# I can’t believe it’s not butternut on plastic! Year two cover crop and fertility observations

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# Specialty Crop sustainability needs

- Conserve water
- Build soil
- Eliminate plastic from budget and farm environment
- Maintain yield

# Year one: moisture conservation

- MDARD Specialty Crop Block Grant - $23,488
  - One year study comparing tillage, cover cropping and irrigation practice and their effect on water retention in winter squash

# Year two: fertility

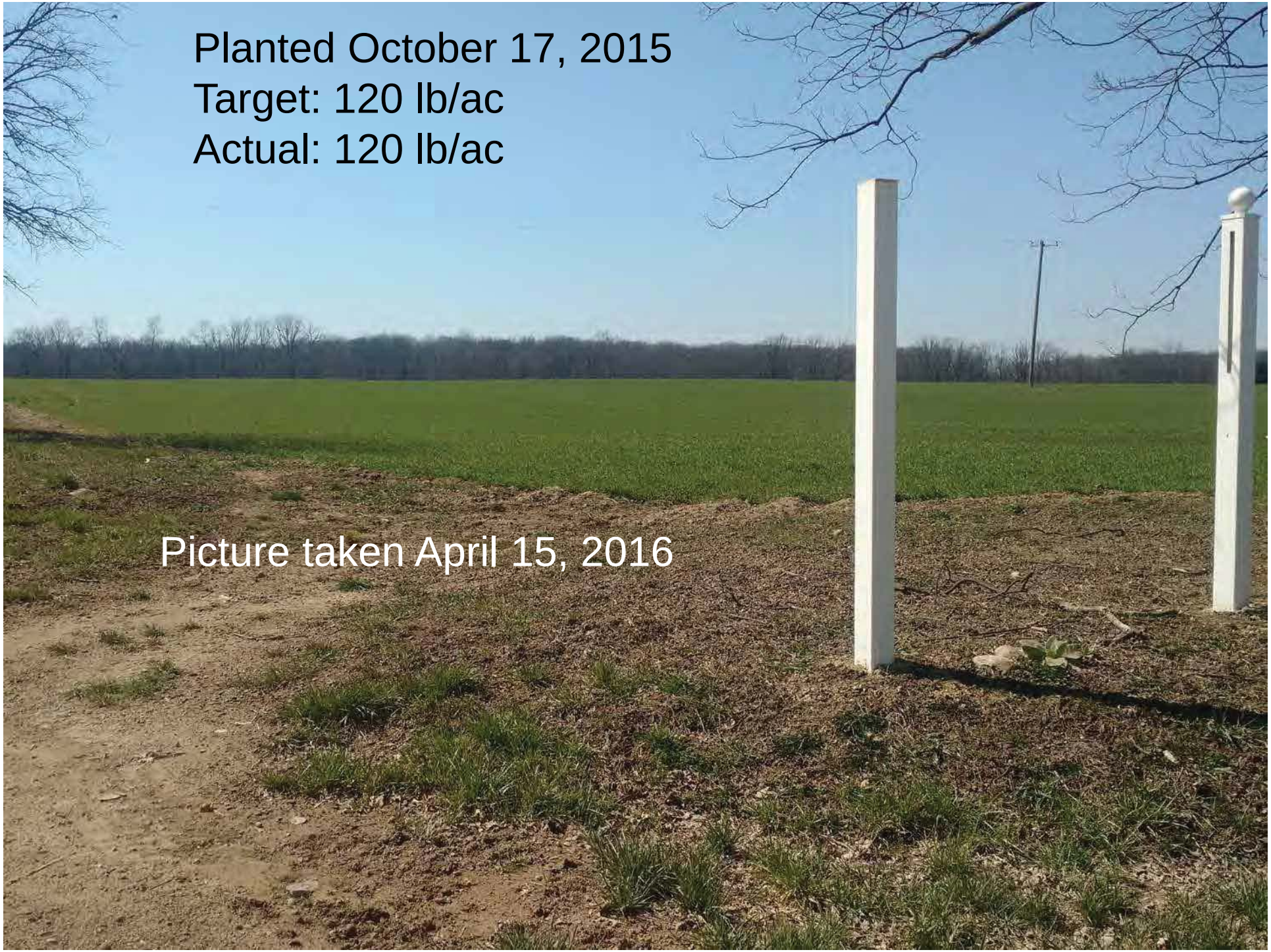
- Donation from ICL fertilizer and small MSU grant

