

# Suitability of Winter Canola (*Brassica napus*) for Enhancing Summer Annual Crop Rotations in Iowa



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**BACKGROUND:** Current practices of corn-soybean rotations in Iowa often leave soil bare and exposed to erosion and water run-off during fall, winter, and spring. Winter canola (*Brassica napus*) might be a suitable crop for providing ground cover and living roots during the winter months and for oilseed production in Iowa, thus enhancing conventional rotations. However, winter survival represents a challenge in the cooler climates of the Upper Midwest. We have recently initiated a series of field trials to test the viability and short-term profitability of incorporating winter canola into the corn-soybean rotation, as winter cover crop and as cash crop frost seeded with red clover. We examined the effect of seeding date on winter survival, track ground cover and calculate nitrogen uptake of winter canola. We will also compare the costs, income and risks of the alternative cropping systems with a conventional corn-soybean system. The results of this project will serve to increase the information available about the use of winter canola as both a grain crop and as a cover crop, which will be useful for designing strategies that increase the diversity and resilience of cropping systems in Iowa.



Fall seeding Winter Canola



Frost Seeding Red Clover



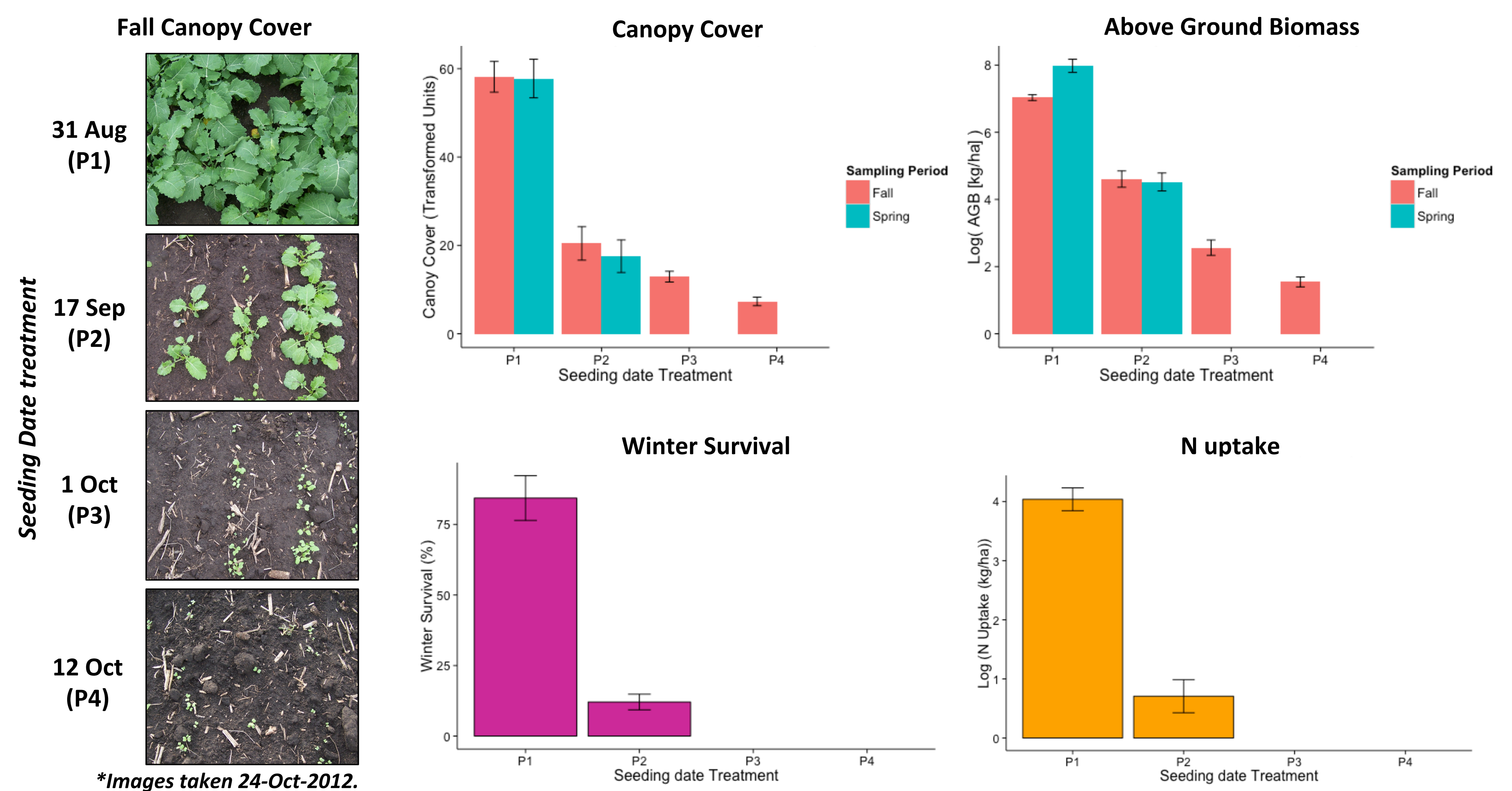
Harvesting Winter Canola

**METHODS:** Winter canola (*B. napus* var. Baldur) was seeded in the fall of 2012 into a field following soybean, with four seeding date treatments (P): 31-Aug, 17-Sep, 1-Oct and 12-Oct. In the spring, whole plots were divided into subplots for evaluating profitability of two alternative cropping systems (Q). A control plot of a conventional corn and soybean rotation was also established (CTL). The experiment was conducted in a Split Plot Design with four blocks and will be replicated in a different location in 2013-2014.



Planting corn (left) vs. flowering winter canola (right) on 24-May-13.

