

**Cross-Canada Seeding Rate Study  
Results from the 2003 Field Season**

*Roxanne Beavers, Andy Hammermeister, Brenda Frick and Ralph Martin*

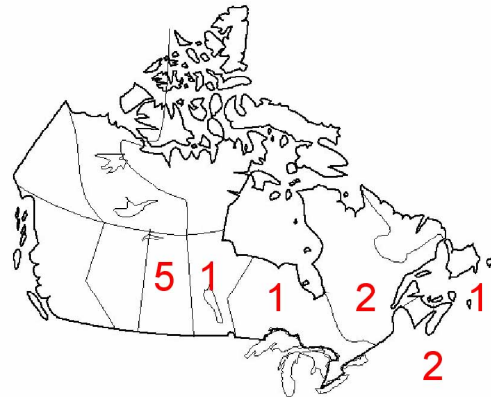


Do higher seeding rates lead to lower weed competition in spring wheat? This was the question investigated in a two-year research program by the Organic Agriculture Centre of Canada (OACC) and farmers from across the country. Preliminary results from the first year are presented.

**Background:**

At a high density, developing crop plants can cover the ground more quickly and shade out weeds. Their roots are distributed more evenly, and they can access more of the water and nutrients. Where there are few crop plants, weeds gain a greater proportion of the resources. There has been some research done on the potential for higher crop density to suppress weeds, particularly in conventional systems in western Canada.

The best seeding rate for a competitive crop may be different for organic farms. Weed management, cropping history, and nutrient availability can differ in organic systems. Collaborating with farmers across Canada allows testing of this theory across a wide range of farming practices and environments. This can help assess if the recommendation to seed at a higher rate is applicable for all organic grain growers.



Location of 2003 participant farmers (SK, MB, ON, QC, NS and PE)

There were twelve field sites for the 2003 seeding rate study. Due to crop failure and other circumstances not all farmers were able to complete all parts of the study. Nine complete sets of data were collected (8 wheat and 1 oat).



Wheat emergence at Manitoba field site (R. Guilford)

## Methods:

Cooperating farmers examined four different levels of seeding rate (conventional, 1.25X, 1.5X and 2X), based on conventional rates appropriate for each region of the country (see Table 1).

Table 1: Target seeding rates by region

Conventional Seeding Rate	lb/ac	kg/ha
Prairies (brown, dark brown soil zone)	80	90
Prairies (black, dark grey soil zone) and Atlantic Canada	105	118
Ontario and Quebec	134	150

Each farm recorded the exact seeding rate used for each of the four target rates. About two weeks after seeding, crop density and weed density were assessed. Prior to harvest, samples of aboveground weeds were collected from within each seeding rate. Both wet weight and dry weight of the weeds was recorded. During harvest, the yield of each seeding rate was assessed by the means most appropriate for each farm concerned (scale and combine, or quadrat harvest). Samples of grain were sent in for analysis.



Combine with truck and scale harvesting in Brookside, NS

## Preliminary Results:

### Weed dry weight

There were no statistically significant differences in weed dry weight between the different seeding rates over all sites ( $p=0.127$ ). Averages are presented in Figure 1.

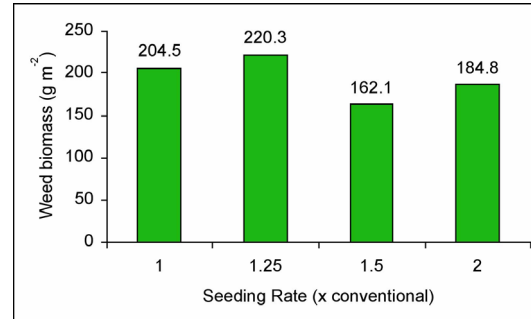


Figure 1: Average weed dry weight across Canadian seeding rate trials over 9 fields

At some sites, there was a clear decline in weed dry weight while at others there was no clear pattern of increase or decrease with seeding rate. When the raw data is plotted by seeding rate (Figure 2), it appears that there may be a decreasing trend but differences between farms are large. Additional trials in 2004 will help clarify this relationship.

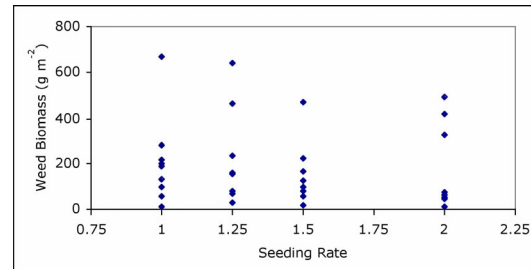


Figure 2: Plot of weed biomass by seeding rate over 9 fields

## Wheat Yield:

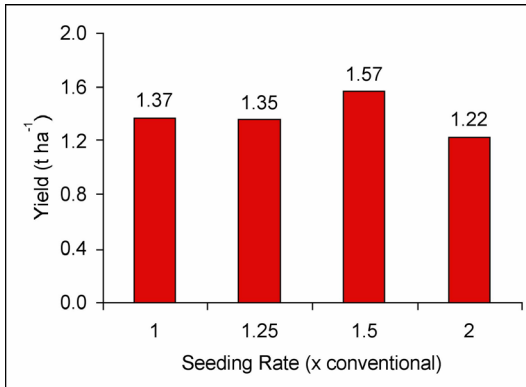


Figure 3: Average wheat yield across Canadian seeding rate trials over 8 fields

There was no significant difference in yield ( $p=0.212$ ) detected between the different seeding rates. At most sites there was no pattern of increase or decrease of yield with seeding rate. When crop density (as measured two weeks after emergence) is plotted against yield, a clearer trend emerges (Figure 4).

