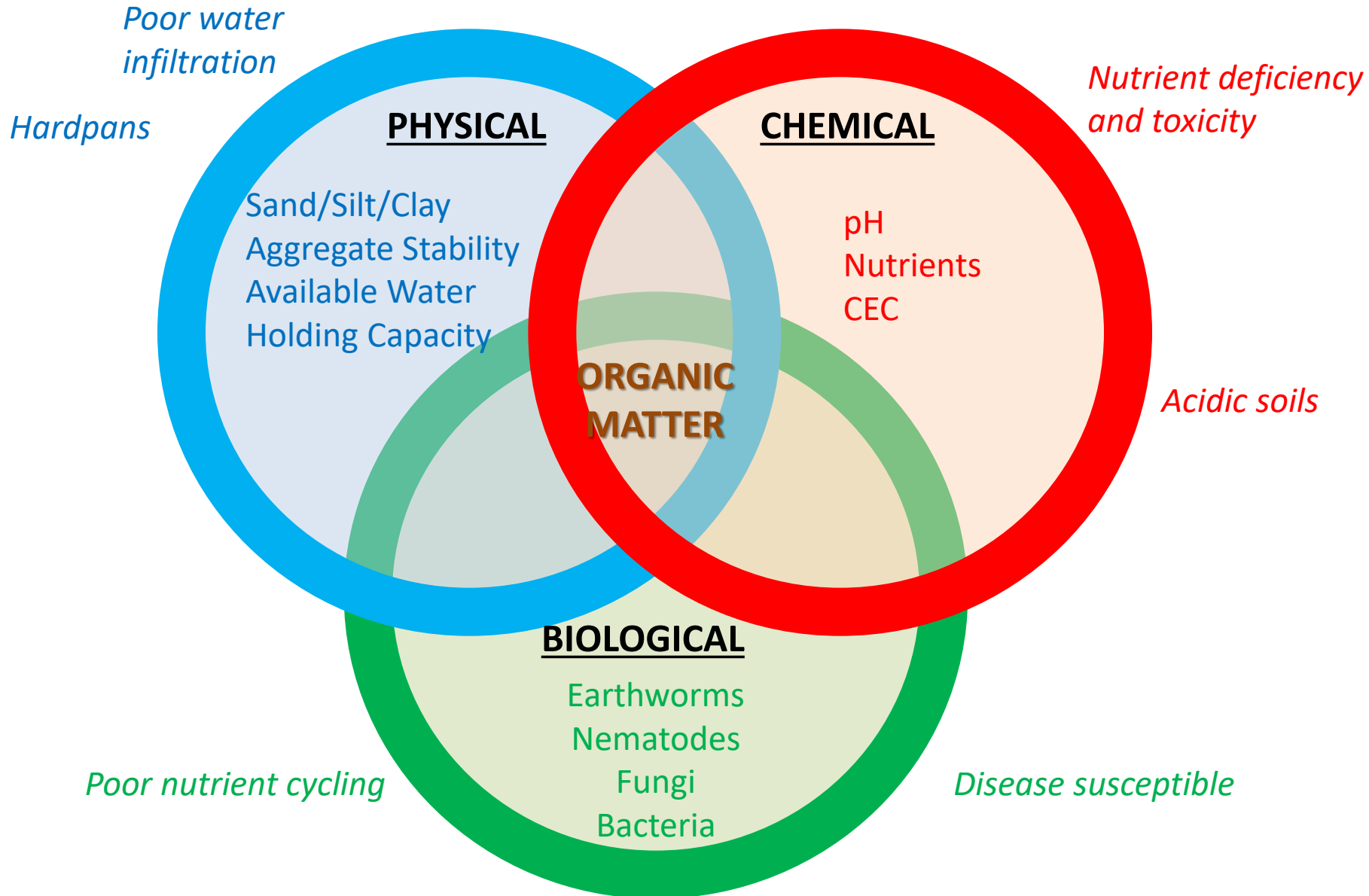




Diverse Rotation and Cover Crop Impacts on Soil Health in Ontario

**Canadian Forage & Grassland Association
Conference November 2017**

