# An Evaluation of Red Clover Establishment

## (Interim Report)

### Purpose:

Red clover underseeded in winter wheat offers an incredible opportunity to fix nitrogen for the succeeding crop, to capture sunlight energy after the wheat crop is harvested, and to turn that into organic matter and greatly improved soil health. The benefits of red clover to the soil are well documented.

Despite all these positive potentials, fewer and fewer winter wheat fields are being underseeded to red clover, since stand establishment is very inconsistent and poor. As little as 25% of the wheat crop is currently underseeded to clover.

This project was undertaken to evaluate if any differences in seed source existed that may help to explain the establishment problems of the clover crop under the wheat. A new technology called “seed priming” is widely used in the horticultural industry, so primed clover seed was included in this project. As well, the production of clover seed has evolved, from a system of swathing and drying before combining, to a system which predominantly relies on pre-harvest glyphosate and direct combining when the crop has dried down. There is some evidence that the pre-harvest glyphosate treatment can have negative impacts on seed vigour in some crops, especially for indeterminate crops like clover. Thus seed sources of both treated pre-harvest and untreated were included.

Lastly, there have been questions regarding the target clover seeding rate, so a double seeding rate treatment was included in a limited number of trials in 2005.

### Methods:

Field scale, two replicate tests were seeded into winter wheat fields in the early spring at a number of locations across Middlesex, Elgin, and Oxford counties (the Thames Valley Region Soil and Crop Improvement Association, from 2003 to 2005. Tests were a minimum of 1000 feet long (300m), with each treatment 50 feet wide (15m). Every attempt was made to select areas in these fields that had uniform variability. Seeding rate was consistent at 7 pounds per acre (8 kg/ha) of all seed sources, using a belt fed ATV spreader. Seed sources included single cut clover (SC), double cut clover without pre-harvest glyphosate (DC), double cut clover with pre-harvest glyphosate applied (DG), a biotype of late maturing double cut red clover that has developed in the Niagara region of Ontario called Mammoth clover (MC), primed double cut red clover (no pre-harvest glyphosate seed source) (PC), and a 14 pound seeding rate (DD).

Stand counts were taken post wheat harvest using the hula hoop method. 5 counts were taken in each treatment, with each count being taken from specific slope locations, in an attempt to assess slope impacts on establishment. In a few locations, nitrogen rates or varieties of wheat were perpendicular to the clover treatments, and when this occurred visual observations were taken when possible.

## Results:

Many of the results are of a more visual nature than supported by the objective measurements like stand count. In all years, nitrogen rate did have an effect on growth of the clover after harvest (biomass), but had only a very small effect on actual clover plant counts in the different nitrogen rate strips. The following slides illustrate this fact. However, even zero nitrogen strips did not guarantee clover from end to end, as shown in Figure 3.

**Figure 1.**

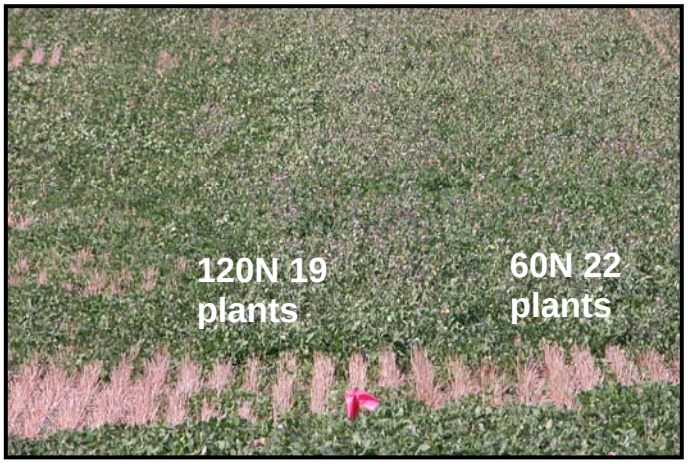
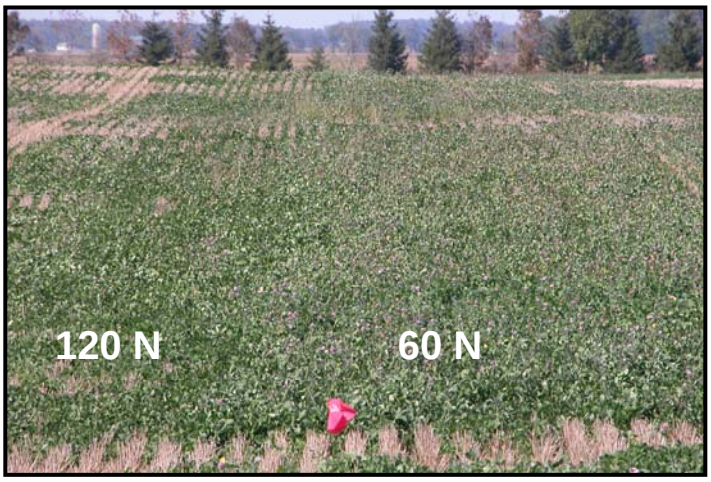



**Figure 2.**




Wheat varieties had a significant impact on clover stands at some locations. Taller varieties tend to reduce clover stands, and awned varieties also seem to reduce clover survival. Thus tall, awned varieties have the poorest survival, in general, while short, awnless varieties are the best for survival. In some fields this could be seen to the line, while in other fields this effect was almost non-existent.

