Fertility management

- Vegetable farming is not easy on the soil
- we want the best environment we can create to grow great vegetables
- Our goal is to create the BEST soil we can

How does one create great soil?

- Don’t abuse it
- Understand your PH, C/M ratio/CEC
- Compost
- Soil tests and Proper nutrients
- Cover crops
- good rotation

What’s the deal with peat moss?

Importing soil fertility

- Easy way out
- can be more expensive in the long-run
- Safe
- can store great quantities of NPK
- Early season soils are too cold to utilize soil fertility easily

Why Compost?

- The great Recycler
- Builds Soil structure
- Aggregate formation (soil fungi)
- Drought Protection
- Just in time nutrient delivery
- Growth stimulator

C/N ratio

- you want a "dirty" compost pile (add a starter/activator)
- ideal Carbon/ Nitrogen ratio is 25:1 to 30:1
- High N would be grass clippings, poultry manure, blood meal
- High C would be straw, sawdust, leaves

Compost ingredients

- Manure
- Wood chips
- spoiled hay
- vegetable scraps
- Whey
- eggshells

What not to put in compost

- domestic animal manure
- humanure
- large amounts of pine needles
- sprayed grass clippings (can contain 2,4 d)
- anything you don't handle.....

Using manures

- Stabilize it first... Should not reek of ammonia... add carbon
- Watch your salt levels (especially in GH)
- Needs hot composted to get rid of disease and pathogens
- Stay away from pig manure - too many diseases (especially roundworms)

Composting methods

- Hot- Material is turned frequently to kill weed seeds, pathogens, is ready in a matter of weeks a month (temps up to 160 F)
- Cool- Material is piled and let sit, much less work but can take 6 months to 2 years. this method allows beneficial bacteria to live.
- Windrow- Compost is placed in long , semi-circle shaped piles which are mechanically turned
- Aerated Static Pile- Material piled and air forced through it to help it cook faster

http://sevenfarmers.blogspot.com/2012/12/composting.html

Soil tests

- Take them!!!
- Best idea of what is going on down below
- Same time of year each year
- Get micronutrients tested every 2 years or so
- take them to a good lab

Report Number:
R09133-0028
Account Number:
41168

A&L Eastern Laboratories, Inc.

7621 Whitepine Road Richmond, Virginia 23237 (804) 743-9401
Fax No. (804) 271-6446 Email: office@al-labs-eastern.com

Send To: KILPATRICK FAMILY FARM
9778 ST RT 22
MIDDLE GRANVILLE, NY 12849

Grower: MICHAEL KILPATRICK

Submitted By: MICHAEL KILPATRICK

Farm I D:

Field I D:

SOIL ANALYSIS REPORT

Page: 1 **Date Received:** 5/13/2009 **Date of Analysis:** 5/14/2009 **Date of Report:** 5/15/2009

Analytical Method(s):
Mehlich III

Sample Number	Lab Number	Organic Matter %	Organic Matter ENR lbs/A	Organic Matter ENR Rate	Phosphorus Available ppm	Phosphorus Available Rate	Phosphorus Reserve ppm	Phosphorus Reserve Rate	Potassium K ppm	Potassium K Rate	Magnesium MG ppm	Magnesium MG Rate	Calcium CA ppm	Calcium CA Rate	Sodium NA ppm	Sodium NA Rate	pH Soil pH	pH Buffer Index	Acidity H meq/100g	C.E.C. meq/100g
SE	5954	3.1	82	M	91	H			126	H	85	M	918	H			6.1	6.8	0.9	6.5
SW	5955	3.7	89	M	139	VH			218	VH	100	L	1292	H			6.3	6.8	0.9	8.8
SN	5956	3.9	96	M	48	M			134	H	64	L	678	M			5.4	6.8	1.7	6.0
?	5957	3.9	93	M	144	VH			194	H	90	L	1206	H			6.5	6.9	0.6	7.9

