

Integrating reduced tillage and cover crops for organic vegetable production



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Strip tillage



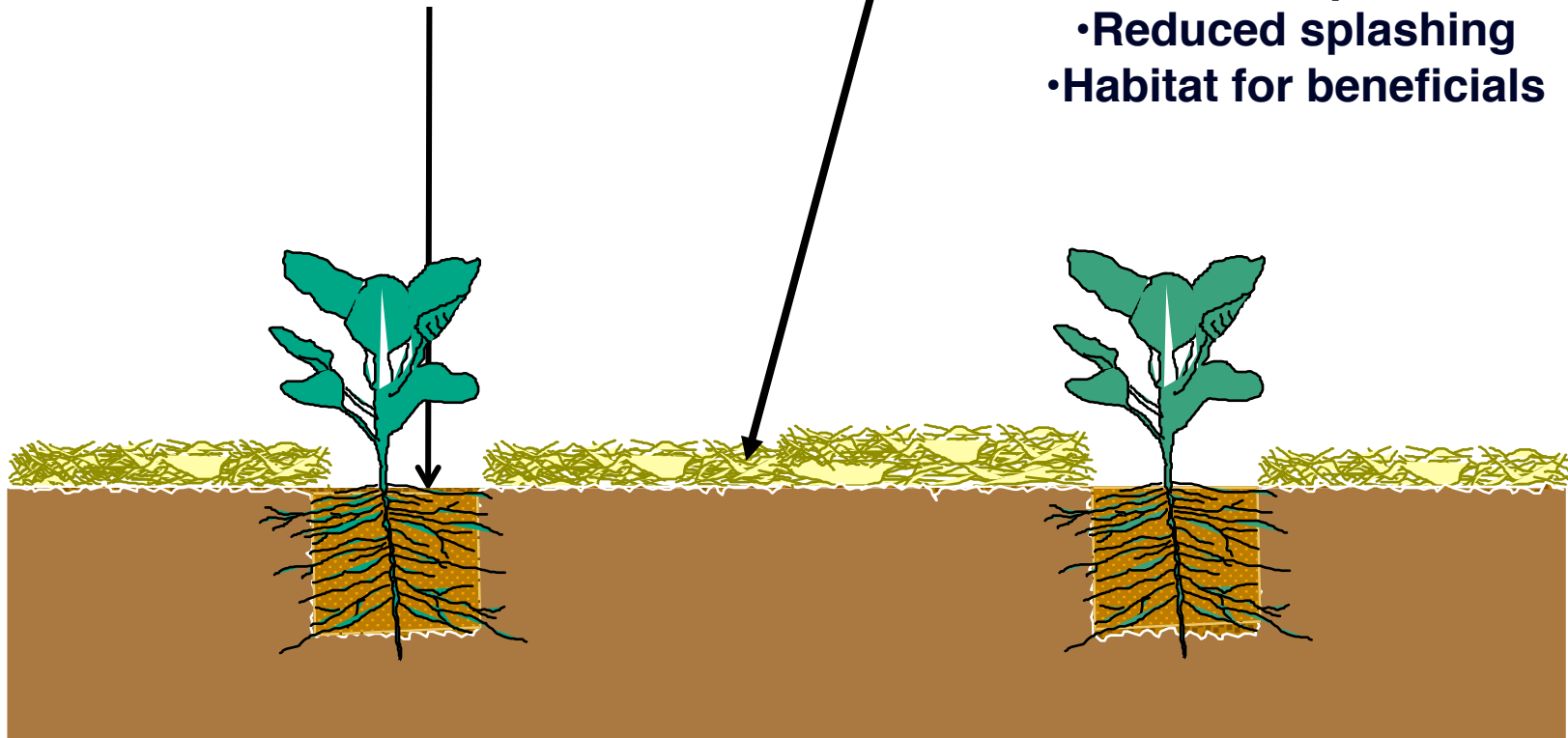
Strip Tillage and Cover Crops

Tilled IR Zone

- Warmer
- Higher mineralization
- Good seed bed

Untilled BR Zone

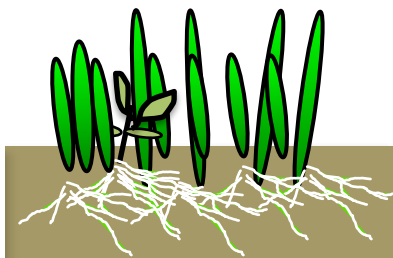
- Soil moisture retention
- Soil erosion protection
- Reduced splashing
- Habitat for beneficials