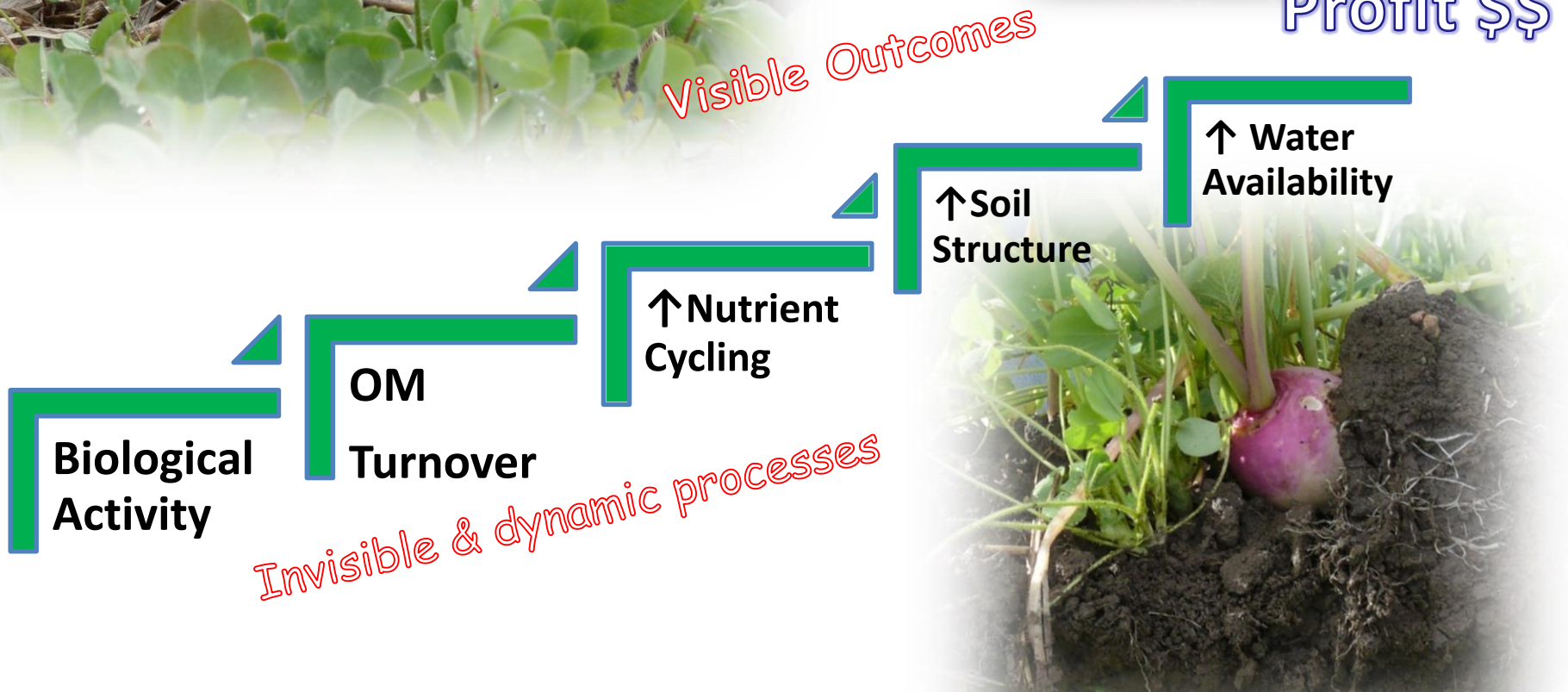
Soil Health



Soil Health Goals

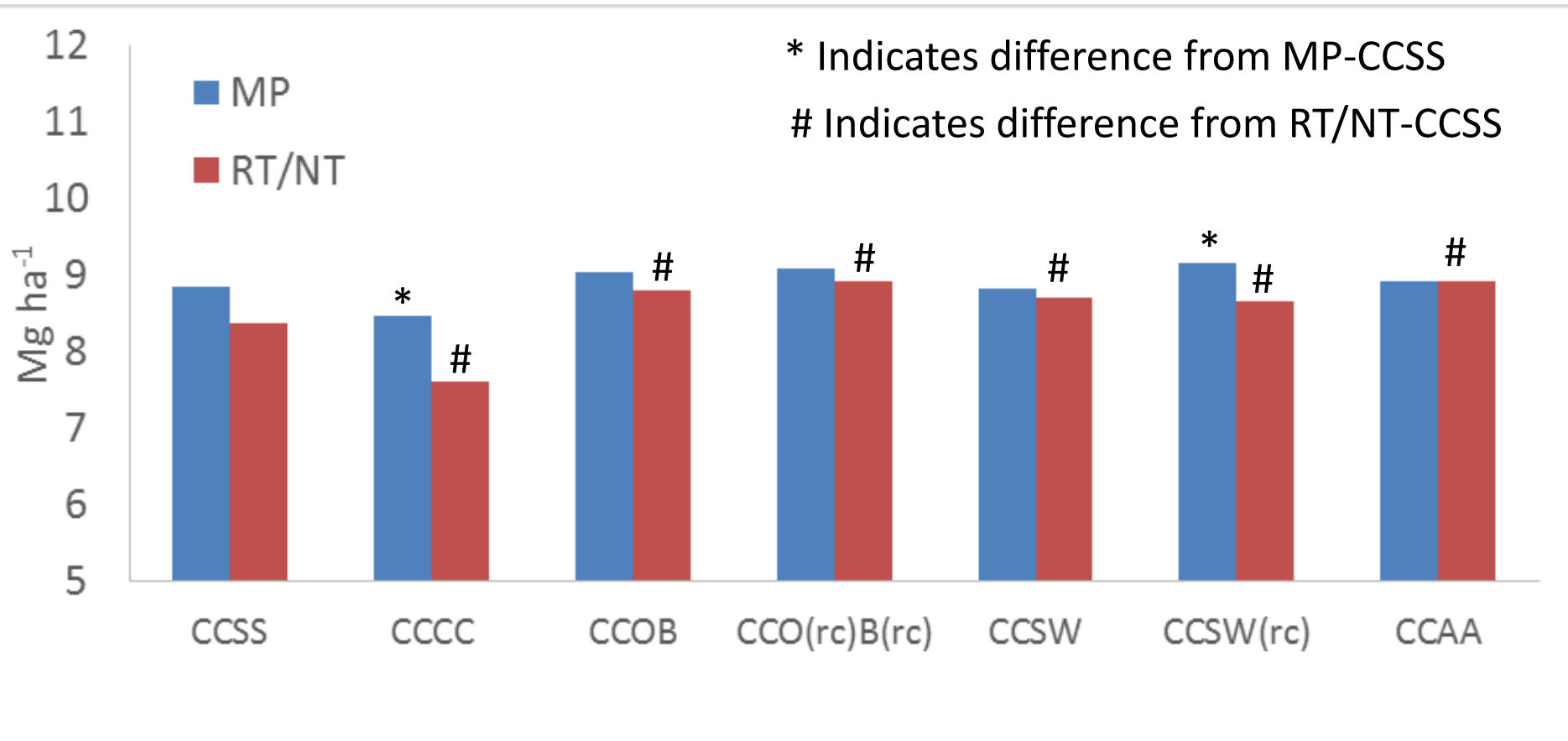
- **Keep the soil covered**
- **Do as little soil disturbance as possible**
- **Have living roots in the soil at all times**
- **Minimize nutrient loss**
- **Minimize soil erosion and soil compaction**