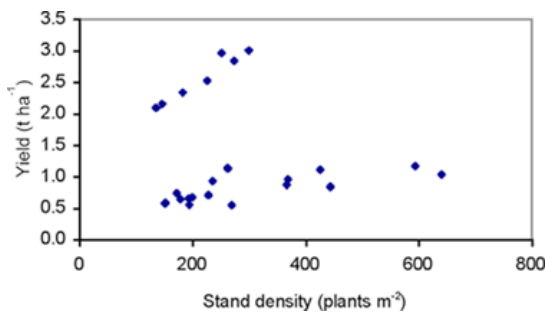


Figure 4: Crop stand density vs. wheat yield across Canadian seeding rate trials over 8 fields

It was expected that yield would be closely related to the number of crop plants that establish after seeding. A surprising result was that the seeding rate was not directly proportional to the crop density (i.e. doubling the seeding rate didn't double the number of crop plants),

although crop density was higher with higher rates (Figure 5). The highest rate (2x) resulted in a significantly greater crop density than either of the two lower rates ( $p=0.011$ ). However, the ratios as seeded were not maintained. The effect of seeding rate at establishing crop plants gets lower as the rate gets higher.

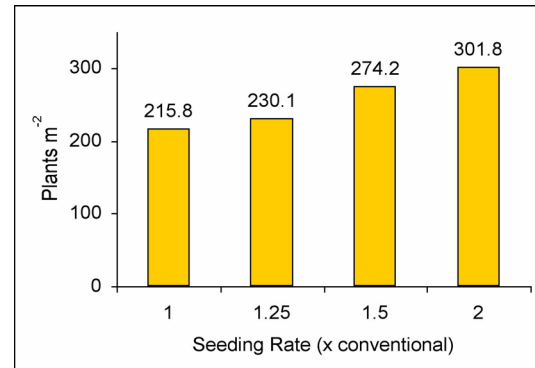


Figure 5: Average crop density by seeding rate across Canadian seeding rate trials over 8 fields

Thousand-kernel weight (TKW) was determined for each seeding rate treatment for each farm that sent in a grain sample. No significant differences were found between the seeding rates ( $p=0.140$ ), but only 7 sites were assessed.



Harvesting with the NSAC combine at Brookside, NS

### **What's Next:**

The trial will continue in the summer of 2004. The goal is to double the number of producers doing the trial, in order to get a sufficient number of sites so that trends can be assessed. Farms may be recruited based on their proximity to a cooperating research group so that more support can be available to help complete data collection. An OACC staff person or cooperating researcher will complete plant counts and weed biomass measurements in most cases this year.



OACC staff harvest a trial in Parrsboro, NS

***Thanks to all the cooperating organic wheat producers and researchers across Canada who assisted with this innovative project!***

- Fred Dollar, Kentdale Farms (Winsloe, PEI)
- Andrew Kernohan (Parrsboro, NS)
- Cyril Welsh, Highland View Sheep Farm (George's River, NS)
- Serge Giard, Ferme Giarmic (St. Hugues, QC)
- Francine Boissonnault & François Bertrand, Ranch D'Alton (St-Alban, QC)
- Bruce Duncan (Almonte, ON)
- Robert Guilford, Guilford Organic Feed and Seed (Clearwater, MB)
- Martin Meinert, Lake Notukeu Farms (Swift Current, SK)
- Marc Loiselle, Loiselle Organic Family Farm (Vonda, SK)
- Wendy Asbil, Marie McClelland, and Tom Hossie (Kemptville College, University of Guelph)
- Sophie Boudreau (Club Agri-Avenir, St-Hugues PQ)
- Steve Shirliffe and Rachelle German (University of Saskatchewan)
- OACC staff, including Shannon Urbaniak, Brenda Vandepol, Stuart McMillan and Janine Cudmore (Nova Scotia Agricultural College)
- Mélanie Leclerc (translation)
- Our funder, the Natural Sciences and Engineering Research Council

### **For more information:**

*By telephone:*

Ontario and East: Dr. Andy Hammermeister at (902) 893-8037  
Manitoba and West: Dr. Brenda Frick at (306) 966-4975

*By email:* Roxanne Beavers ([rbeavers@nsac.ns.ca](mailto:rbeavers@nsac.ns.ca))

*By mail:* Attn. R. Beavers  
Organic Agriculture Centre of Canada  
P.O. Box 550, Truro NS B2N 5E3