

Seeking integrated practices for zero-till barley-pea rotations

Researchers at Agriculture and Agri-Food Canada recently completed a study into integrated weed management (IWM) systems in barley and field pea rotations to see how weed control and yield were affected. They found that IWM has the potential to reduce weed control cost without impacting on yield or weed seed-bank populations.

The field study was conducted at Lacombe, Alberta to determine the combined effects of seed date, seed rate, fertilizer timing, and in-crop herbicide rate on weed growth and crop yield. The study covered four consecutive years within a barley- pea-barley- pea rotation in a zero-till production system.

The crops were seeded during either the last week of April or the third week of May. Seeding rate was at the recommended rate or 150% or recommended rate. Plant populations for barley were targeted at 175 plants per square metre (17 plants per square foot) and pea at 75 plants per square metre (7 plants per square foot). Fertilizer was banded 10 cm (2.5") deep in either the fall or during the spring seeding operation. Pea was inoculated with granular *Rhizobium* inoculant.

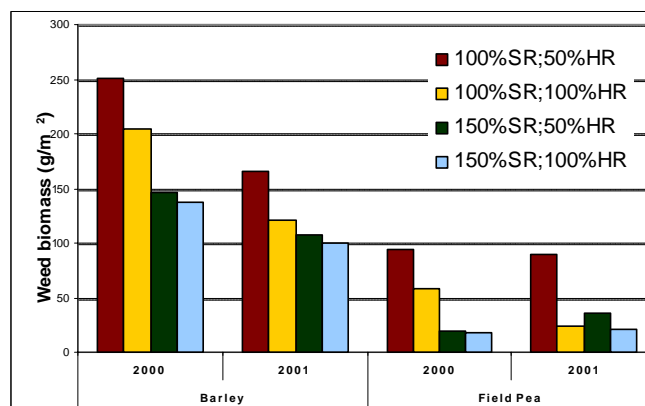
In the first year of the study, herbicides were applied at 50% of recommended rates or not at all. However, because of heavy weed competition in the non-herbicide treatment, the herbicide treatments were changed to 50% and 100% of labeled rates in the final three years. Barley received a treatment of Achieve and Prestige, while pea was sprayed with Odyssey.

Putting the pieces together

The most competitive cropping system in the study was the combined use of early seeding, higher seeding rates, and spring-applied fertilizer. By implementing a competitive cropping system, the research showed that growers have greater flexibility in herbicide use, and may be able to consider fewer herbicide applications or reduced rates.

Overall, an increase in seeding rate had the most consistent positive effect on weed management and crop yield. Crop yield was never lower with higher seeding rates, indicating that this is a low-risk production practice that farmers can readily adopt.

The research found that within a competitive IWM cropping system of early seeding, higher seeding rates and spring-applied fertilizer, weed biomass, crop yield, and weed seed bank in the study were often similar between the 50% herbicide rate and the 100% herbicide rate.



Effect of the interaction of seed rate and herbicide rate on weed biomass in barley and field pea

Legend: 100%SR = Recommended seeding rate.
150%SR = 150% of recommended seeding rate.
50%HR = 50% of recommended herbicide rate.
100% HR = Recommended herbicide rate.

Source: Blackshaw, R.E., Moyer, J.R., Harker K.N., Clayton, G.W. 2005 Integration of agronomic practices and herbicides for sustainable weed management in zero-till barley field pea rotation. *Weed Technol.* 19:190-196

Seeding date was also an important consideration. Pea yield was greater with April than with May seeding in 3 of 4 years, but barley yield was similar with April seeding in 3 of 4 years and greater in the other year. Clearly, early seeding is more beneficial for field pea than for barley under the environmental conditions of this study.

This study demonstrates the combined merits of early seeding (April), higher crop seed rates, and spring-applied fertilizer in conjunction with timely but limited herbicide use to manage weeds and maintain high yields in rotations containing barley and field pea. If a management strategy of altered seed dates were to be used, then late-seeded barley may be a good choice because its yield was never lower with the later May seeding date.