

Agricultural Research and Extension Council of Alberta

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Innovative Pest Management Techniques for Better Crops

Finding the right method of dealing with weeds, insects and crop diseases can be a challenge for any producer. Given the costs, the build-up of resistance and environmental impacts of chemicals, many are now shifting towards using a variety of pest control techniques as an alternative. By using an integrated approach, producers can lessen their crop risks, lower their input costs and reduce the ecological effect on their land.

Using Competitive Crops and Cultivars

Crops vary in their ability to naturally compete with weeds. Those crops that germinate quickly tend to do better as they are able to grow more quickly and choke out the weeds (*see Figure 2*). Competitive abilities in common Alberta crops are ranked as follows:

- | | |
|---------------------|--------------------------------|
| 1. Barley | 4. Triticale |
| 2. Oats | 5. peas, flax, beans & lentils |
| 3. Wheat and canola | |



Figure 1. From left to right: barley, triticale and oats under competition from mustard.



Figure 2. Triticale (left) and barley (right) under heavy weed competition from mustard on organic land.



Hybrid (left) and open-pollinated canola seeded at 6 lbs/acre

When using this method to control weeds and minimize herbicide application, it is important to match the crop and variety to the field conditions. It is not advisable to grow field peas or hull-less barley in a field infested with Canadian thistle, for example, as neither crop can compete with this plant. The more weeds a crop can eliminate naturally, the less herbicide is required.

Optimizing Seeding Rate

Many producers determine seeding rate based on anticipated acres per bushel, but do not take into account the fact that different seed sizes will impact that number significantly. If the seeding rate does not result in enough plants per acre, weeds will have a chance to take hold and spread, leading to the increased need for herbicides.

If, for instance, you were determining the seeding rate for barley, the correct number varies according to variety. For example, while under normal conditions the rate for Manny barley is 114 lb/acre, you would need 145 lb/acre of Conlon barley to grow the same number of plants.



Figure 4. AC Cadillac wheat seeded at 12 (left), 24 (middle) and 48 (right) plants per square foot.

Alberta Agriculture and Rural Development has an online Seeding Rate Calculator for both cereals and pulses (www.agric.gov.ab.ca). By using this tool, you can determine seeding rates based on 1000 seed rate rather than bushels/acre, resulting in the optimal numbers of plants per square foot.

The following tables show optimal crop stands for some common Alberta crops.

Table 1. Cereal seeding rates

	Desired plant population		1,000 kernel weight	seeds per pound
	per square meter	per square foot		
Wheat				
Hard red	250	24 (16 - 30)	31 - 38	12,000 - 14,600
CPS	250	24 (18 - 30)	39 - 50	10,800 - 12,000
Durum	210	20 (16 - 24)	41 - 45	10,000 - 11,000
Extra strong	210	22 (20 - 24)	40 - 44	10,000 - 11,000
Soft white	210	20 (18 - 25)	34 - 36	12,600 - 14,200
Barley	210	22 (16 - 30)	40 - 50	9,000 -11,000
Oats	250	24 (16 - 30)	30 - 45	10,000 -15,000
Fall rye	250	24 (16 - 25)	30 - 35	13,000 - 15,000
Triticale				
Spring	310	30 (25 - 35)	42 - 48	9,500 - 10,800
Winter	250	24 (18 - 30)	43 - 46	9,900 - 10,600
Corn				
Sweet	5	0.5	380	1,200
Grain	6.1	0.6	380	1,200
Silage	7.6	0.7	380	1,200

Table 2. Oilseed seeding rate

	Desired plant population		1,000 kernel weight	seeds per pound
	per square meter	per square foot		
Canola				
Polish	70 - 170	7 - 17	2 - 3	151,000 - 227,000
Argentine	70 - 120	7 - 12	2.5 - 4	113,500 - 182,000
			3 - 4.5	91,000 - 151,000
			3.5 - 5.5	83,000 - 130,000
Flax	300 - 400	30 - 40	5 - 6.5	70,000 - 91,000

Table 3. Special crop seeding rate

	Desired plant population		1,000 kernel weight	seeds per
	per square meter	per square foot (range)		
Pea	75	7 (7 - 9)	125 - 300	1,500 - 3,600
Bean	25	2.4 (2.2 - 2.6)	200 - 350	1,300 - 2,300
Fababean	45	4.3 (4.0 - 4.3)	350 - 425	1,000 - 1,300
Lentil	105 - 147	12 (10 - 14)	30 - 80	5,600 - 15,000
Buckwheat	150	14	30	15,100
Safflower	30 - 60	3 - 6	36	12,600
Sunflower				
Confection	4.5	0.4	175	2,600
Oil	6	0.6	126	3,600

Optimizing Seeding Date

Although the timeframe for seeding can vary depending on your location in Alberta, the generally accepted principle for seeding is the earlier, the better. When you are seeding more than one type of crop, however, you can choose the order in which you seed in order to give your crops the advantage over weeds.

The suggested order for common Alberta crops is:

1. canola and peas
2. wheat
3. oats
4. barley
5. silage, green feed
and swath grazing crops

The key factor in deciding when to seed is soil temperature. Canola and cereals, as a case in point, can germinate at 4-5°C, but do so much faster and more reliably at 9-10°C. You must determine for yourself the balance between seeding early to maximize yield (and higher competitiveness) and seeding later for more reliable germination.

Using Seed Treatment

Crop diseases including loose smut, bunt, seedling blight, blackleg, Alternaria and damping-off are often borne on seed. As a result, producers can expect weakened plant stands and increased seedling mortality in cereals and oilseeds. This in turn lowers plant density in the field and allows openings for weeds to thrive.

With the development of easy-to-use seed treatments, you can protect your crop before the seeds even reach the field. Cold soil temperatures, frost, herbicide residue and damaged seed are some factors that can decrease crop vigour and leave plants susceptible to diseases and insects. Using a seed treatment protects your crop so that it can germinate and grow quickly, outcompeting emerging weeds and increasing your yield.

New seed treatments have been developed in recent years that are easy-to-use, are applied in low doses to reduce applicator exposure and contain several different fungicides to control many diseases at once



Figure 1. Using seed treatments helps prevent crop loss from loose smut (left) and Alternaria blackspot (right).

Conclusion

Using crop competitiveness, optimizing seed rates and dates, and taking advantage of seed treatments can give you the edge when it comes to controlling weeds and maximizing yield. By reducing your dependence on herbicides and pesticides, you can get the most out of your crops while reducing both input costs and negative impacts on your land. Best of all, effective crop management can mean more of your hard-earned money stays in your pocket

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