell Vegetable Program

480 North Main Street
Canandaigua, NY 14424

VEGEdge

YOUR TRUSTED SOURCE FOR RESEARCH-BASED KNOWLEDGE

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VegEdge is the award-winning newsletter produced by the Cornell Vegetable Program. It provides readers with information on upcoming meetings, pesticide updates, pest management strategies, cultural practices, marketing ideas and research results from Cornell and Cornell Cooperative Extension. VegEdge is produced every few weeks, with frequency increasing leading up to and during the growing season.

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Cornell Cooperative Extension
Cornell Vegetable Program

For more information about our program, email cce-cvp@cornell.edu or visit us at CVP.CCE.CORNELL.EDU