# Cover crop selection

- Winter Rye
  - Can plant in previous season
  - Accumulates biomass
  - Cheap and easy to get
  - Good rotation between veggies
  - Efficient nutrient scavenger
  - Strong root system…outcompetes weeds


Grain drill
$2800
Nothing special

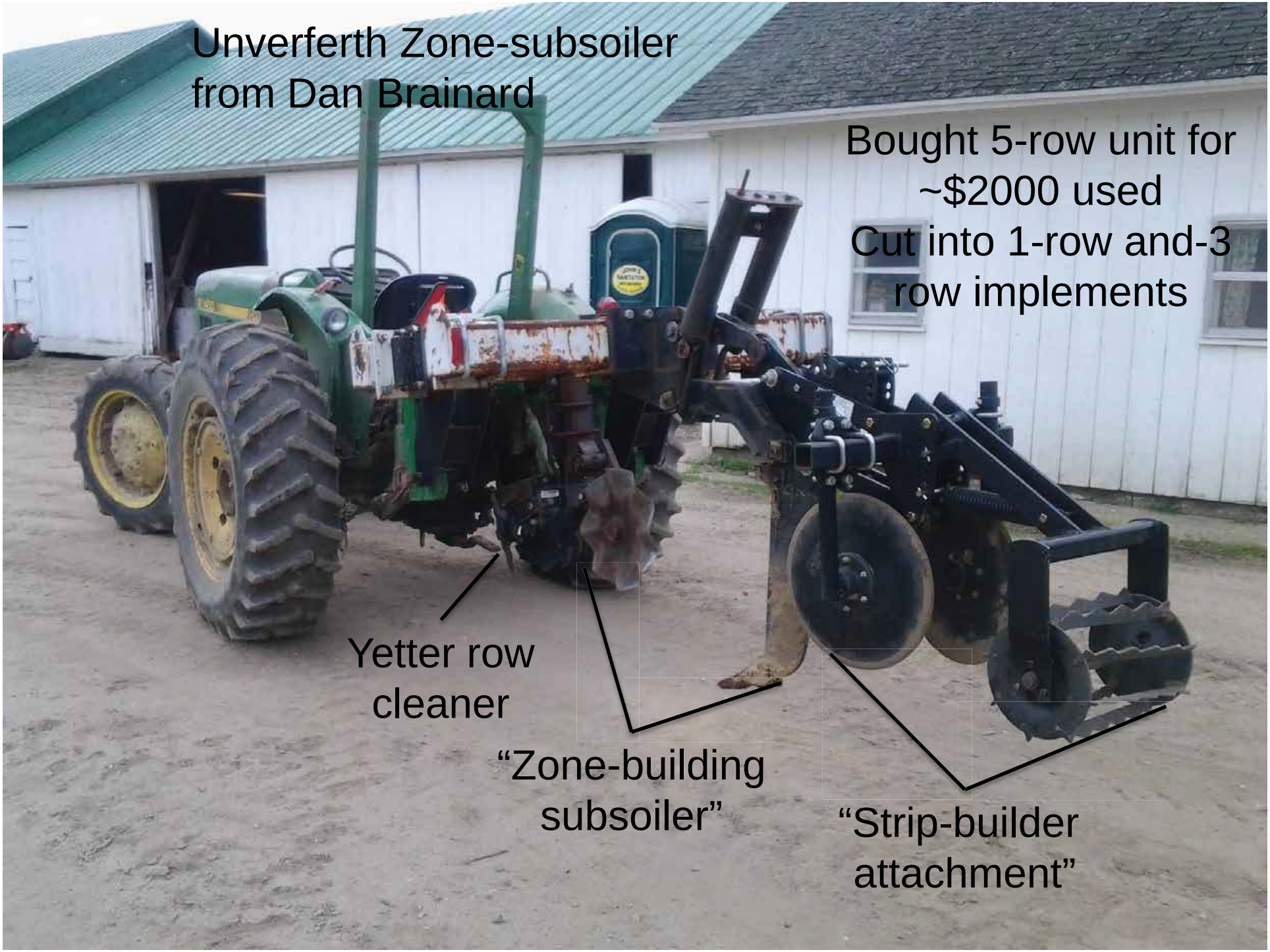

Planted October 15, 2014
Target: 115 lb/ac
Actual: ~ 70 lb/ac
Lesson 1: calibration
Picture taken April 15, 2015


Planted October 17, 2015
Target: 120 lb/ac
Actual: 120 lb/ac
Picture taken April 15, 2016


Burned down rye
May 25, 2015
May 27, 2016
Waist height and flowering


Rolling rye
June 3, 2015
June 2, 2016
I&J Roller crimper
With loader adapter
$4100


Chisel plowing and discing
June 10, 2015
June 4, 2016


Unverferth Zone-subsoiler
from Dan Brainard
Bought 5-row unit for
~$2000 used
Cut into 1-row and-3
row implements
Yetter row
cleaner
“Zone-building
subsoiler”
“Strip-builder
attachment”


