



# RODALE INSTITUTE

## *“Innovative Cover Crop Management Strategies”*

By Jeff Moyer  
Farm Director





# Written in 1942

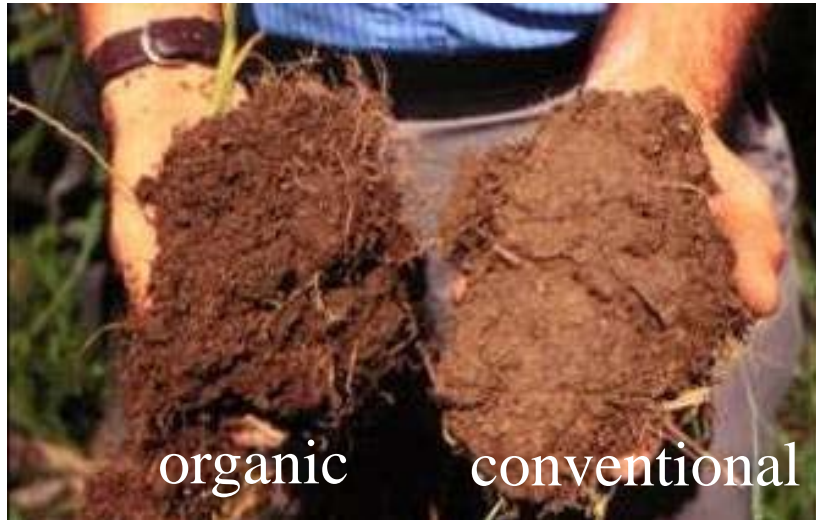
**“Healthy Soil = Healthy Food = Healthy People”**

***J.I.Rodale***





# FST Soil Results



Soils of the organic systems have a more active soil biological community  
→ higher levels of **glomalin** (a glycoprotein that acts like 'glue', binding organic matter to mineral particles),  
→ greater populations of **mycorrhizae** (a fungus that forms a symbiotic relationship with its host plant: the fungus receives carbohydrates from the plant, which in return gains access to water and nutrients).

This leads to improved soil structure and enhanced carbon sequestration.



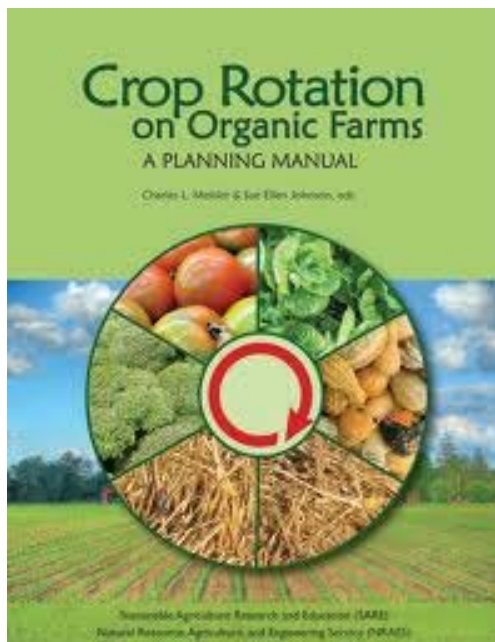
# Cover Crops

- Soil cover (reduces erosion)
- Builds soil organic matter
- Deliver key nutrients (Legumes - N)
- Conserves (recycles) nutrients
- Nutrient source for soil microbes
- Weed suppression
- Breaks pest cycles
- Reduces compaction
- Increases soil aggregation
- Increases infiltration
- Improves water holding capacity
- Improves aeration
- Reduces soil crusting





# Crop Rotation Protocols



- By Plant Type
- To Build Pest Resistance
- To Improve Soil
- To Make More Money
- To Enhance Biodiversity



# Tillage has it's Drawbacks







# Tillage Opens the System Up to Damage





# Several Secondary Tillages







# **We Can Mulch Out Annual Weeds In The Garden**







# A Different Way of Farming





## Past - equipment to kill cover crops

- **Culti-packer**
- **Stalk chopper**
- **Flail mower**







# Tools That Make it Possible



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# Corn

## PLOW TILL

- PLOW
- DISC
- PACK
- PLANT
- ROTARY HOE
- ROTARY HOE
- CULTIVATE
- CULTIVATE
- HARVEST
- **(143 Bu/A)**

## NO-TILL

- ROLL/PLANT
- HARVEST
- **(160 Bu/A)**

A two step organic production system Plant and Harvest!