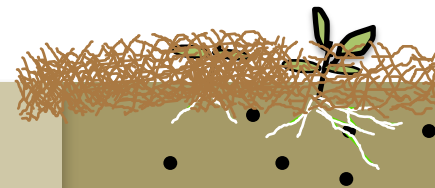
Adapted from John Luna

Living Versus Dead Mulch

**Living
mulch**



**Dead
mulch**



Adapted from John Luna

Living Mulches



Strip-tillage in Carrots

Plant wheat (fall) or barley (April)

Strip-tillage and carrot planting in May

Kill wheat or barley once carrots are established



Dead mulches

Early spring winter rye



Strip-tillage



July



August



Figure 1. Winter rye residues in reduced-tillage snap beans can help suppress weeds, retain moisture, and protect the soil.

Benefits: Erosion protection

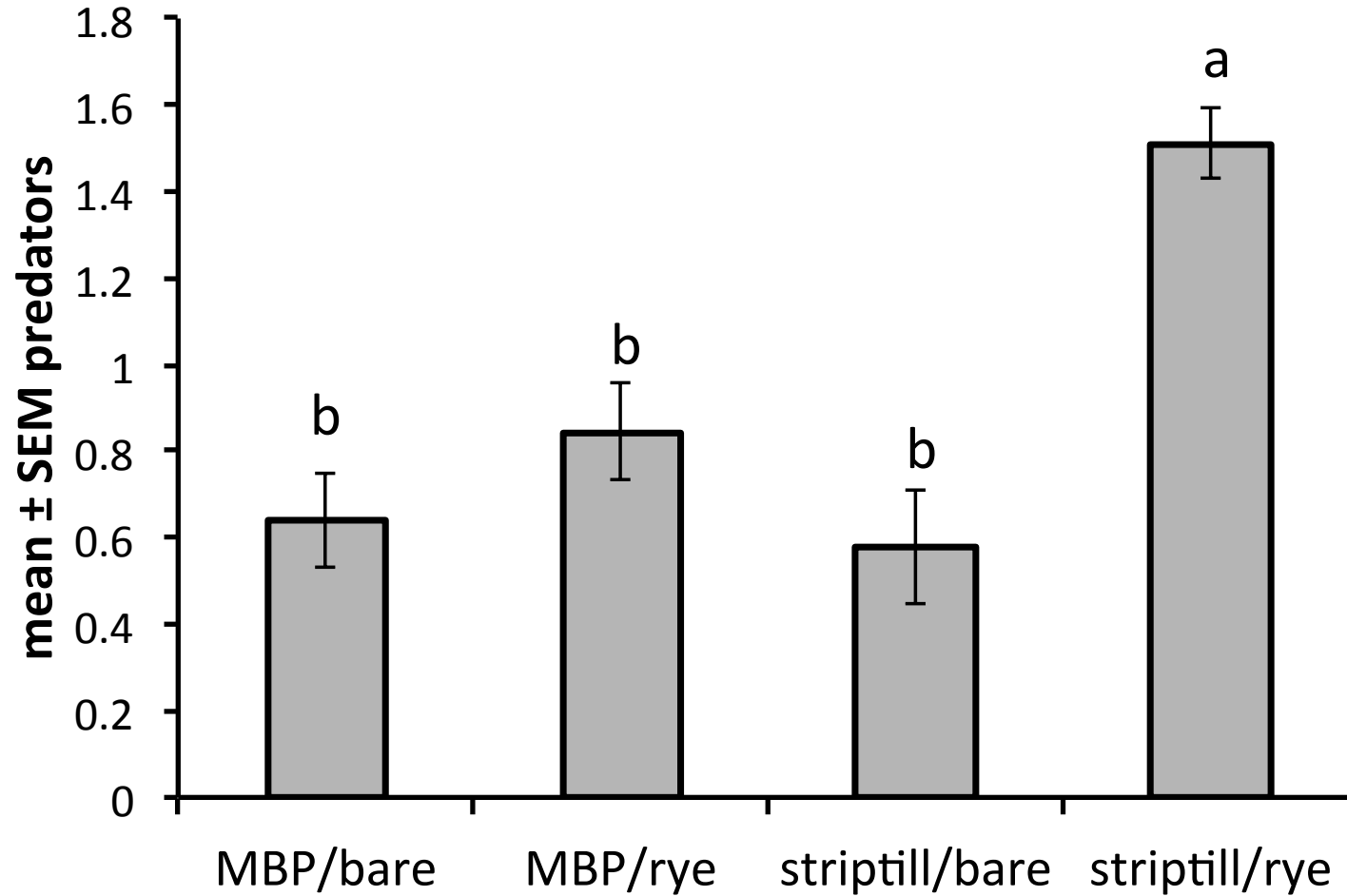


Benefits:

Reduced soil splash
& fruit staining



Benefits: Beneficial Insects



Bryant and Szendrei unpublished

Sub-surface Drip and Strip Tillage

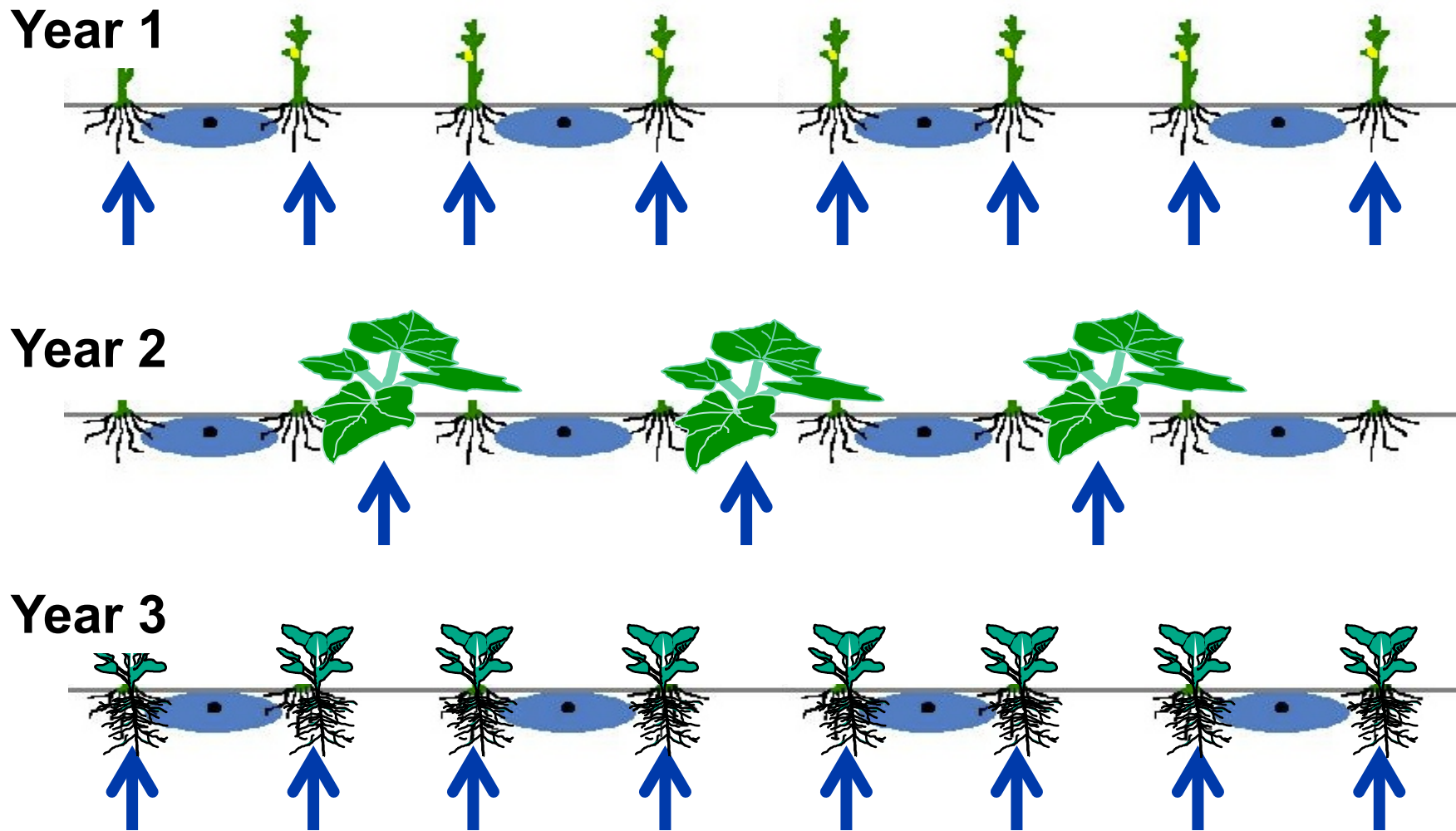
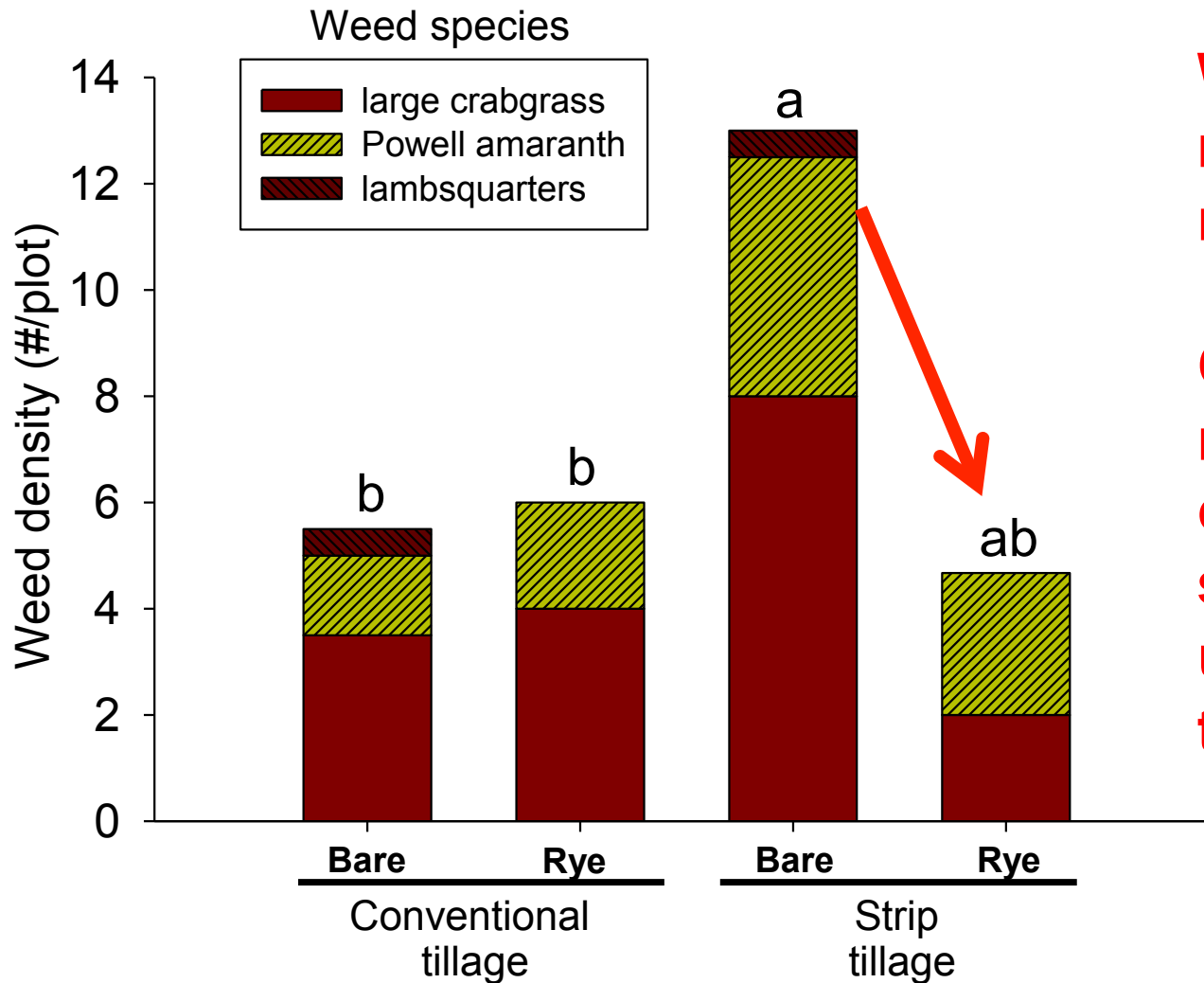