Sample Number	Percent Base Saturation K %	Mg %	Ca %	Na %	H %	Nitrate NO3-N ppm	Nitrate Rate	Sulfur SO4-S ppm	Sulfur Rate	Zinc ZN ppm	Zinc Rate	Manganese MN ppm	Manganese Rate	Iron FE ppm	Iron Rate	Copper CU ppm	Copper Rate	Boron B ppm	Boron Rate	Soluble Salts ms/cm	Soluble Salts Rate	Chloride CL ppm	Chloride Rate	Aluminum AL ppm	Aluminum Rate
SE	5.0	10.9	70.5		13.7																			1044	
SW	6.4	9.5	73.6		10.6																			984	
SN	5.8	9.0	57.0		28.3																			1060	
?	6.3	9.5	76.7		7.4																			1087	

Values on this report represent the plant available nutrients in the soil.
Rating after each value: VL (Very Low), L (Low), M (Medium), H (High), VH (Very High).
ENR - Estimated Nitrogen Release. C.E.C. - Cation Exchange Capacity.

Explanation of symbols: % (percent), ppm (parts per million), lbs/A (pounds per acre), ms/cm (milli-mhos per centimeter), meq/100g (milli-equivalent per 100 grams).
Conversions: ppm x 2 = lbs/A, Soluble Salts ms/cm x 640 = ppm.

This report applies to the sample(s) tested. Samples are retained a maximum of thirty days after testing. Soil Analysis prepared by A & L EASTERN LABORATORIES, INC.

by: Paul Chu, Ph.D.

Soil Report

Job Name: Michael Kilpatrick Date: 8/2/2013

Company: Michael Kilpatrick Submitted By:

Sample Location			1				
Sample ID							
Lab Number			41				
Sample Depth in Inches			0				
Total Exchange Capacity (M.E.)			15.13				
pH of Soil Sample			7.93				
Organic Matter Percent			7.81				
ANIONS	SULFUR:	Lbs/ac	42				
	Mehlich III Phosphorous:	ppm	125				
EXCHANGEABLE CATIONS	CALCIUM: (ppm)	Desired Value	7182				
		Value Found	2294				
		Delta					
	MAGNESIUM: (ppm)	Desired Value	210				
		Value Found	343				
		Delta					
	POTASSIUM: (ppm)	Desired Value	238				
		Value Found	58				
		Delta	181				
	SODIUM:	ppm	22				
BASE SATURATION %	Calcium (60 to 72%)		75.57				
	Magnesium (10 to 20%)		18.97				
	Potassium (2 to 7%)		0.82				
	Sodium (1 to 5%)		0.64				
	Other Bases (Variable)		3.80				
	Exchangable Hydrogen (10 to 15%)		0.00				
TRACE ELEMENTS	Boron (p.p.m.)		0.3				
	Iron (p.p.m.)		177				
	Manganese (p.p.m.)		95				
	Copper (p.p.m.)		5.07				
	Zinc (p.p.m.)		8.73				
	Aluminum (p.p.m.)		553				
OTHER	Cobalt ppm		<0.01				
	Molybdenum ppm		0.01				
	Selenium ppm		0.7				
	Silicon ppm		50.4				
	EC (mmhos/cm)		0.25				

Logan Labs, LLC

Logan Labs is great

Nutrient Dense

- Dan Kittridge, Real Food Campaign
- Jerry Brunetti, Agri- Dynamics
- John Kemp, Advancing Eco Agriculture

Measuring Brix

- The higher the brix the healthier the plant
- Higher brix is a result of better mineralization of the soil
- For the best brix, nutrients are foliar applied during the season.

The Big 5

- Nitrogen
- Phosphorous
- Potassium
- Sulfur
- Calcium

Micro-Nutrients

- Magnesium
- Cobalt
- Copper
- Iron
- Manganese
- Molybdenum
- Zinc

Sources for Micronutrients

- Lancaster Ag
- Nutrient Density Supply Co.
- SeaAgri, INC

Soil management

- Squeeze test for dryness
- Don’t compact by driving on wet
- bedding up in fall
- Some soils are just later
- Providing adequate drainage to heavier soils

Soil health resources

- Northeast cover crop handbook
- The real dirt
- Building soils for better crops
- Advanced biological farming

Growing Great Cover Crops

What is a cover crop?

Any crop that is covering the soil

Yes, weeds can be a cover crop!

Cover crops vs green manures

Why Cover Crops?