# Cover Crops

## The Key To A Successful Weed Program



Crimson Clover



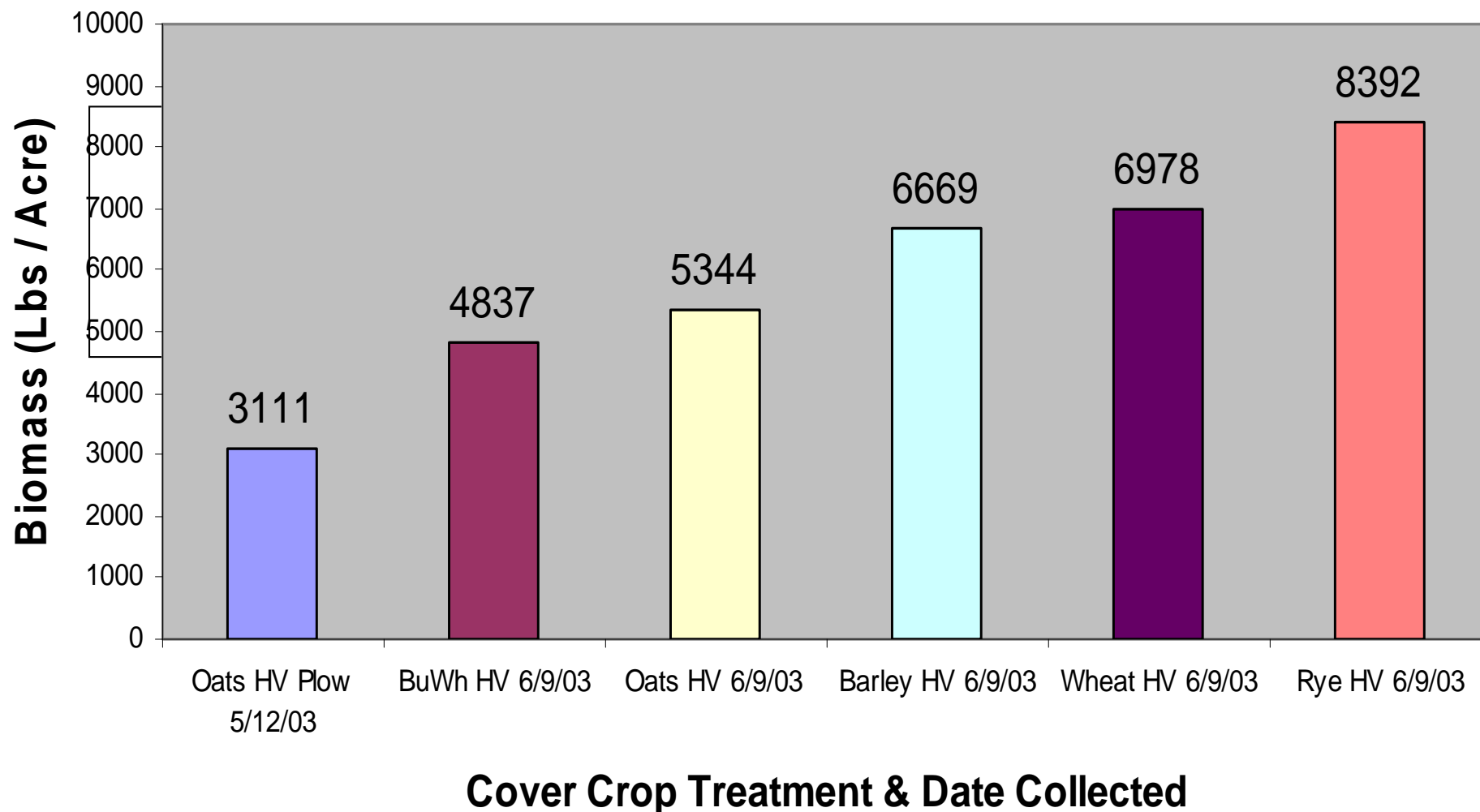
Hairy Vetch/Rye

Hairy Vetch



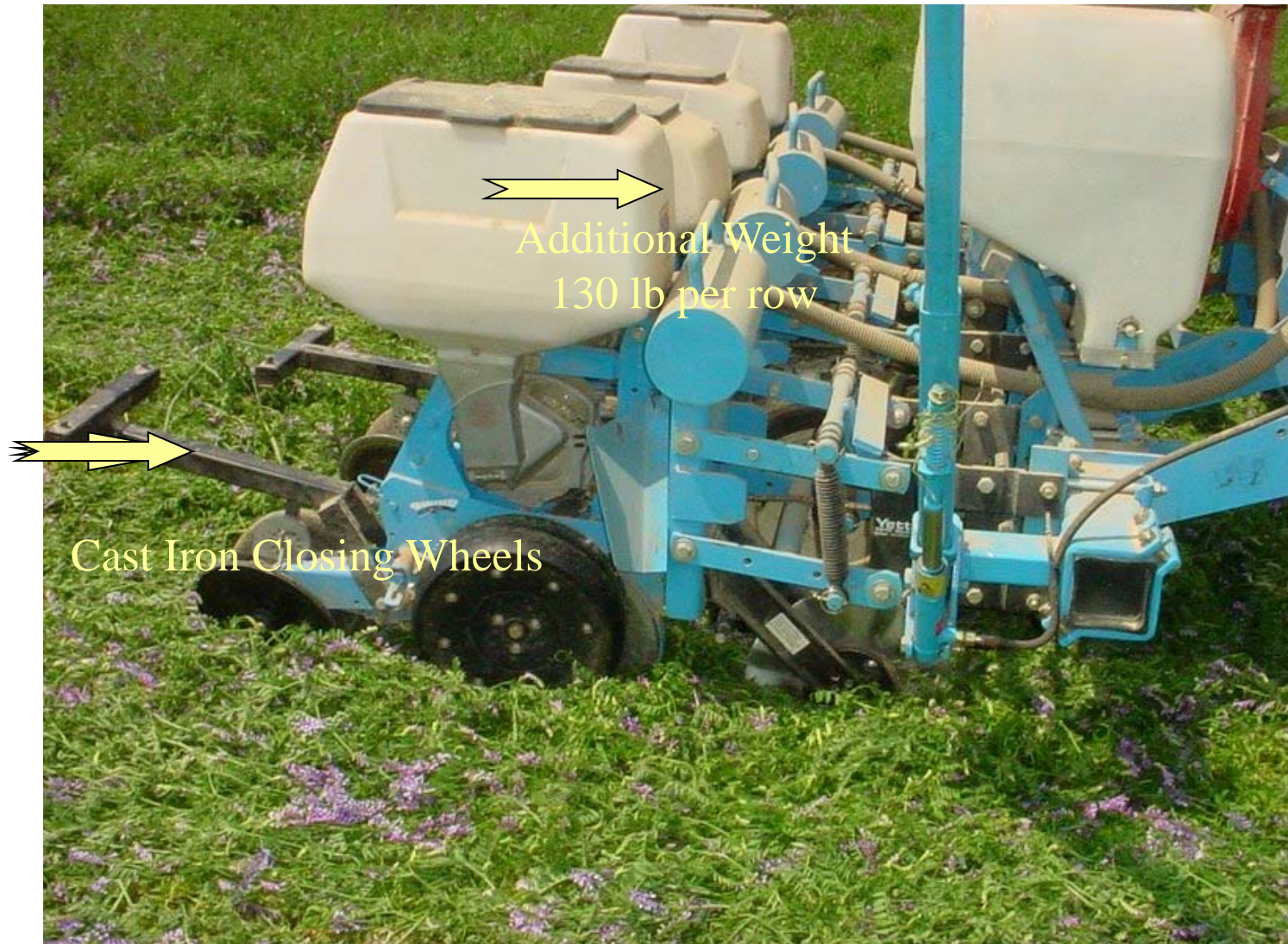


## Average Biomass (lbs/A) of Cover Crop Mixtures: 2003 Corn Cover Crop Trial





# Planter Modifications









# Mis-Planted Seed







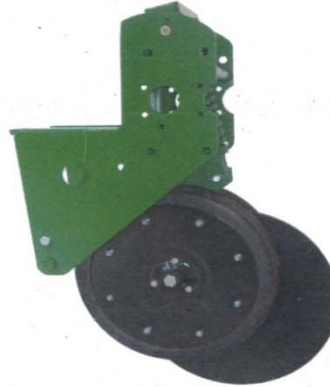
# Yetter Residue Managers





## Residue Slicer

- The Residue Slicer is used in combination with the I&J Mfg Cover Crop Roller to plant organic corn, beans, and other crops into heavy cover crop, no-till conditions.
- Can be used for non-organic, no-till using less chemicals, or in extremely heavy residue conditions without installing row cleaners.
- The Residue Slicer is compatible with John Deere 7000-7200-1750 planters.
- With enough down spring pressure, a straight blade, in combination with the rubber wheels to hold the heavy residue, will make a clean cut. Without the rubber wheels, the residue may hair-pin into the seed trench.
- The Residue Slicer will also work well under general no-till conditions, with little or no residue.