Image adapted from: <http://www.swac.umn.edu/classes/soil2125/img/8drprg2.jpg>

Challenges: Weed Suppression



Weeds often more abundant in reduced tillage

Cover crop residue can help suppress weeds under reduced tillage

Challenges: Cover Crop Regrowth and Weeds



Hairy vetch: Friend or Foe?



Approximate N contribution of legumes

Cover crop	N (lb/A)
Red Clover	50-120
Crimson clover	30-60
Hairy vetch	50-100
Austrian Winter Peas	30-70
Cowpea/Soybean	40-100



Hairy vetch: Research MSU

Variety trials (Henshaw/Snapp)

- Early flowering
- Winter hardiness
- Compatibility with rye

Mixtures

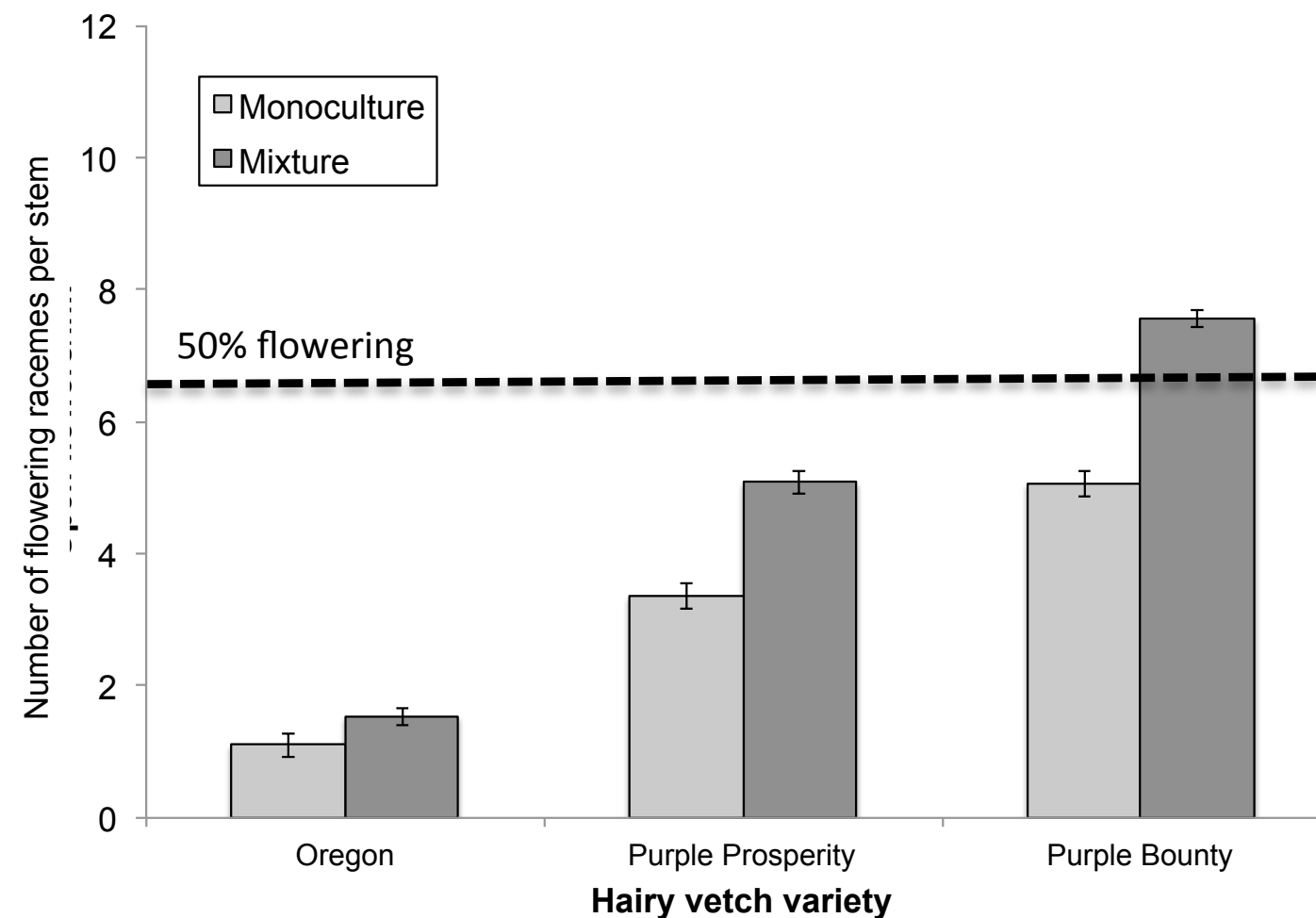
- Proportions (Hayden)
- Placement (Lowry)