## Seeding Date Effects on the Performance of Winter Canola as Cover Crop

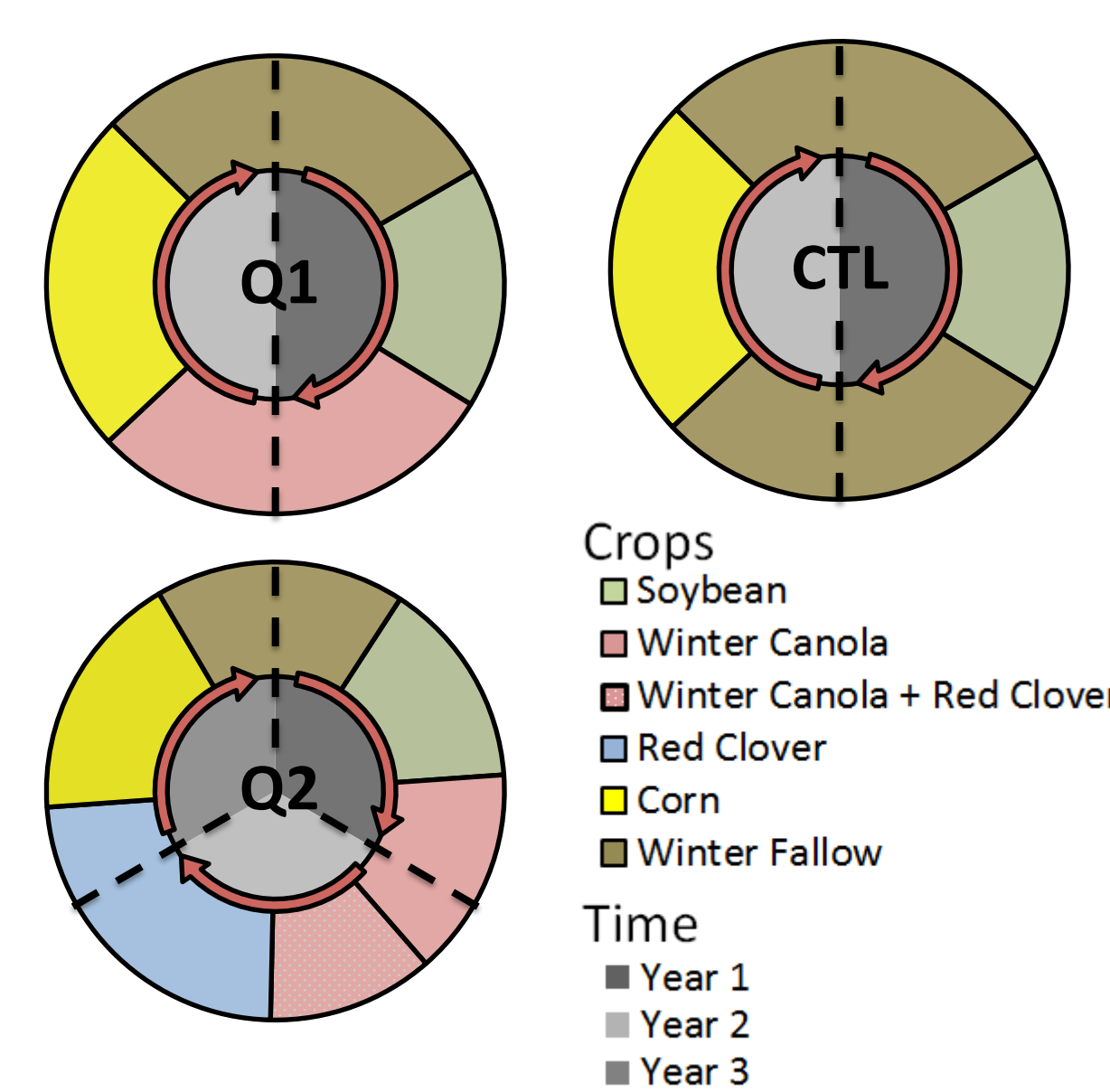


**PRELIMINARY RESULTS (2012-2013):** findings from this year suggest that winter canola seeded in early September (P1) achieved adequate winter survival, provided up to 70% canopy cover during the fall and spring, and when used as a cover crop accumulated up to 3.07 Mg ha<sup>-1</sup> of above-ground biomass and at least 59.9 kg ha<sup>-1</sup> of N. Early-seeded canola also produced relatively high grain yields of up to 3.6 Mg ha<sup>-1</sup> when allowed to mature. Nonetheless, further investigation is needed in order to determine if