Strip-tilling
June 5, 2015
June 8, 2016

# Laying plastic June 25, 2015

## 2015 plots

Yellow = no-till
Red = strip-till
Blue = disced
Black = plastic

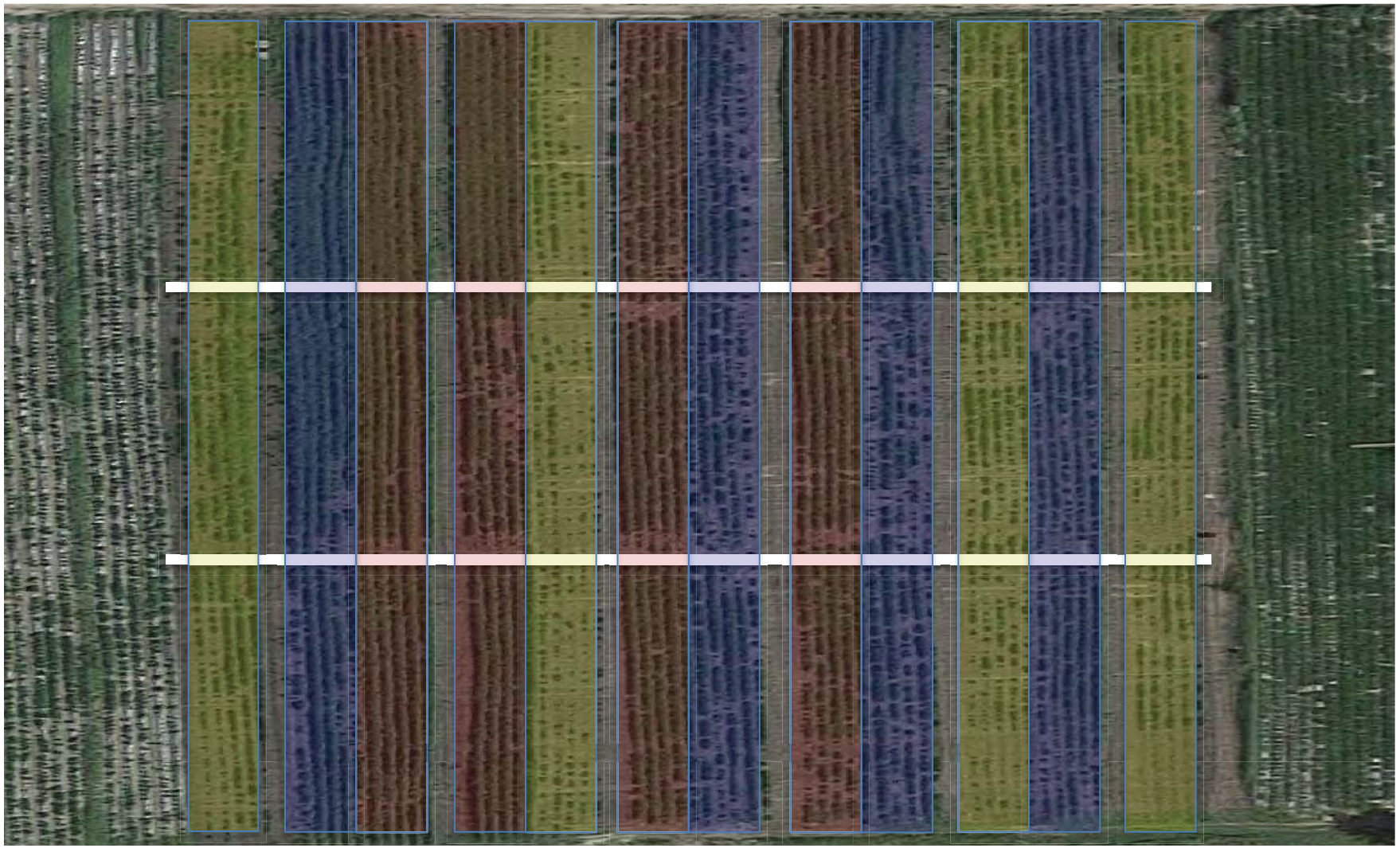
3 reps
2 irrigation trts


“Buy the biggest measuring tape”