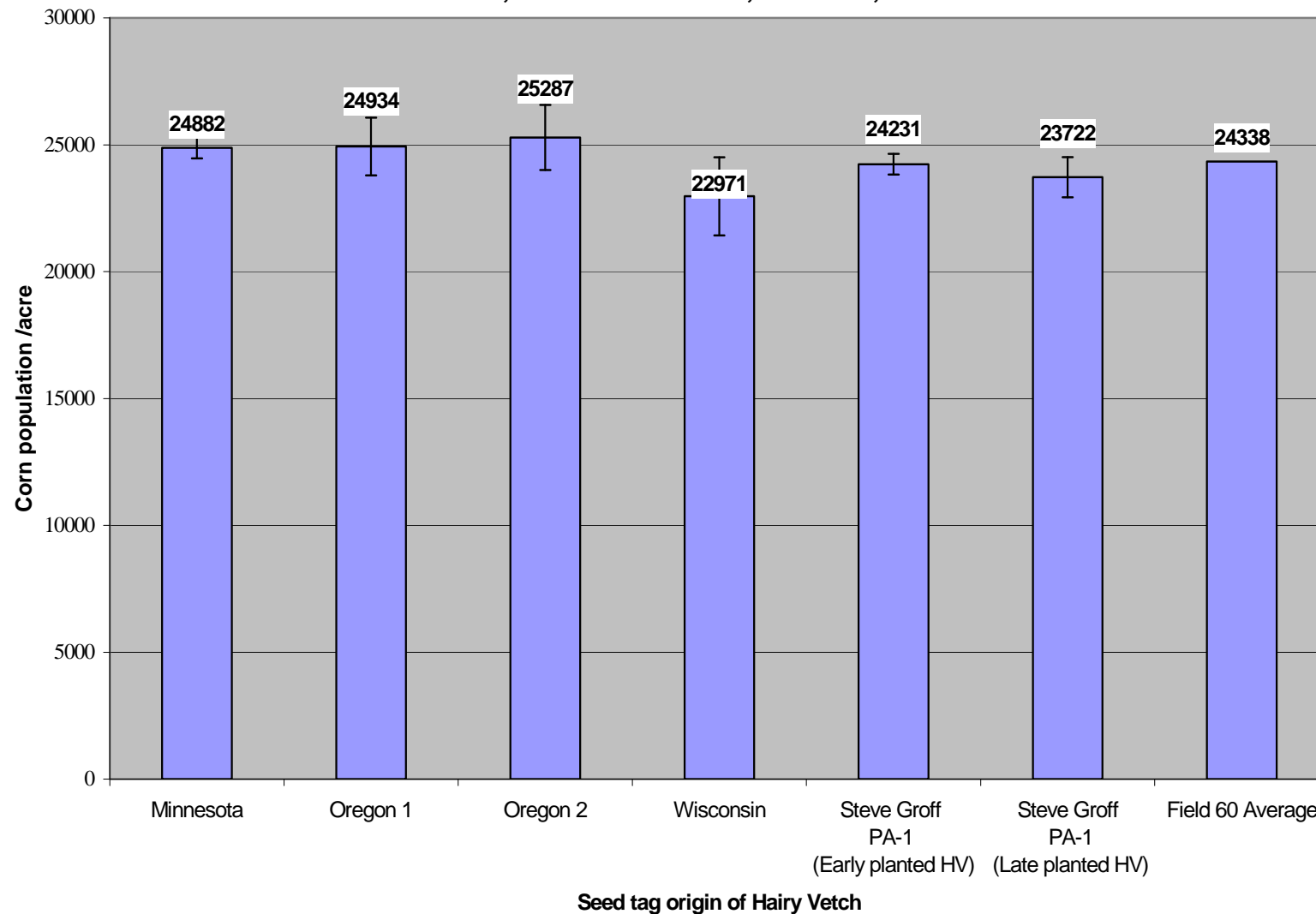






# 2006 Pre-harvest No-Till Corn Plant Population

2006 preharvest No-till Corn plant population  
Field 60, The Rodale Institute, Berks Co., PA