Iowa-grown winter canola can be a competitive alternative for producers. We also found that survival and winter cover benefits significantly declined if seeding was delayed. However, low performance of later-seeded winter canola was probably related to unfavorable weather during the fall of 2012, since germination and establishment was delayed by abnormally dry conditions. In the other hand, yield of corn was significantly reduced when planted after an early-seeded winter canola cover crop (p value = 0.00018). The reasons for this yield decrease are still not clear.

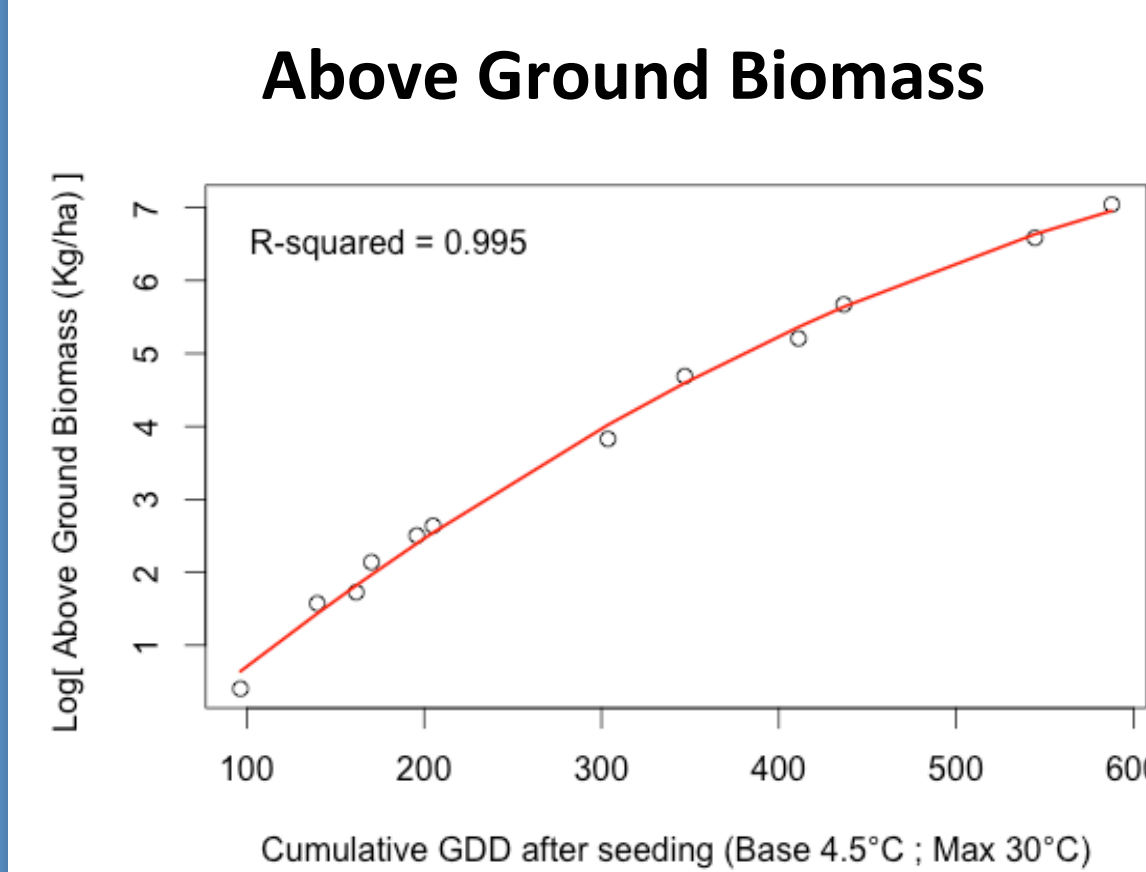
### Assessing winter canola's potential in Iowa:

as cover crop (Q1 subplots)	as cash crop (Q2 subplots)
<ul style="list-style-type: none"> <li>✓ Estimate winter survival</li> <li>✓ Measure fall and spring above-ground biomass</li> <li>✓ Analyze samples for N and C content</li> <li>✓ Estimate percent canopy cover with digital photographs</li> <li>✓ In spring: terminate cover crop, plant corn and measure yields</li> <li>✓ Estimate economic profitability of the cropping system</li> </ul>	<ul style="list-style-type: none"> <li>✓ Frost seed red clover (double cropping) in early spring</li> <li>✓ Allow winter canola to mature, harvest and determine yield and yield components.</li> <li>✓ Leave red clover as cover crop for the rest of the growing season</li> <li>✓ Year 2: Plant corn and measure yields.</li> <li>✓ Estimate economic profitability and compare the three cropping system scenarios (Q1, Q2, and CTL)</li> </ul>

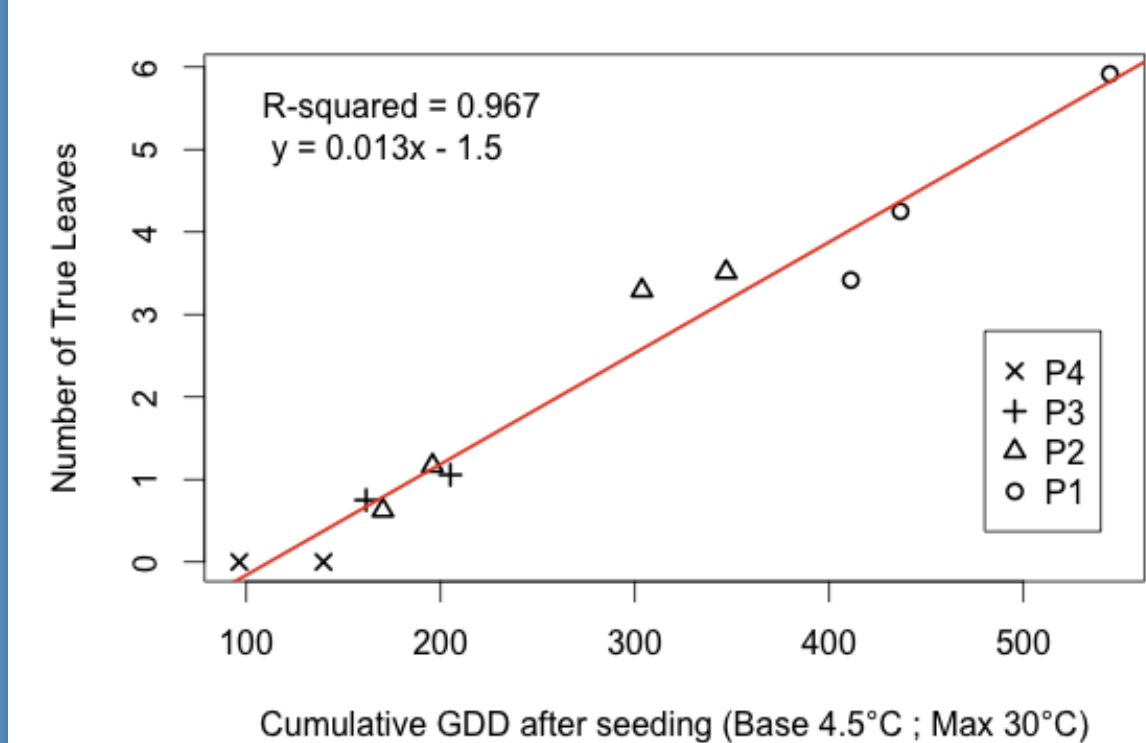
### Rotation treatments for Q subplots



### Winter canola rosette growth (fall 2012)



### Leaf development



### Integrating Winter Canola into Summer Annual Rotations

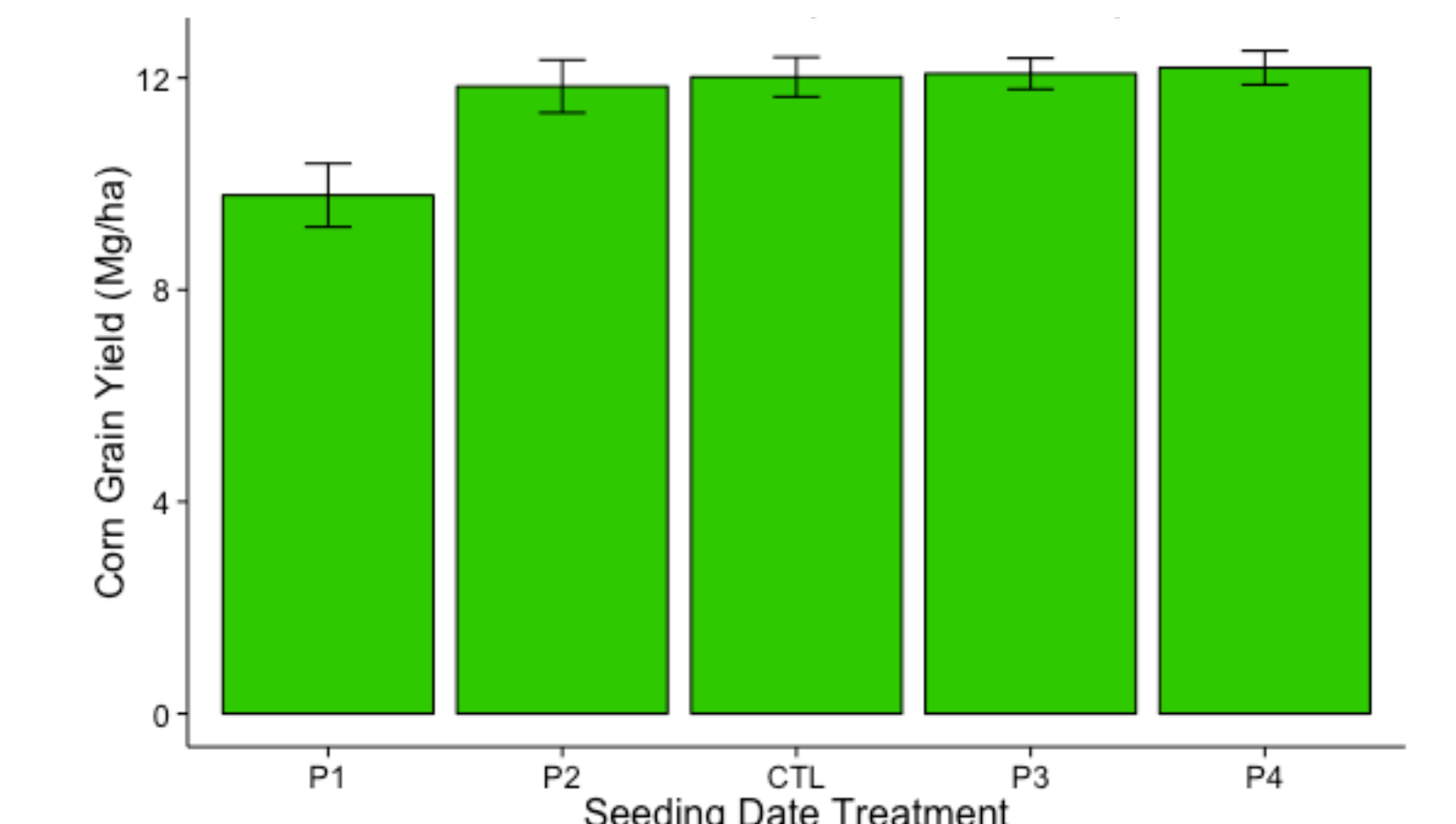