# 2016 plots

Yellow = no-till
Red = strip-till
Blue = disced

4 reps
3 tillage trts
3 fertilizer trts



# 2016 plots

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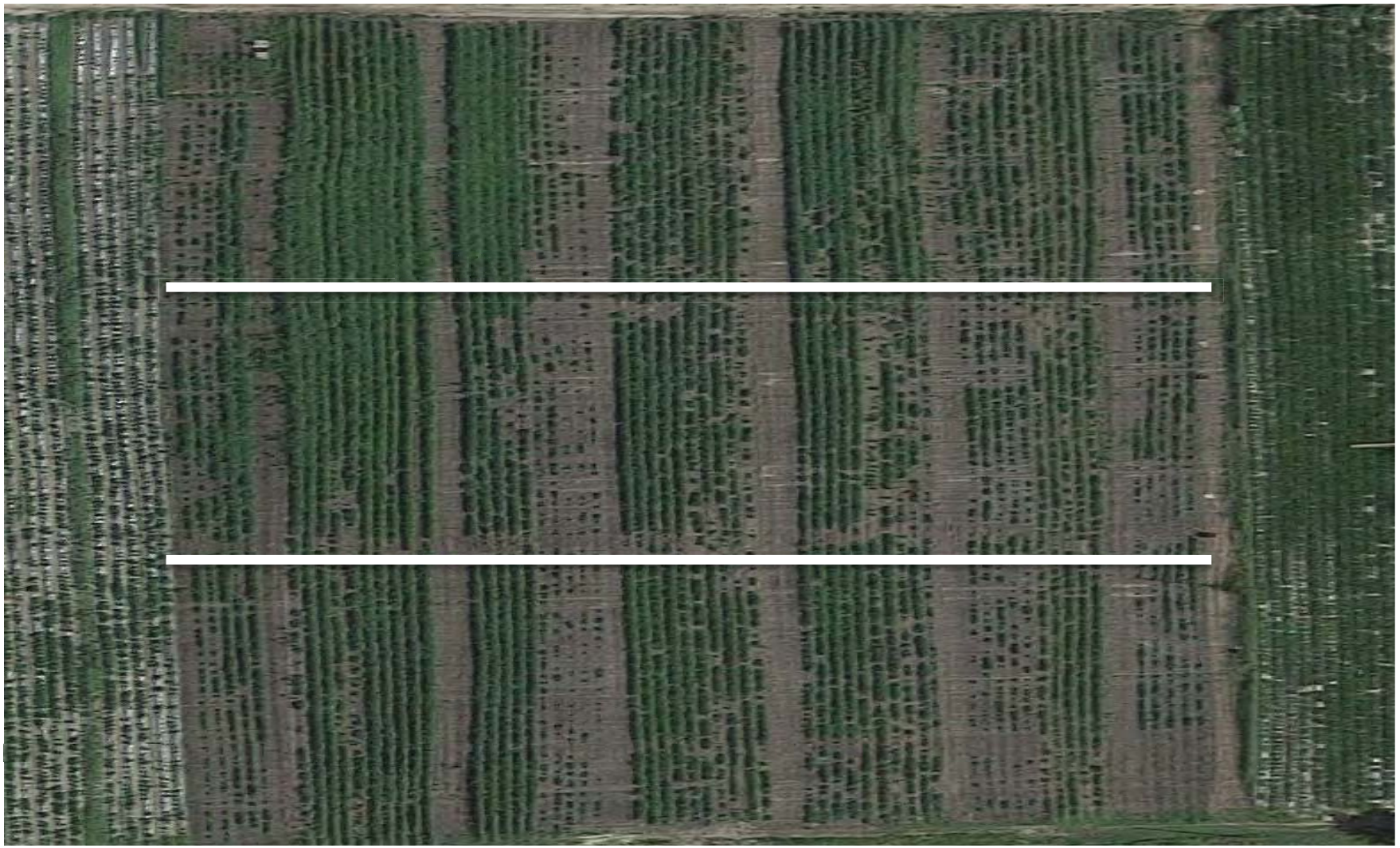
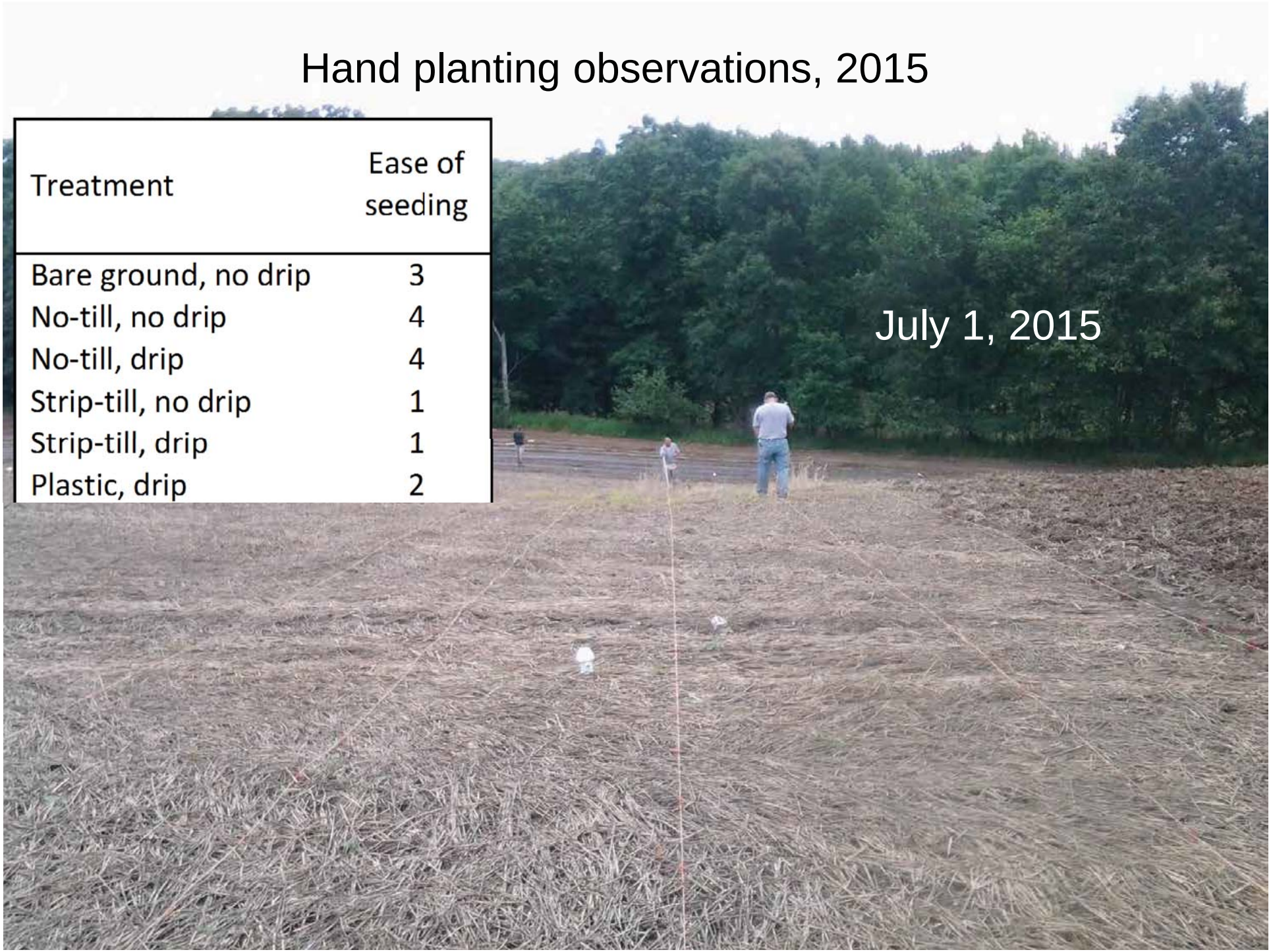