**Figure 3.**

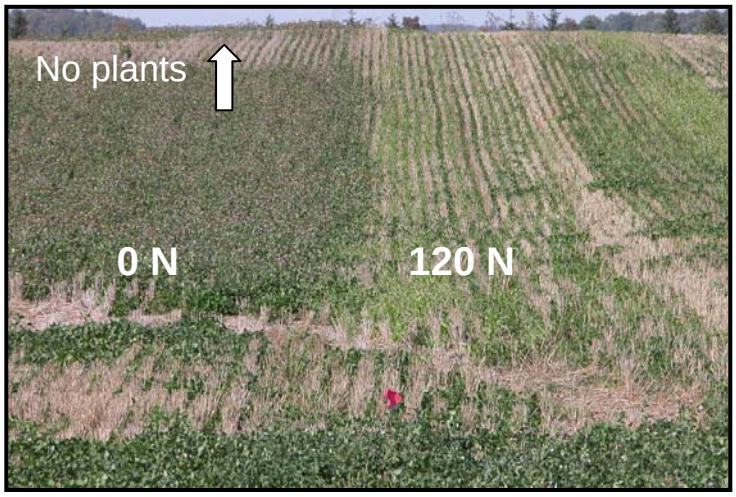
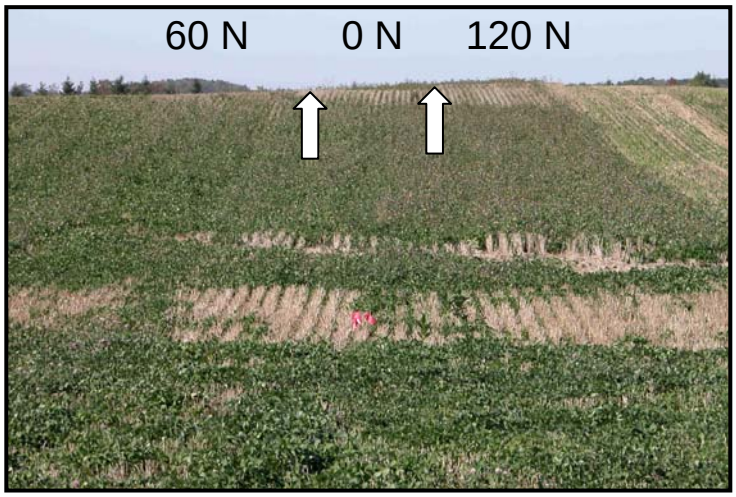



**Figure 4.**




Seed source had very little impact on overall clover establishment, with the exception of the primed seed source. There is little overall difference in seed source, with a slight trend where DC<DD<MC<DG<SC. All seed sources were much superior to the primed seed. Figure 5 gives a picture of one site, while Table 1 summarizes the 2005 stand count data.

## Summary:

With the exception of primed seed, seed source had little impact on clover stands. Primed seed was significantly lower in final stand than other seed sources. Although there were no significant differences among other seed sources, some general trends did emerge. Nitrogen rates correlated with clover growth and vigour, although had little impact on stand survival. Wheat variety also had a significant impact on survival, but this effect was not evident at all sites.

**Figure 5. Field photo of a typical site involved in this project.**

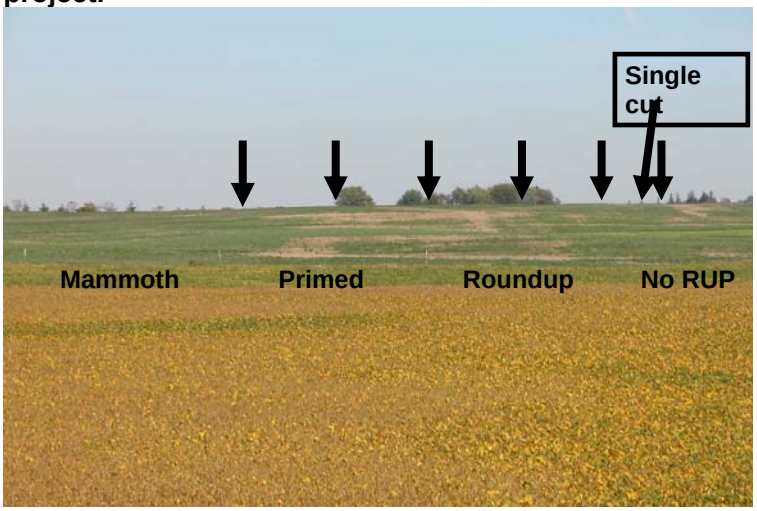



**Table 1. 2005 Summary of seed source impacts on red clover stand.**

| | # Plants | % Coverage |
|---|---|---|
| **SC** (single cut) | 20.4 | 35 |
| **DG** (double cut, glyphosate applied to seed field) | 27.3 | 45 |
| **DC** (double cut, glyphosate not applied to seed field) | 34.3 | 52 |
| **MC** (Mammoth clover) | 30.6 | 48 |
| **DD** (double cut red clover, double seeding rate) | 31.3 | 52 |

## Next Steps:

Further analysis of this data is ongoing. Studies investigating row width in wheat, and wheat populations, and their respective impacts on clover survival, are underway.

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## Project Contacts:

Peter Johnson, OMAFRA, Stratford peter.johnson@omafra.gov.on.ca