- Benefits soil: Stops erosion, sequesters carbon (organic matter), stabilizes soil moisture
- Manages Nutrients: adds or scavenges
- helps reduce weeds and flummoxes pests

Drawbacks

- Management
- establishment is when workload can be highest (spring and Fall)
- Weeds can establish in cover
- Uses soil moisture to grow (not a problem in irrigated vegetable land)
- difficulty incorporating at end of year.

Types of Cover Crop

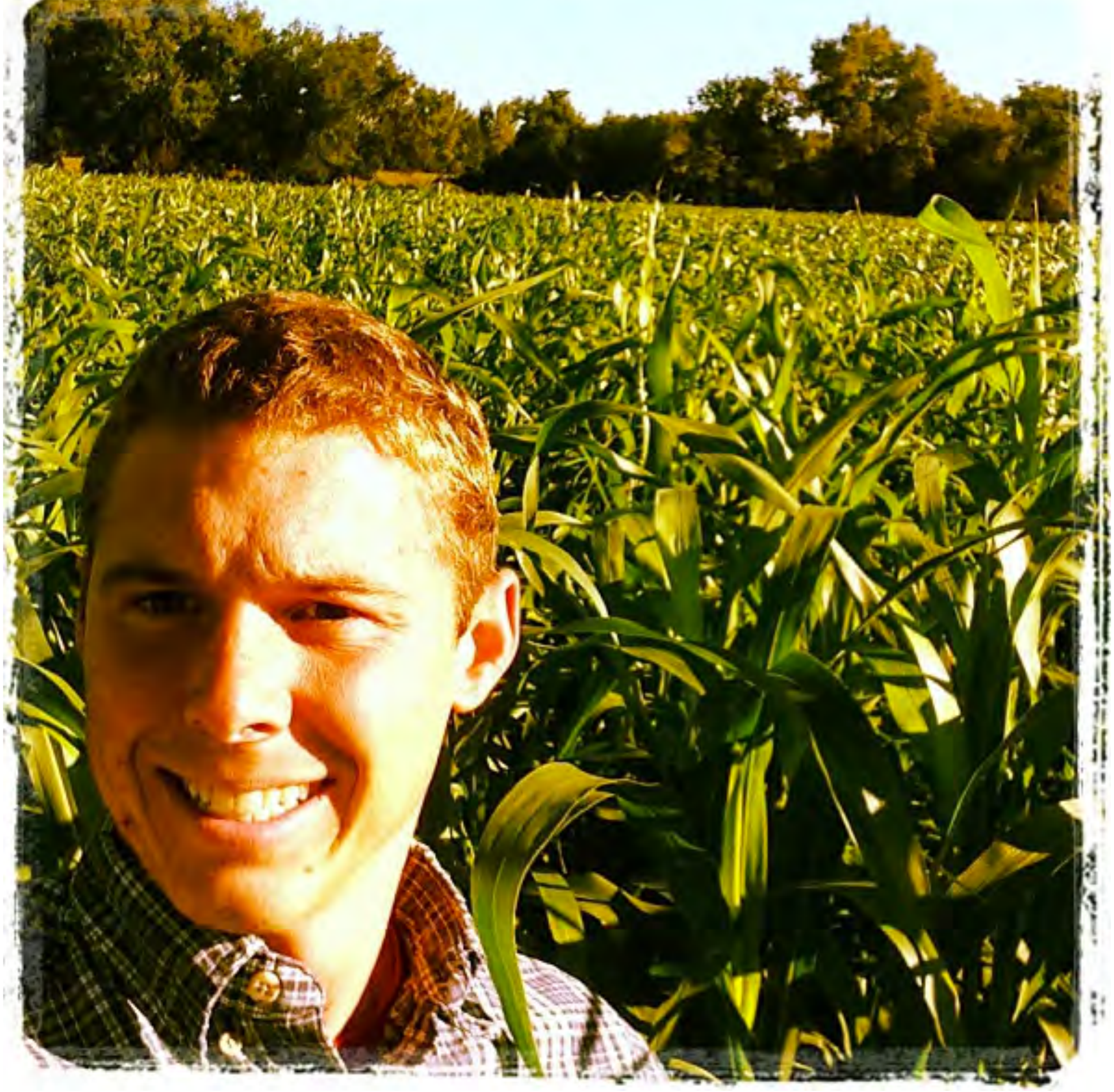
- Winter vs. Summer
- Legume vs non-legume
- Annual, Biennial, Perennial
- Intercropped
- Cover Crop Mixtures