Vetch variety and mixture trial Treatments (Ben Henshaw)



Hairy vetch Flowering Timing

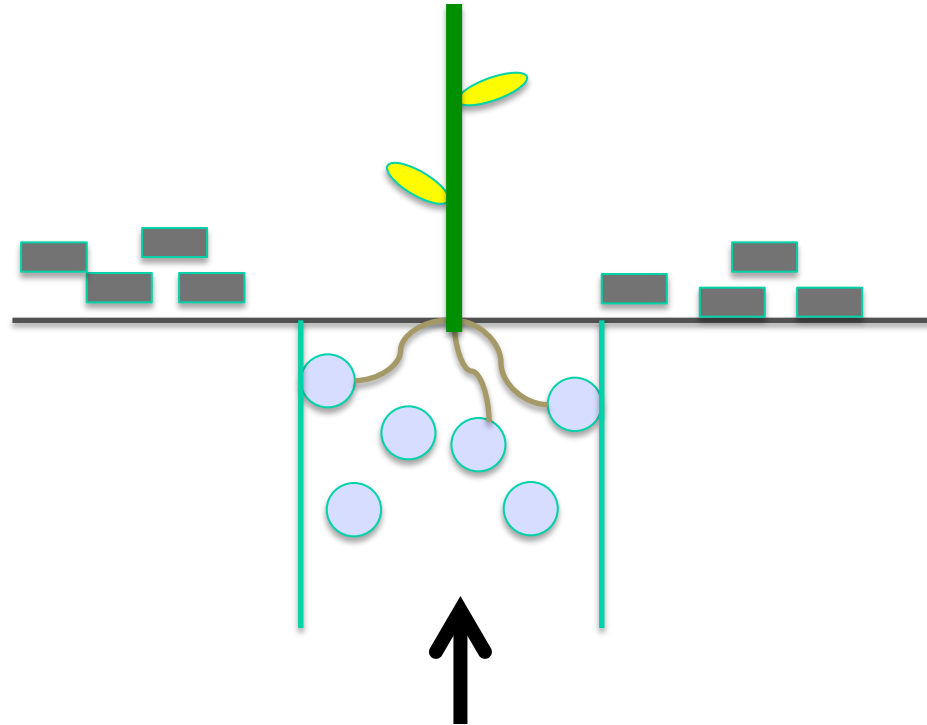


“Early flowering” varieties flower earlier !