Steps to Maximum Soil Health



Adapted from Jerry Hatfield

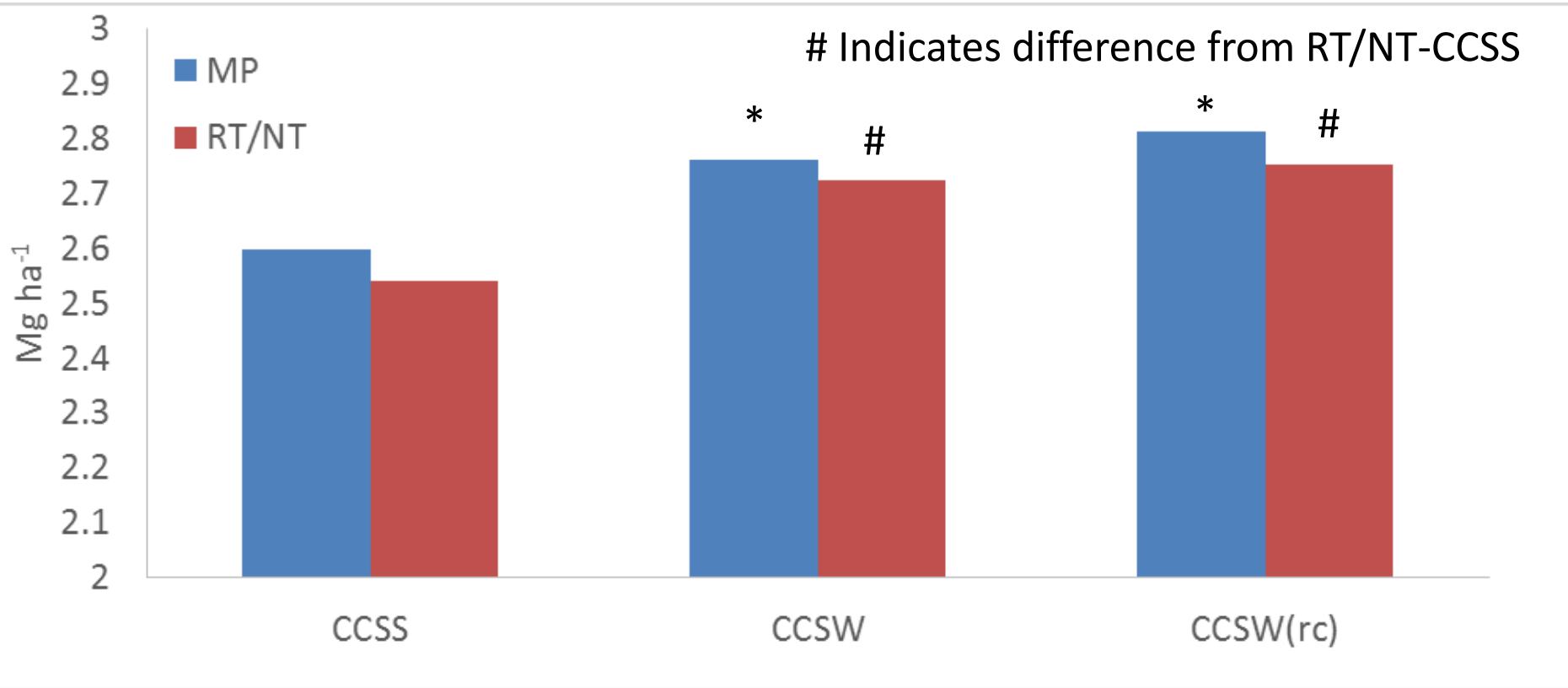
First Year Corn Yield: Elora Rotation Trial 1982-2013