Corn planted into canola cover crop residue

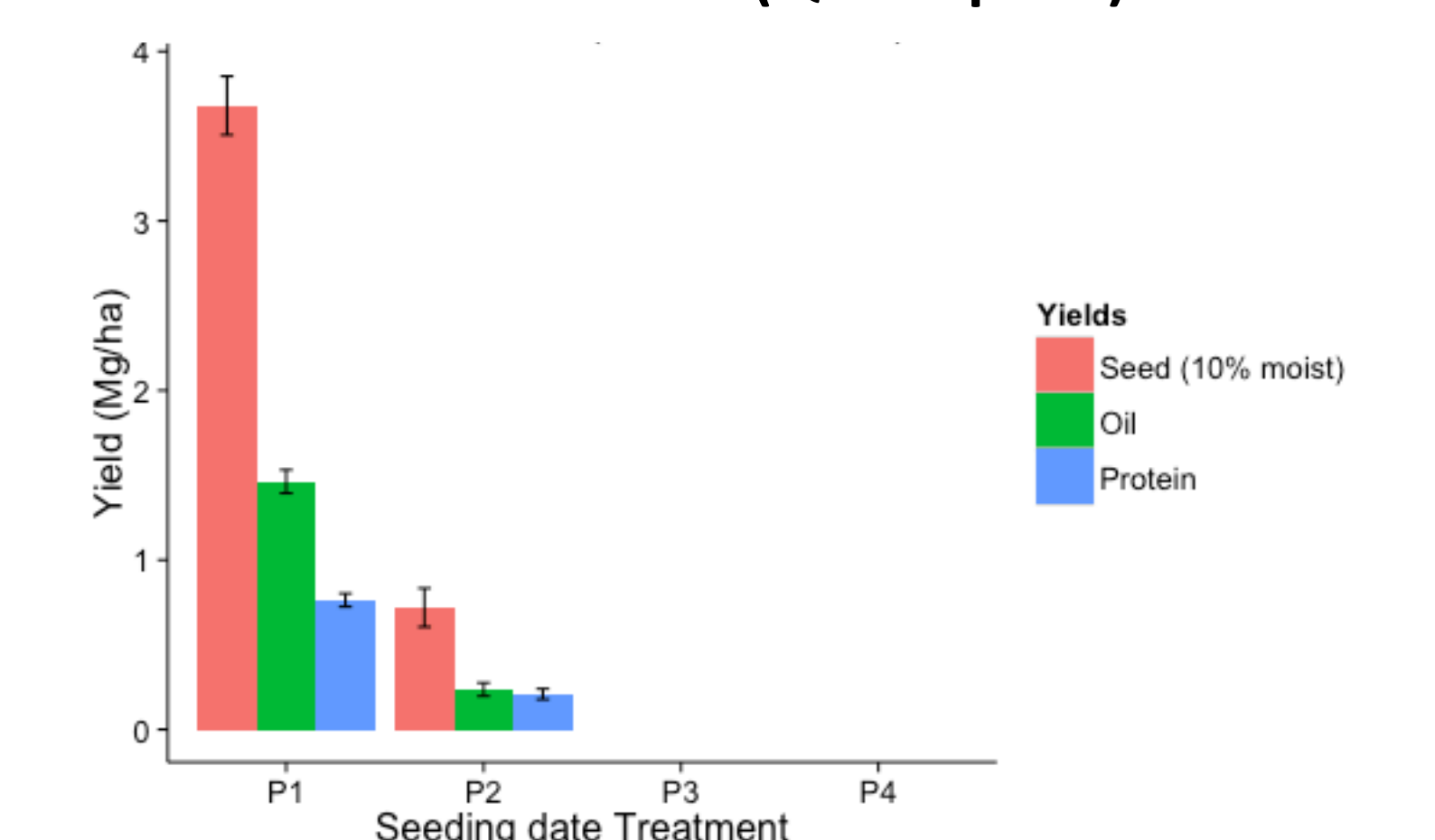


Winter Canola Seed Fill Stage

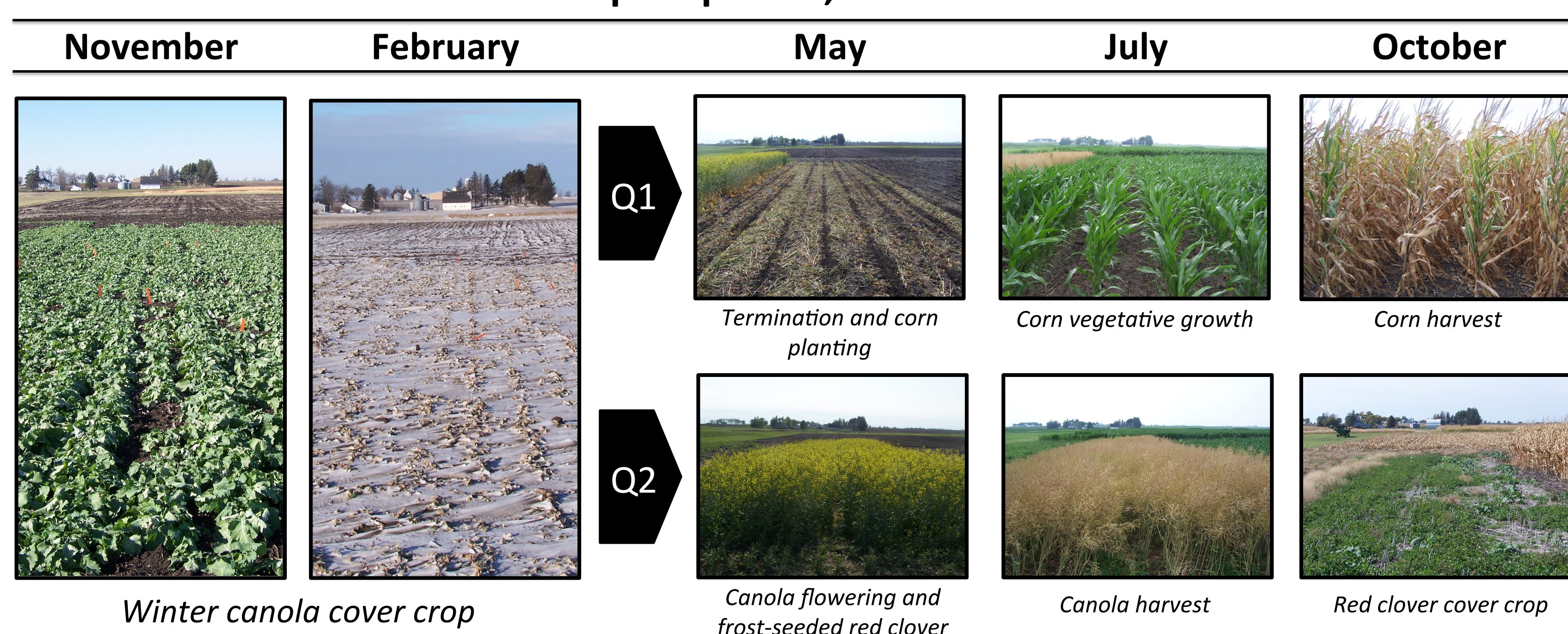
### Corn Yield (Q1 subplots)



### Canola Yields (Q2 subplots)



### Crop Sequence, 2012-2013



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