Our Soil Health Journey Diggers' Mirth Collective Farm

at Diggers' Mirth Collective Farm

Certified Organic
12 cultivated acres in the Intervale
Mixed vegetable market farm
Collectively owned
Since 1992

8 acres in vegetables, 4 acres in cover crop

DIGGERS' MIRTH
COLLECTIVE FARM
VERMONT
CERTIFIED
ORGANIC

Previous Primary Amendments:

Giroux's Composted Chicken Manure for N
Sulfate of Potash for K

Cover Crop Rotation

Year 1:

Late April/early May: seed peas and oats
Early July: incorporate peas and oats
Mid July: seed Sudan Grass
August: Mow and/or disk Sudan Grass
Late-August: seed peas and oats, and vetch/rye
October/November: Incorporate any remaining Sudan Grass

Year 2:

Incorporate Sudan Grass again
Vegetables

Year 3:

Vegetables

Cover Cropping Drivers

Weed suppression
Timely incorporation
Increase OM
Nitrogen fixing

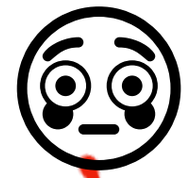
Soil Health at Diggers

1. Simple cover cropping system
2. Inexpensive amendments with simple and broad application
3. Ongoing tillage reduction efforts
4. Tarping

What's working well?

High yields
Great weed control
Simple systems
Profitable farm

So, what's NOT working well?



Reported: 11/30/2020
VT County: Chittenden

Results

Nutrient	Low	Medium	Optimum	High or Excessive
Phosphorus (P):				
Potassium (K):				
Magnesium (Mg):				

Phosphorus is excessive!!!

Analysis	*Value Found*	*Optimum Range ** (or Average *)*	*Analysis*	*Value Found*	*Optimum Range ** (or Average *)*
Soil pH (2:1, water)	7.1		Boron (B)	0.4	0.3*
Modified Morgan extractable, ppm			Copper (Cu)	0.3	0.3*
Macronutrients			Zinc (Zn)	3.7	2.0*
Phosphorus (P)	185.2	4-7	Sodium (Na)	18.0	20*
Potassium (K)	158	100-130	Aluminum (Al)	5	35*
Calcium (Ca)	2040	**	**Soil Organic Matter %**	2.1	**
Magnesium (Mg)	127	50-100	**Effective CEC, meq/100g**	11.7	**
Sulfur (S)	8.0	11*	**Base Saturation, %**		
Micronutrients			Calcium Saturation	87.5	40-80
Iron (Fe)	2.9	7.0*	Potassium Saturation	3.5	2.0-7.0
Manganese (Mn)	5.2	8.0*	Magnesium Saturation	9.1	10-30

** Micronutrient and S deficiencies are rare in Vermont and optimum ranges are not defined; thus average values in Vermont soils are shown instead.*
*** Ranges shown are for Field Crops; Vegetable ranges are higher. Ranges for Calcium, Organic Matter, and Effective CEC vary with soil type and crop.*

Also, all inputs sourced off-farm.

Assumptions

No such thing as too much compost

Excessive P was “legacy phosphorus”

P doesn’t leach through soil

Our excessive P stays in soil because we don’t have soil erosion

MATERIAL	% N	% P2O5	% K20	% Ca	% Mg	% S	Release Rate	Price pe 50 lb	$/lb N	$/lb P	$/lb K
Grioux's Composted Poultry Manure	3%	2%	2%	7%	1%	5%	med	$1.00	$0.67	$1.33	$1.33
Granite dust			6%		11%	22%	very slow	$89.00			$29.67
Greensand		1%	7%				very slow	$31.50			$9.00
Gypsum				23%				$16.50			
K-mag			22%		11%	22%	rapid	$38.00			$3.45
Kelp meal								$69.00			
Peanut meal	8%	1%	2%				slow/ med	$37.00	$9.25	$74.00	$37.00
Minerals			0%	5%		5%		$38.00			
Potassium chloride			60%				rapid	$15.00			$0.50
Rock phosphate		5%					very slow	$24.00		$9.60	
Soybean meal	7%	2%	1%		3%		slow/ med	$17.00	$4.86	$17.00	$34.00
Sulfate of potash			50%			17%	rapid	$51.00			$2.04
phosphate		46%					rapid	$21.00		$0.91	
Urea	46%						rapid	$20.00	$0.87		
Sufur, granular						90%	slow/ med	$28.00			
Blended fertilizers											
Cheep Cheep	4%	3%	3%				med	$20.50	$10.25	$13.67	$13.67
Custom 5-5-5	5%	5%	5%				med	$27.00	$10.80	$10.80	$10.80
Custom 6-0-6	6%		6%				med	$28.50	$9.50		$9.50
Pro-Start	2%	3%	3%				med/ rapid	$17.00	$17.00	$11.33	$11.33
Pro-Booster	10%						med/ rapid	$32.00	$6.40		
Pro-Gro	5%	3%	4%				med	$22.50	$9.00	$15.00	$11.25
Ammonium sulfate	21%					23%	rapid	$10.70	$1.02		
Blood meal	12%	1.0%	0.5%				med/ rapid	$85.00	$14.17		$340.00
Bone meal	3%	15%					med	$39.00	$26.00	$5.20	
Bone char	0%	16%	0%				rapid	$25.00		$3.13	
Calcitic limestone				38%			med				
Calcium nitrate	15%			19%			rapid	$21.85	$2.91		
Chilean nitrate	15%		2%				rapid	$45.00	$6.00		
Dehydrated Poultry Manure (Kreher's or other)	5%	4%	3%	9%			med	$12.00	$4.80	$6.00	$8.00
Dehydrated Poultry Manure (Kreher's or other)	4%	3%	10%				med	$15.00	$7.50	$10.00	$3.00
Diammonium phosphate		46%					rapid	$11.83		$0.51	
Dolomitic limestone				25%	10%		med				
Elemental sulfur							med				
sulfate)					10%	13%	rapid	$18.00			
Feather meal	12%						med	$50.00	$8.33		
Fish emulsion	5%	2%					rapid				
Fish meal	9%	7%					med	$90.00	$20.00	$5.71	