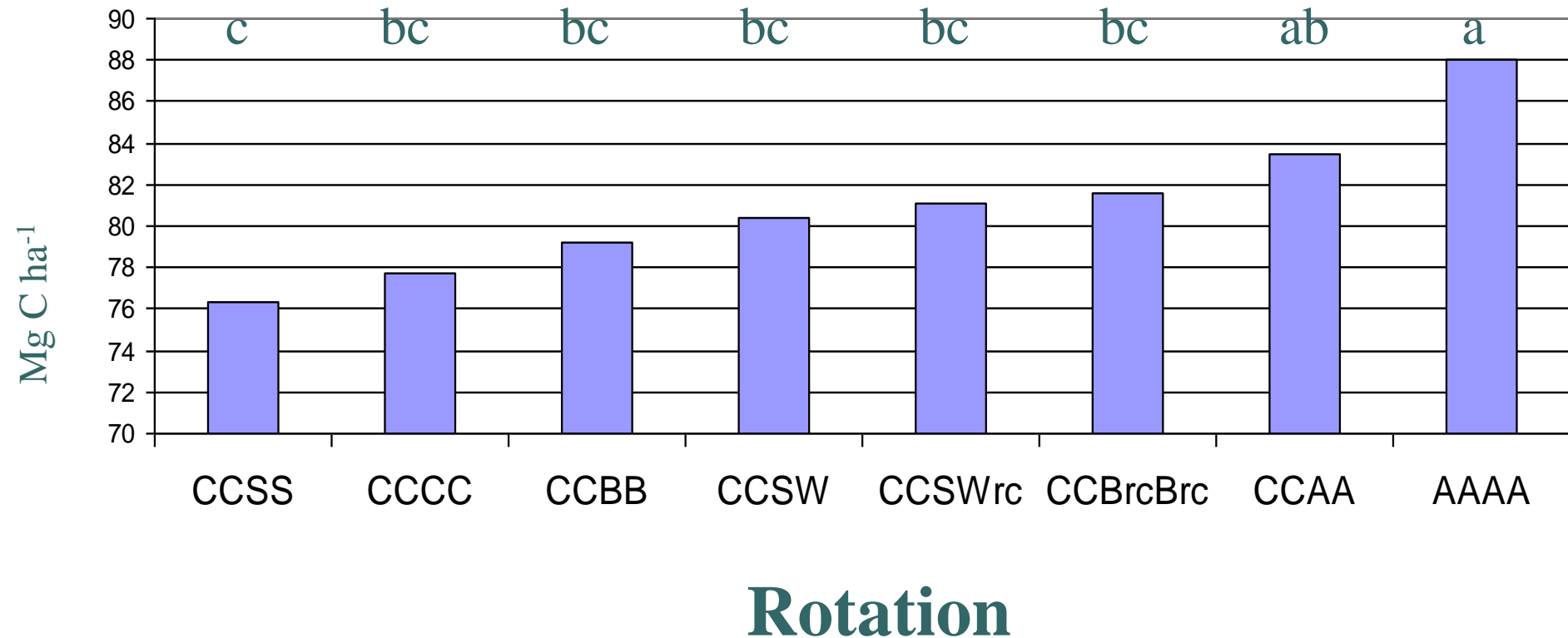
First Year Soybean Yield: Elora Rotation Trial 1982-2013

* Indicates difference from MP-CCSS

Indicates difference from RT/NT-CCSS



Organic Carbon Accumulation



Elora Crop Rotation (20 years)

- more organic matter in the C-C-B(RC)-B(RC), C-C-S-WW and C-C-A-A rotations than continuous corn at depths of 0-15 and 15-30 cm
- bulk density decreased with increases in OM
- wet aggregate stability positively correlated with OM
- total pore volume increased with increase in OM

Crop Rotation Economics

Average revenue by rotation (1982-2013), in \$ ha⁻¹.

	Conventional Tillage	Reduced Tillage ⁺
CCCC	\$2,519	\$2,387
CCSS	\$2,137	\$2,323
CCSW	\$2,744	\$3,047
CCSW(rc)	\$2,980	\$3,122

C – corn, S – soybeans, W – winter wheat, (rc) – underseeded red clover.

*Oats replaced first year barley in the spring cereal rotations starting in 2000.

⁺Chisel plow was switched to no-till in the fall of 2001.

Fairview Farms: Bill and Earl Elgie, Dresden

- Mixed farming (85 steers, vegetables field crops, OSR, maple syrup)
- Nearly all 700 acres in cover crops – rye, radish, buckwheat, red clover
- Manure is purchased off farm, applied to fields beyond the home farm to maintain soil health
- Reduced tillage system