# Fertilizer treatments

- 67.76 lb actual N Controlled Release
- 47.16 lb actual N Controlled Release
- 59.69 lb actual N urea, DAP, K2SO4

# Hand planting observations, 2015

| Treatment | Ease of seeding |
|---|---|
| Bare ground, no drip | 3 |
| No-till, no drip | 4 |
| No-till, drip | 4 |
| Strip-till, no drip | 1 |
| Strip-till, drip | 1 |
| Plastic, drip | 2 |



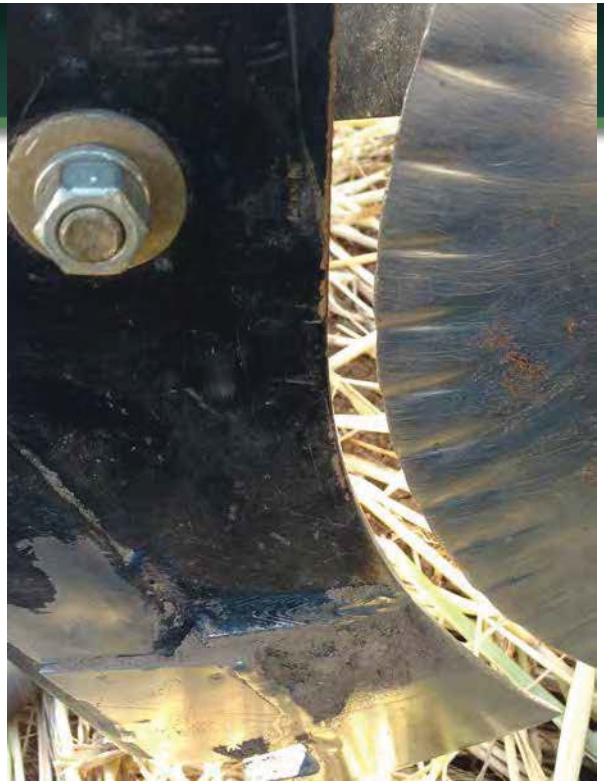

Machine planting with June 10-13, 2016

Dual 5x5 dry fert

# Hand planting observations, 2016


Hand planting observations, 2016

# Extension



Hand planting observations, 2016

# Weed control 2015

- Extra burn down waiting for weather and equipment, and wrong PRE timing in 2015
  - Dual Magnum before seeding

- Poor rye stand and delayed planting allowed germination of weeds in most plots

# Weed control 2016

- 1 burn down, and right PRE right time in 2016
  - Sandea + Curbit + Command one day after planting, followed by 1/4” rain.
- Excessive tillage in bareground plots germinated lots of lambsquarters
- Poor seeding depth and delayed germination in no-till may have allowed weeds to out-compete