Non-Legume Cover Crops

- Adds Organic matter
- Reduces erosion
- Suppresses weeds
- Large amounts of residue (can be tough to manage for next crop)
- Can tie up Nitrogen

Examples of Non-Legume Crops

- Grasses (rye, oats, sorgum)
- Brassicas (tillage radish)
- sunflowers
- Buckwheat



Legume Cover Crops

- Annuals (Soybeans, field peas, cow peas, Sunhemp)
- Perrenials (red & white clover, medics, Alfalfa)
- Biennnials (sweetclovers, hairy vetch)
- Less residue


2011 Mike Simmons


FRONTIER
OS1072M


SUNFLOWER

Ray Archuleta

Gabe Brown

What are you looking for in a cover crop?

- Partial season or full season?
- do you need nitrogen or carbon?
- are you looking to reduce erosion?
- Summer or Winter crop?
- Can you manage it with your equipment?

Managing Cover Crops Profitably

THIRD EDITION

Plant Health=

Disease Resistance

Fighting disease...

- good soil health
- variety selection
- adding mycorrhizae
- not working the soil too early or too late- the clump test
- good air circulation- giving plants nessesary space, and uncovering so they can dry out
- clean seed, propagation trays, equipment

Aphids

- thrive in cool, wet environments with lush greens
- Love to be under rowcover
- Also can transmit many diseases

Surround

Crop Rotation

Why Rotate

- Decrease Disease
- Slow pests
- Soil Health
- Weed Pressure

How to plan a rotation

- Look at field history
- what do you want to accomplish?
  - weed suppression
  - soil health
- full season vs partial season crops

Write it down

- Keep good records, as simple as a journel but so much easier in the age of google docs
- we use an online spreadsheet program
- Helpful to know back at least 4 years

Vegetable Families

- **NIGHTSHADES** *Solanaceous* Tomatoes, Tomatillos, Eggplants, Peppers, Okra, Potatoes
- **MORNING GLORY** Sweet potato
- **MELONS & SQUASH** *Cucurbits* Cucumbers, Zucchini & Summer Squash, Watermelon, Musk Melon, Pumpkin, Gourd
- **GOOSEFOOT** Beet, Spinach, Chard, Quinoa, Orach
- **SUNFLOWER** Sunflower, Jerusalem artichoke, Lettuce, Endive, Artichoke

Vegetable Families

- **COLE** *Brassicas*, Broccoli, Brussels sprouts, Cauliflower, Cabbage, Kale, Collards, Radishes, Kohlrabi, Rutabaga, Turnip, Mustard
- **ONIONS** allium Onion, Leeks, Chives, Garlic
- **PEAS** *Legumes*, Peas, Runner beans, Bush beans, Fava beans , Garbanzo beans, Peanuts
- **GRASSES**, Corn, Millet, Rice, Barley, Wheat, Rye
- **PARSLEY** Parsley, Carrots, Parsnips, Celery, Fennel, Cilantro/Coriander

Crops for weed suppression

Good	Bad
• greens	• carrots
• corn	• onions
• potatoes	• peas
• Squash	• leeks
• beans	• asparagus

Rotation in the field

- Preferred four years for most crops
- Tough with the amount of brassicas we grow
- We treat all greens direct seeded as one type has grown together (lettuce radishes spinach)
- Onions, carrots, long-season brassicas always in 4 year rotation.