Soil health is high –
basically non responsive
to N fertilizer

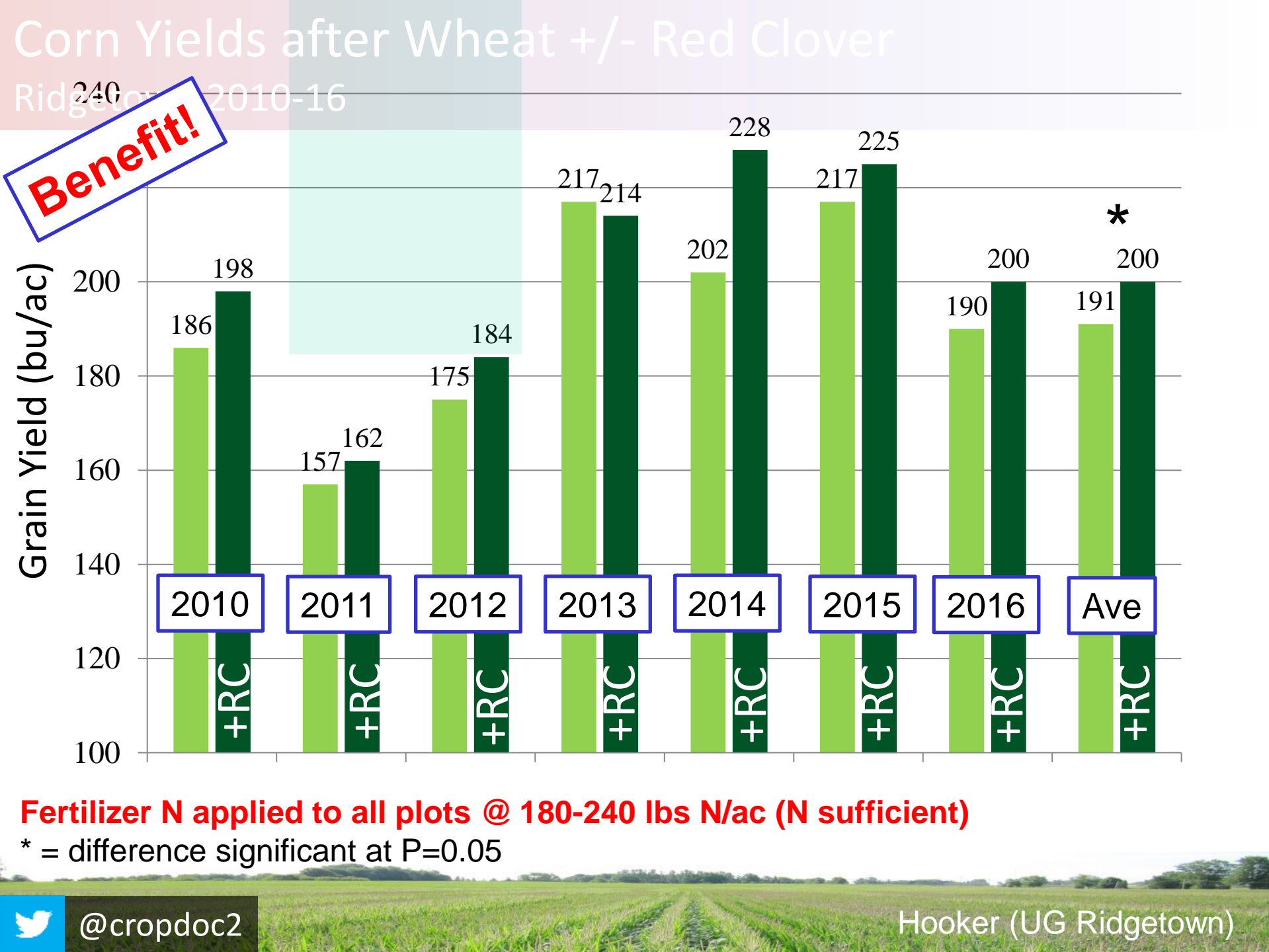


Cover Crops in the Rotation

Cover crops can add organic matter to the soil which:

- Helps to maintain or improve organic matter levels
- Improves soil aggregation and structure
- Feeds soil microbial populations – improves diversity





Harvesting an Oat Cover Crop







Adam Shea @FarmingForYou ·Oct 15

Day 1 of cattle on cover crops at @Adam4Bentafter 'walking' them across the road they've settled in.

@GallagherNA M1000 fencer, reels, turbowire & ring posts for dividing. Feeding the soil biology! #ontag @OntarioBeef @Shea_8







04/01/2005

Integrated Crop – Livestock Systems

- No negative impact on soil properties from hoof traffic
- One study found the soil health of an integrated crop – livestock system was as good as a grazed perennial pasture
- Studies have also shown increased crop yields and enhanced nutrient cycling



Soil Health Synergies



Questions?