# 2016 season

No-till planted June 13
Picture taken July 14

# 2016 season

No-till planted June 13
Picture taken Sept 12

# 2016 season

No-till planted June 13
Picture taken Oct 7

# 2016 season

Strip-till planted June 13
Picture taken July 14

# 2016 season

Strip-till planted June 13
Picture taken Sept 12

# 2016 season

Strip-till planted June 13
Picture taken Oct 7

# 2016 season

Conventional-till planted June 13
Picture taken July 14

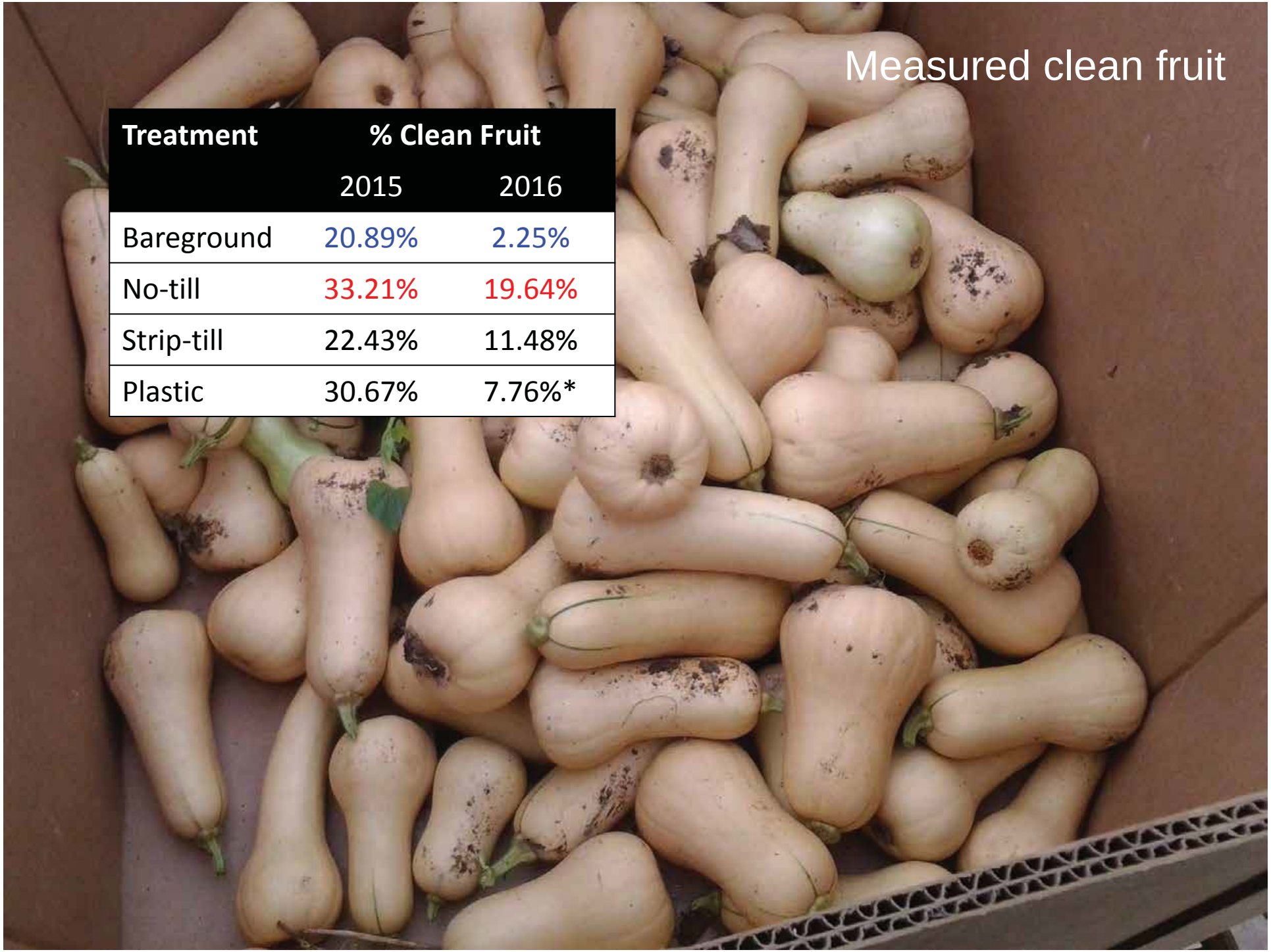
# 2016 season

Conventional-till planted June 13
Picture taken Sept 12

# 2016 season

Conventional-till planted June 13
Picture taken Oct 7

Harvest
October 8, 2015
October 6-7, 2016




| Treatment | % Clean Fruit | |
|---|---|---|
| | 2015 | 2016 |
| Bareground | 20.89% | 2.25% |
| No-till | 33.21% | 19.64% |
| Strip-till | 22.43% | 11.48% |
| Plastic | 30.67% | 7.76%* |

# Yields

| Treatment | Plants/Acre | | Tons/Acre | |
|---|---|---|---|---|
| | 2015 | 2016 | 2015 | 2016 |
| Bareground | 3775 | 5400 | 8.36 | 9.70 |
| No-till | 3086 | 4478 | 4.34 | 8.72 |
| Strip-till | 3666 | 7498 | 6.65 | 12.5 |