Crop needs

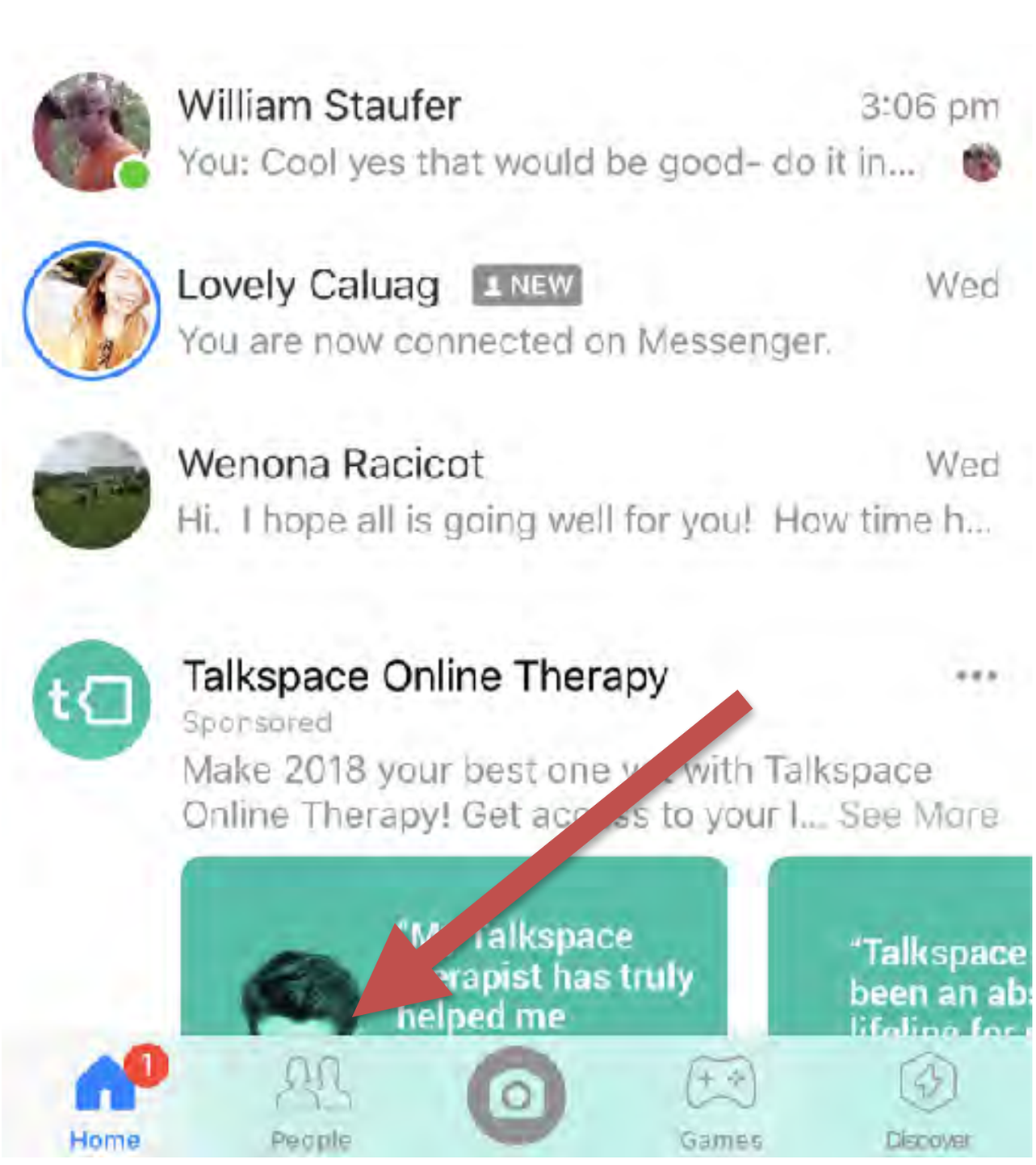
- Check each individual crop needs (and what they take out)
  - beets need high amounts of K (Potassium)
  - Celeriac and Celery like lots of Boron
  - Corn and greens like lot of nitrogen