# Corn 3 Days After Planting







# Cover from Mechanical Kill







# Corn Mid-Season







# 2013 Corn into Hairy Vetch







# 2010 Soybean Research Plots







# 2012 Termination Trials - Soybeans







# Treatment #14 Planted May 23<sup>rd</sup> w/o Shark Teeth



Cover Crop Removed



Yield 17 Bu/A







# Treatment #11 Planted June 1st w/Shark Teeth



Yield 38 Bu/A







## Treatment #2 Planted May 23<sup>rd</sup> w/Shark Teeth

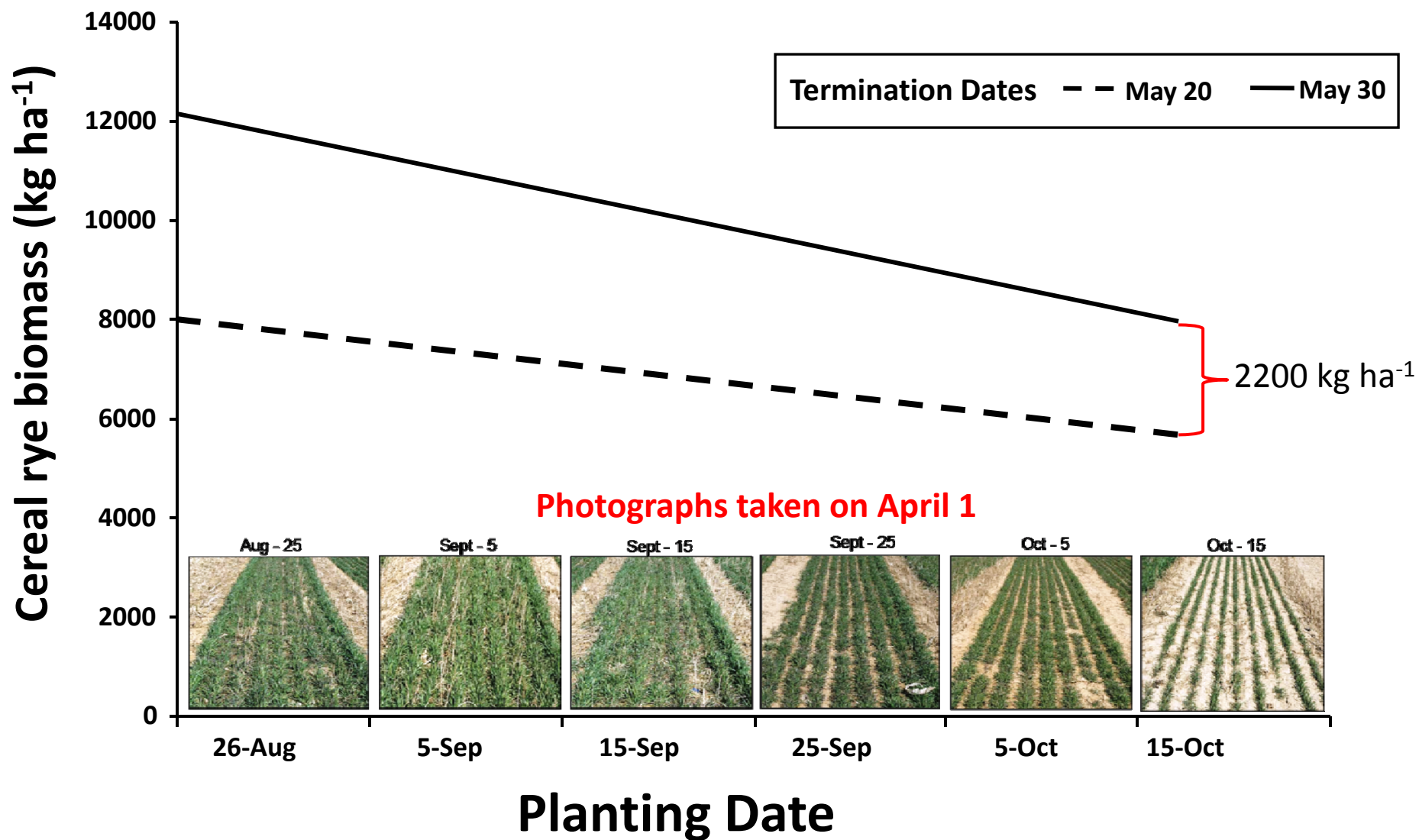


Yield 59 Bu/A



# Effects of planting and termination date on cereal rye biomass

(Penn State University, Rock Springs, PA; Aroostook cereal rye)



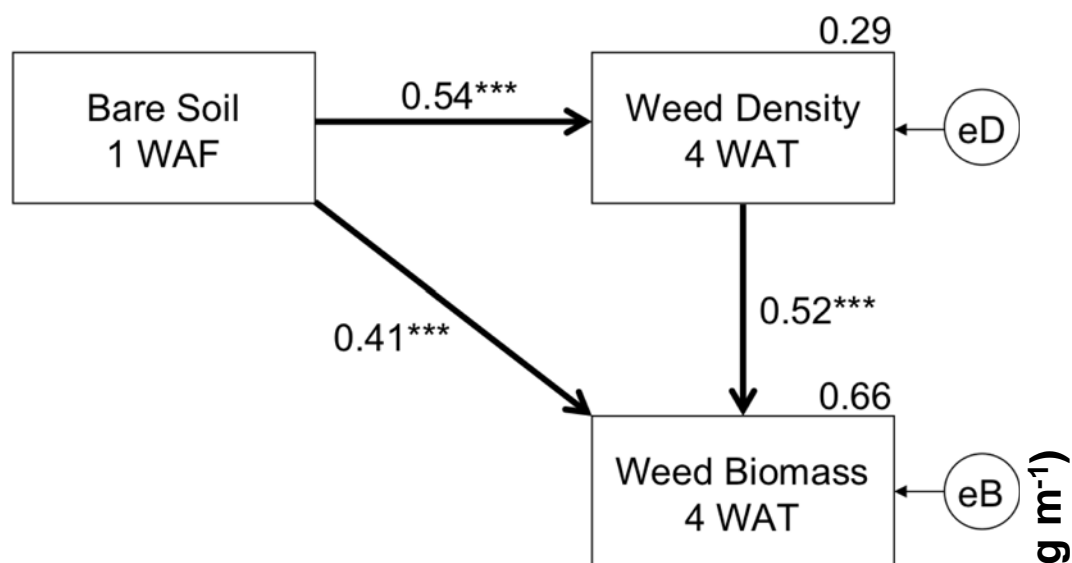
Mirsky, S.B., W.S. Curran, D.M. Mortensen, D.L. Shumway, and M.R. Ryan. 2011.