| Plastic | 4240 | 4329* | 13.8 | 11.2* |

| Treatment | Inorganic soil N ppm | | | | Fertilizer cost/ac |
|---|---|---|---|---|---|
| | 30 dap | 60 dap | 90 dap | Tons/ac | |
| Hi-rate CRF | 10.86 a | 13.76 a | 6.32 a | **10.88 a** | $160.30 |
| Lo-rate CRF | 12.75 a | 9.68 a | 6.76 a | 9.65 a | $111.57 |
| GSF | 15.51 a | 14.39 a | 9.14 b | **10.39 a** | $72.13 |

- CRF is $16.56 per 50 lb bag
- GSF is $14.25 per 50 lb bag

# Lessons learned in year 1

- Calibrating cover crop drill
- Checking sprayer performance
- Right product, right time…herbicides
- Nitrogen was lacking
- Plastic…is pretty good

- Equipment total: ~$9000

# Lessons learned in year 2

- Calibrate for at-plant fertilizer
- Repeated tillage flushes weeds
- Plant deeper in no-till
- Hi-rate controlled release offered a higher return, but not significant based on yield data

# Thanks


- Ann, Nikita, Lori, Joe, Kevin, and Tom at Forgotten Harvest
- Work Force Development crews
- Dan Brainard, Markah Frost


USDA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& Rural Development