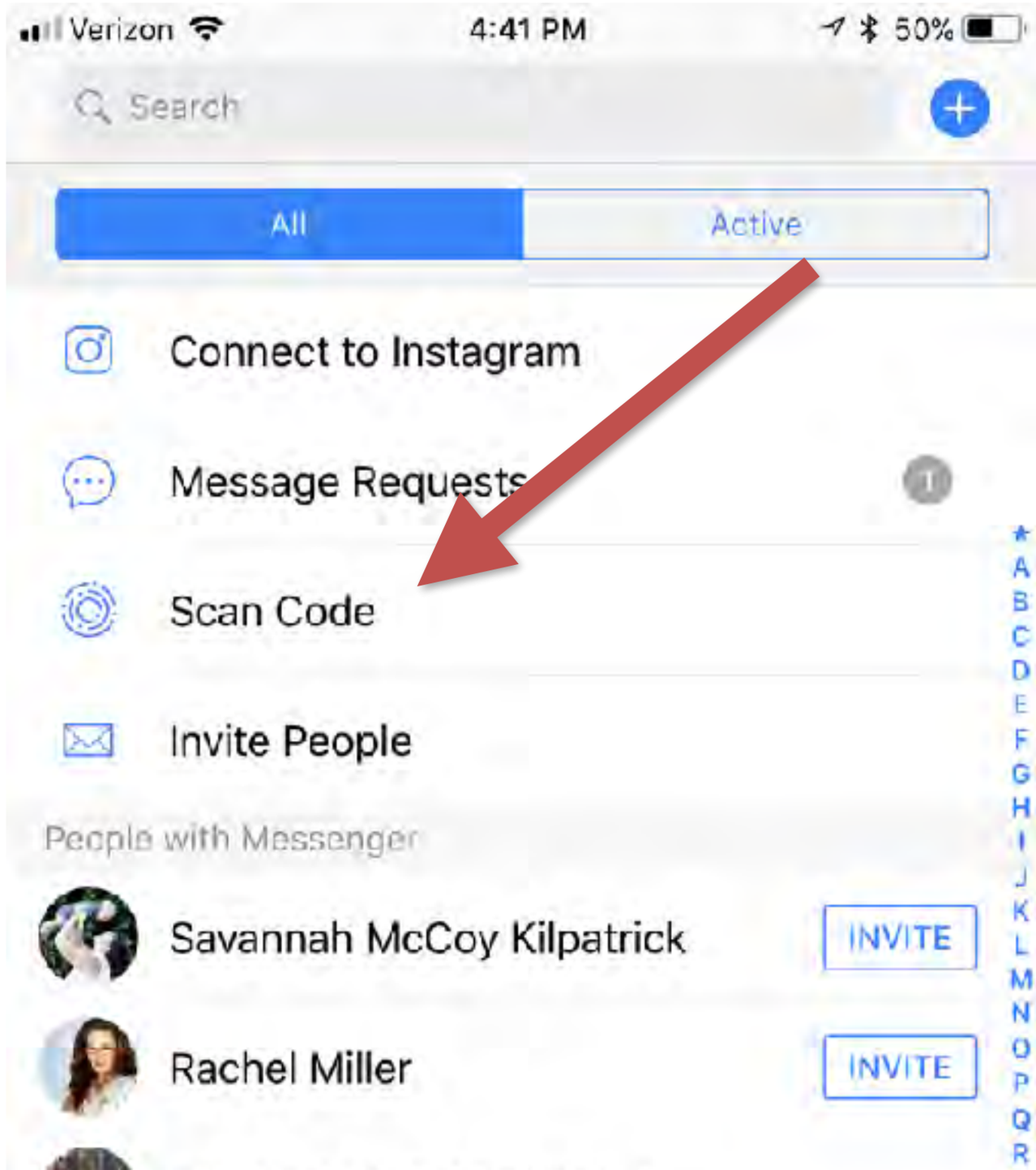
TOP	length	13	12	11	10
1	150	Brussels	kale 4/11	onion 4/6	
2	150	Brussels	kale 4/11	Spinach 3/27	
3	150	Brussels	cucumber 5/30	Swiss chard 4/20	
4	150	Brussels	cucumber 5/30		
5	150	Brussels	eggplant 5/23		
6	150	Brussels	Tomato 5/16	kale/radish 3/27	
7	150	Brussels	Tomato 5/16	kale/ spinach 3/27	
8	150	squash	Tomato 5/16	kale/ spinach/spinach/arugula/ kale, red russian	
9	150	squash	Tomato 5/16	fallow/w	
10	150	Peppers	Tomato 5/16	fallow/w	spring lettuce
11	150	Peppers	Tomato 5/16	fallow/w	spring lettuce
12	150	Peppers	Tomato 5/16	fallow/w	spring lettuce
13	150	tomato	cherry tom 5/16	peppers	tomatoes
14	150	squash	cherry tom 5/16	tomatoes	tomatoes
15	150	tomato	cherry tom 5/16	peppers	tomatoes
16	150	greens	Peppers 5/10	tomatoes	Fallow/ winter kale
17	150	greens	Peppers 5/10	tomatoes	Fallow/ winter kale
18	150	greens	Peppers/tomatillo 5/10	tomatoes	Fallow/ winter kale
19	150	bare	Swiss chard 4/11	Strawberries	Strawberries
20	150	bare	Swiss chard 4/11/ Squash	Strawberries	Strawberries
21	150	bare	Squash 5/16	spinach/ Strawberries	Strawberries
22	150	bare	Squash 7/11	spinach/ Strawberries	Strawberries
23	150	bare	Squash 7/11	spinach/ Strawberries	Strawberries

Rotation in the greenhouse

- Very, very tough
- Never repeat the same crop
- Greens, tomatoes, greens
- Try to move beds around
- Would be great to uncover and freeze houses during winter time

To get the slides!