Timing of cover crop management effects on weed suppression in no-till planted soybean using a roller-crimper. Weed Science. 59:380-389.

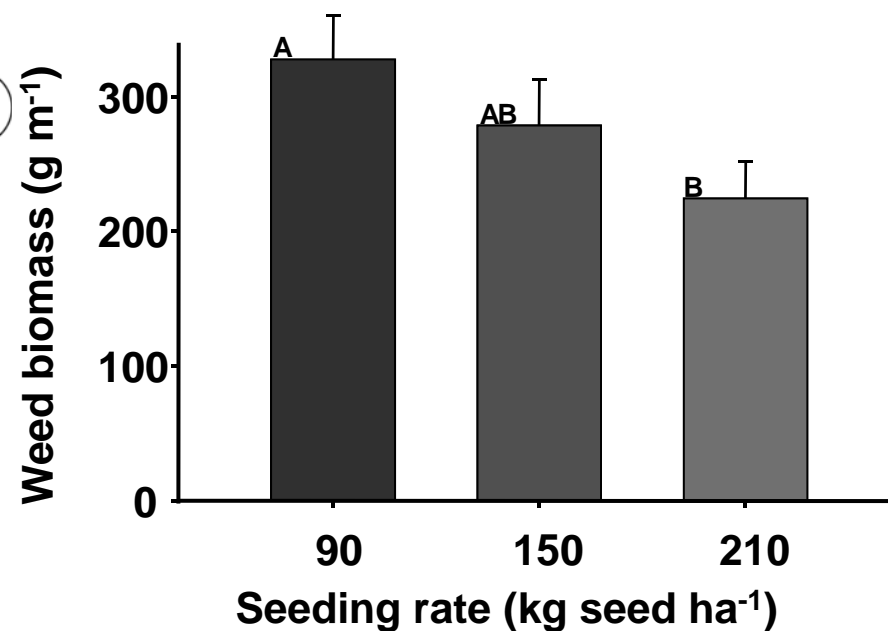
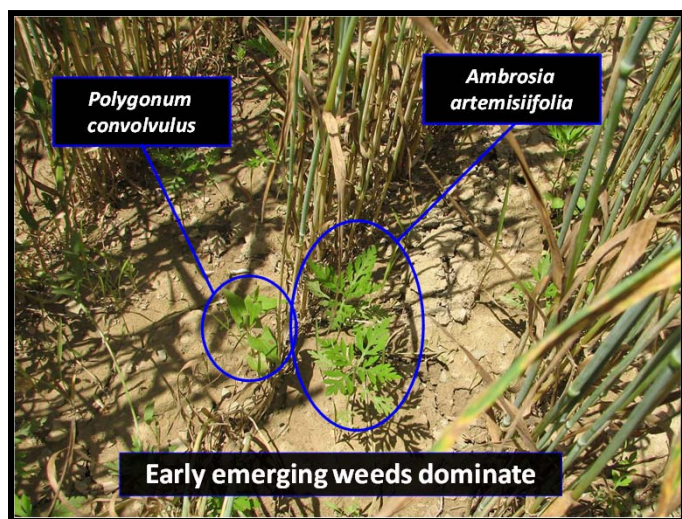




# Increasing seeding rate did not increase cereal rye biomass



**However, it did decrease weed biomass**



Ryan, MR, WS Curran, AM Grantham, LK Hunsberger, SB Mirsky, DA Mortensen, EA Nord, and DO Wilson. 2011. Effects of seeding rate and poultry litter on weed suppression from a rolled cereal rye cover crop. *Weed Science* 59:438–444.



# 2009 Tomato







# 6 weeks after rolling





# Sorghum Sudan Grass







## **No-Till Pumpkins into Rye – Long Island, NY**





# No-Till Grain Drill



copywrite: Jeff Moyer, Rodale Institute





# Horse Drawn & Pull Type





# Roller/Crimper for Raised Beds







# The Concept is Scale Neutral





## Clove Oil: Application





# High Residue Cultivator







# Rodale Institute

**Thank You!**

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