

INPUTS, AGRONOMICS AND WEEDS

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Cash flow is often the most important consideration when growers make cropping decisions. One can manage crops well to improve yield, and market crops well to improve returns, but the real cash crunch comes at the beginning of the growing season where input costs seem to be ever-increasing. Therefore, it is tempting, and potentially advantageous, to reduce inputs. The problem arises when input reductions reduce yield so much that any profit gains that might have been realized due to lower inputs costs are outweighed by substantially lower yields and returns. Some have questioned whether it is ever profitable to reduce inputs.

Individual Inputs.

A study to evaluate the relative importance of inputs in canola and barley production was initiated at Scott and Melfort, SK and at Lacombe, Beaverlodge, Lethbridge and Fort Vermilion, AB in 2005. It is not feasible to study at all possible combinations of inputs. However, it is important to know how changes to one input might affect responses to others. The study is based on evaluating responses to individual inputs as they are either removed from a 'full' package of inputs or added to an 'empty' package of inputs. The premise is that responses may not be the same in a 'full' versus an 'empty' package. Studies were designed as a split plot factorial with canola and barley as main plots and inputs as factors in sub plots. The same input strategy would be applied to each plot for a period of 4 years to evaluate cumulative effects of inputs over time. In subsequent years, the plots used for canola would be seeded to barley, and vice versa creating a canola-barley rotation. To ensure adequate and uniform weed populations, wild oat and wild buckwheat were seeded in year one only on all plots at a rate of 100 seeds of each species per square meter. Studies were direct seeded after application of Roundup burnoff at 0.5 or 1.0 liters per acre depending upon whether perennial weeds were present. The list of experimental treatments follows:

Got Questions?

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Treatment List – Canola and Barley:

- 1) Full package
- 2) Full package minus best genetics
- 3) Full package minus seed
- 4) Full package minus 50% fertilizer
- 5) Full package minus 100% fertilizer
- 6) Full package minus 50% herbicide
- 7) Full package minus 100% herbicide
- 8) Empty package
- 9) Empty package plus best genetics
- 10) Empty package plus seed
- 11) Empty package plus 50% fertilizer
- 12) Empty package plus 100% fertilizer
- 13) Empty package plus 50% herbicide
- 14) Empty package plus 100% herbicide

Canola Full package = InVigor 5020, 150 seeds m², 100% fertilizer, 100% herbicide

Canola Empty package = LBD2393LL, 75 seeds m², no fertilizer, no herbicide

Barley Full package = AC Metcalfe, 300 seeds m², 100% fertilizer, 100% herbicide

Barley Empty package = Harrington, 150 seeds m², no fertilizer, no herbicide

Agronomic and weed management outcomes follow input level decisions. For example, how long will it take for a repeated 50% fertilizer rate to reduce yields below what is gained by lowering fertilizer inputs? Are there soil zones where fertilizer inputs are more crucial? Given greater native fertility, nitrogen mineralization and yield potential in high organic matter soils, should fertilizer inputs be lower than commonly recommended? When herbicides inputs are reduced what weeds will build up after several years and in what densities? Should soil zone influence herbicide input decisions? Will uncontrolled weeds be a significant problem when weed seeds are left on the soil surface in zero till and direct-seeding systems? In canola, will higher yields following hybrid seed substantially out-yield cheaper open pollinated seed? Can seeding rate for canola hybrids be reduced without significantly lowering yields and profit? These questions will be discussed in the presentation, although long-term effects will only be determined after at least four years of study.

Combined Inputs and Integrated Crop Management Impacts on Wild Oat.

There has been little research conducted to determine if a relationship exists between crop competitiveness with weeds, and the efficacy of low herbicide rates. It is conceivable that crop competition may influence the effectiveness of lower than recommended rates of herbicides used for wild oat control. Semi-dwarf and hull-less varieties are generally less competitive than hulled, taller varieties. A long-term barley rotation study that illustrates agronomic practices favouring integrated crop management and crop health was initiated in 2001 and still continues. The experiment was conducted at three sites to represent a dark grey-wooded (Beaverlodge), a Black sandy loam (Lacombe) and clay loam soil (Brandon).

Treatment Factor and Levels List:

Rotation System Options: (2) continuous barley or barley–canola–barley–peas.

Barley Type: (2) tall or short

Seeding Rate: (2) 200 and 400 seeds m⁻² for barley; 100 and 150 seeds m⁻² for peas and canola, respectively. Wild oats (100 seeds m⁻²) were seeded across all treatments in 2001 only.

Herbicide Rate: (3) 1 X, ? X and ? X rates in all crops

By year five, barley yields were substantially lower under continuous barley production than when the barley was rotated with canola and field peas. Without agronomic crop health support, wild oat biomass after five years of ? herbicide rates was very high (4530 kg/ha). Crop rotation alone reduced wild oat biomass by more than 50%. Seeding a taller variety reduced wild oat biomass by 2-fold. Doubling the seeding rate reduced wild oat biomass by 3-fold. Combining both of the latter factors together reduced wild oat biomass by 8-fold. Combining all optimal practices for crop health reduced wild oat biomass by 70-fold. It is evident that there is

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much more that you can do about wild oat management (and by extrapolation, the management of other weeds) other than just spraying herbicides and worrying about water volume, adjuvants, nozzle types and weather.

Adhering to integrated crop management principles that favour crop health will help growers struggling with input-level questions. Skilfully combining optimal agronomic factors that work on your farm is the art and science of integrated crop management as well as the primary determinant of how long you will be happily farming. The combination that works one year, on one field could be a disaster in another year on another field; long-term “recipes” are not recommended.