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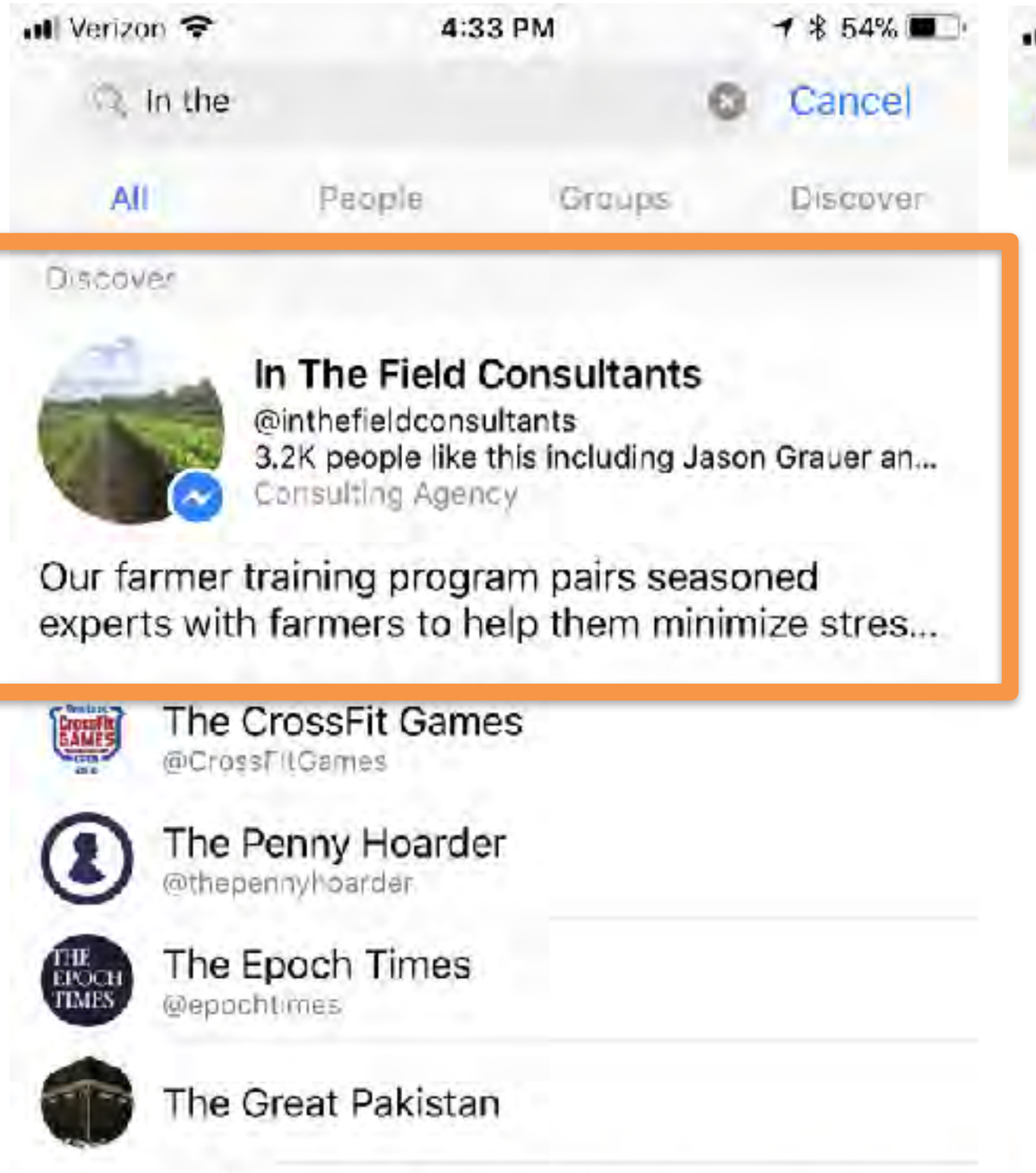