Mixtures with rye result in earlier flowering

Earlier flowering means easier to kill

Segregated Cover Crop Strips (Carolyn Lowry)



N to crop not weeds
Minimize vetch re-growth
Minimize rye interference
Lower seed costs

Segregated Cover Crop Strips



Acknowledgements



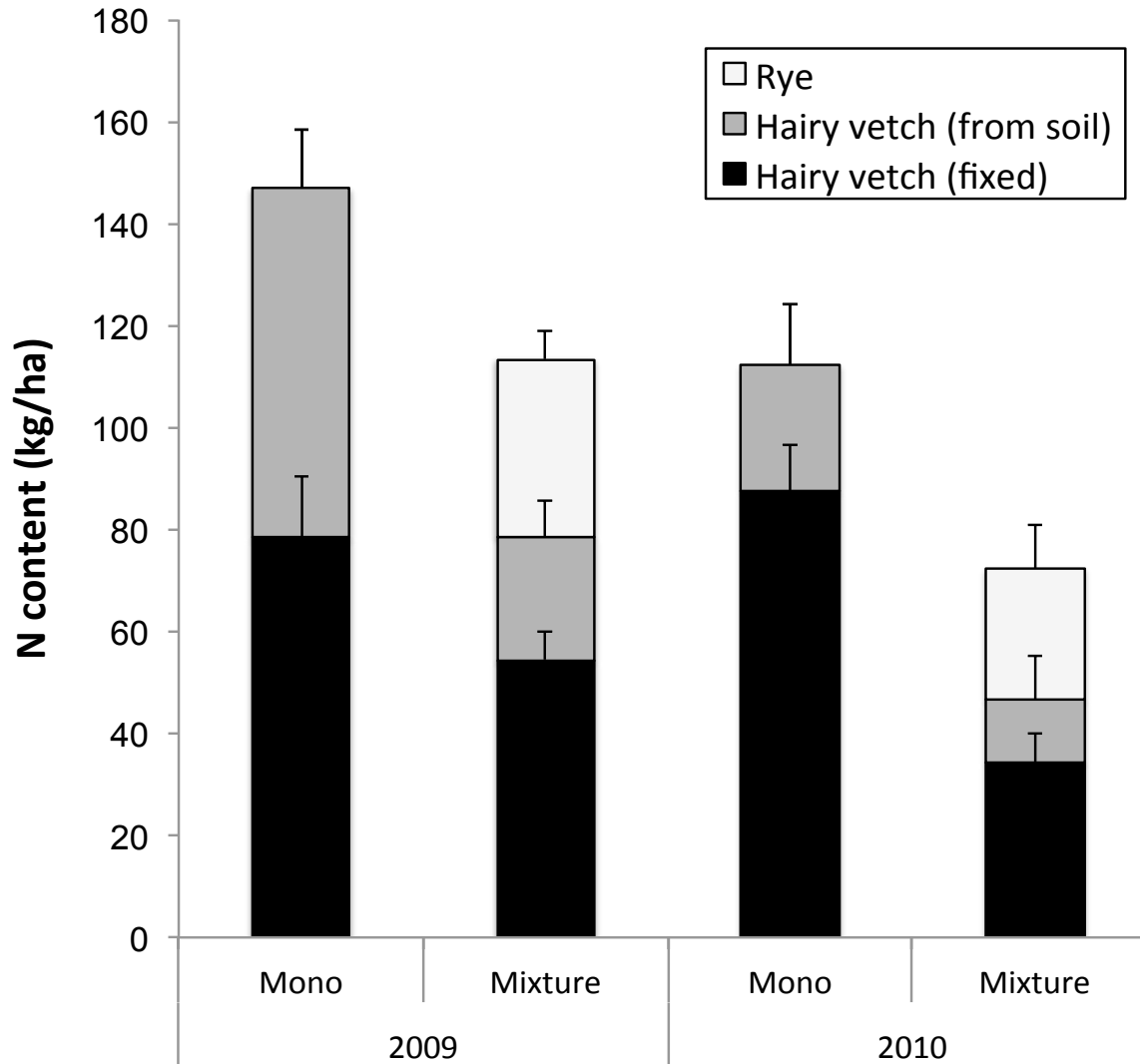
- **MSU Project GREEN**
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- Robin Bellinder
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- Steve McKay

Rye-vetch mixtures N content by source



**N content =
40-140 lbs N/acre**

**Nitrogen Fertilizer
Replacement Value=
20 - 70 lbs N/acre**

**Approximate cost of N
fixed=
\$ 0.41 – 1.42 lb**