Giroux's (2-3-2) is by far the cheapest source of N

Source:
UVM Extension
Nutrient Management for Vegetable Farmers
2019

Thank you UVM Extension!

2012-2019:

All Giroux’s

2020:

Cut Giroux’s application in half
Applied Pro-Booster for some second cropping

2021:

NO Giroux’s
Naturesafe 13-0-0 (+ some Chilean Nitrate for early Spring)
Tried to Cover Crop for N

2021 Results

—Zero Phosphorus added to soil
—Over twice the cost for N sources)
—Sufficient N, but a little on the edge
—Ran into timing issues with Cover Crops
—Experimented with the use of PSNTs

PSNT

Pre-Sidedress Nitrate Test

2021 PSNT RESULTS

Q2 West	5/22: 15	Cold temps, Sudangrass debris
	7/1: 50 (w/tarp), 35 (solarized), 35 (control)	Higher value with tarp!
	8/9: 16.2	Lower value post-harvest
Q3 West	5/22: 46.1	No Sundangrass here
	6/11: 36.6 (wout tarp), 43.4 (with tarp), 44.1 (young fennel, carrot)	Again, higher value with tarp
	8/9: 14.1	Lower value post-harvest

"In general, the rule of thumb recommendation for veg crops is if the PSNT is below 30 ppm to sidedress with N IF you take the PSNT at a time of normal sidedressing (when crops are already growing)." —Rebecca Maden

PSNT test ideas for 2022:

–At least once per quadrant in the middle (to capture average release time post-amending) when tarps are removed (2-4 weeks after amending, just before seeding) to test level and signal need to sidedress

–A few times sample sooner or later to see if there are

MATERIAL	% N	C:N Ratio	PAN *(plant available nitrogen)* @ 4 weeks	PAN @ 8 weeks	PAN @ 12 weeks
Alfalfa meal	3%	15.1	10%	21%	35%
Blood Meal	12%	3.4	44%	59%	61%
Bone Meal	3%		17%		32%
Bradfield	6%	5.9	34%	45%	54%
Canola Meal	6%	8.7			50%
Chilean Nitrate	16%				84%
Compost (mature)	1%		5%		10%
Espoma	6%	5.8	29%	37%	44%
Feather meal	12%	4.0	45%	47%	65%
Fish Meal	10%		45%	47%	65%
Gluten	9%	5.3	45%	54%	55%
Kreher's	5%	5.8		50%	
Mustard meal	6%	8.9		45%	
(NH4)2SO4	21%	0.0	69%	82%	85%
NatureSafe	13%	3.9	42%	64%	62%
Nutriwave	3%	12.6	18%	23%	36%
Pelletized chicken manure	4%		41%		41%
Poultry litter	2%	14,4	29%		
Progro	5%	4.6	49%	56%	53%
Soybean meal	7%	5.5	48%	61%	57%
Urea	46%	0.4	81%	78%	84%

Sources:

Oregon State University http://smallfarms.oregonstate.edu/calculator

Heather Darby, UVM http://www.uvm.edu/vtvegandberry/VVBGAMeeting2014/DarbyOrganicN.pdf

Bruce Hoskins, UMaine

Point of Ave Max Plant Growth

Point of PSNT Test

Hopes and Dreams for 2022

- Continue/standardize/incorporate PSNT
- Hone record keeping —trial farm os or similar software? Or expand spreadsheet
- Continue to try cover cropping for N
- Increase amount of NatureSafe
- Myccorhizae and nutrient uptake?
- No and low till practices intriguing