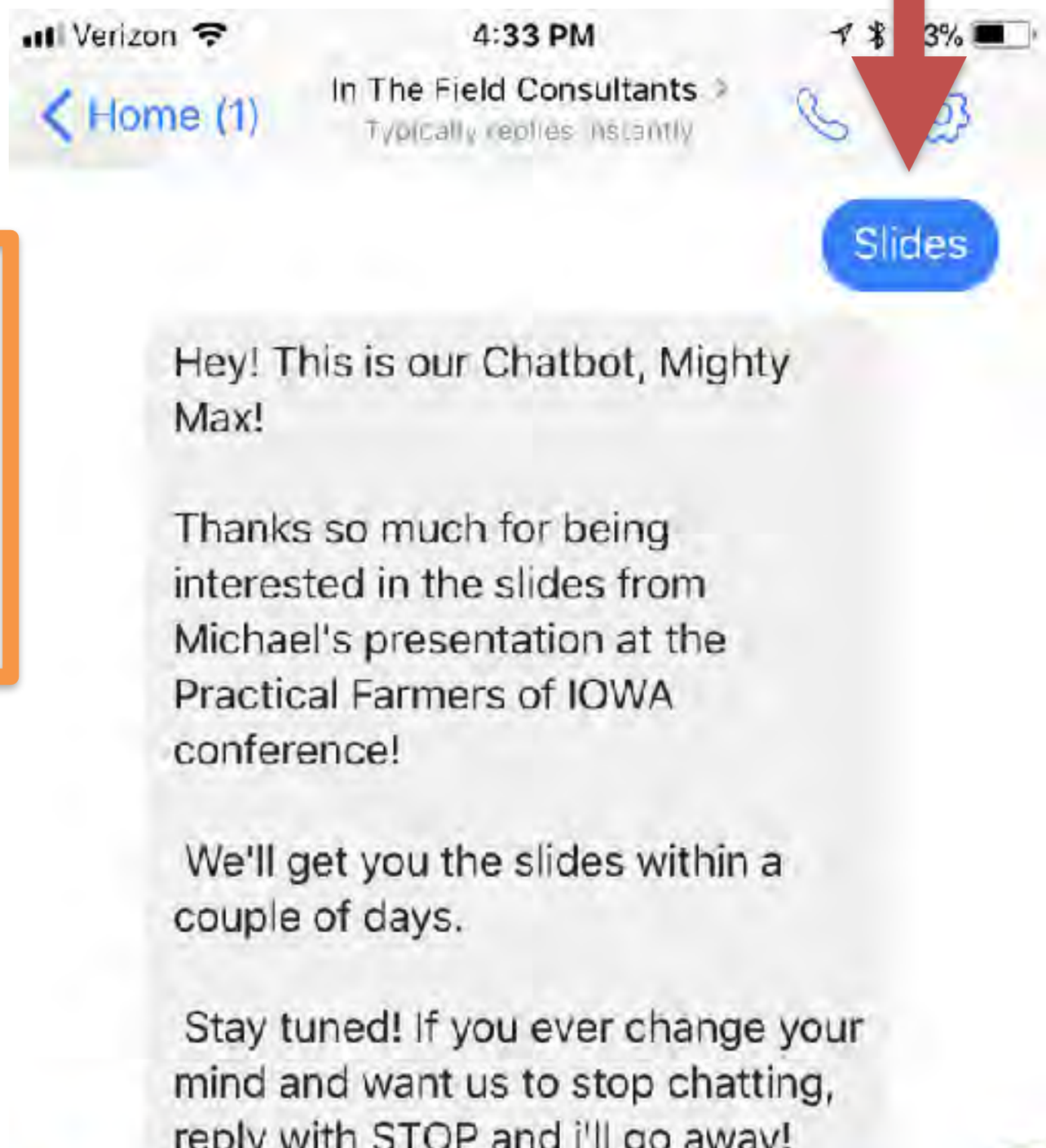

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Text “FARMING” To 44222

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