

June 2006

## How many weeds are too many?

Weeds can be a major limiting factor in canola production and deciding just when to spray can be a complex decision that must balance agronomics and economics. Here are a few tips to keep in mind.

### Economic thresholds

The challenge is knowing when you should spray and when you can afford not to spray. You can make this decision by calculating the economic threshold. That's the level of infestation at which yield losses exceed cost of the application and cost of the chemical used. To determine the economic threshold, you need to know:

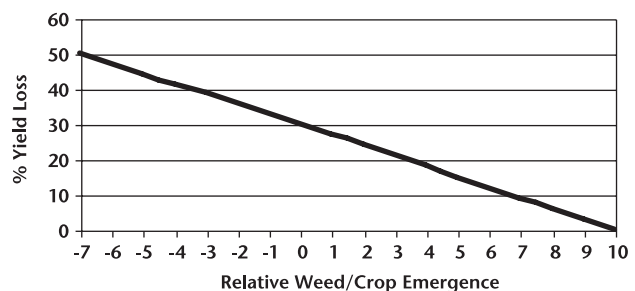
- weed density in the field
- staging of the weeds relative to the crop
- market price of the crop
- cost of controlling the weeds
- yield loss and income loss that will occur if the weeds are not controlled.

It's important to take at least 20 accurate weed counts per field to calculate economic thresholds. The more counts you make, the more accurate you will be.

### Yield losses

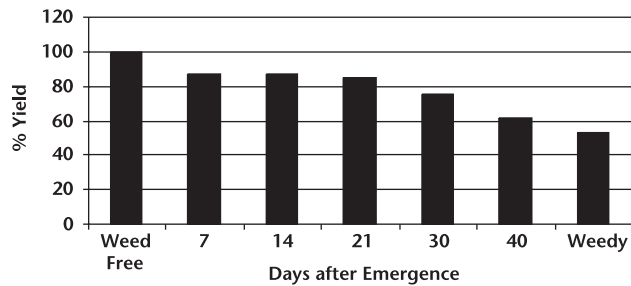
The competitiveness of the weed species is important in determining yield losses. The more competitive the weed, the fewer weeds needed to cause a yield reduction. Research by Alberta Research Council (ARC) at Vegreville on wild oats has shown weeds that emerge before or with the crop cause greater yield loss than weeds that emerge after the crop. Fewer weeds tend to emerge after the crop has reached the four-leaf stage and those that do are usually weak and spindly (Figure 1).

**Figure 1: Yield loss versus weed/crop emergence**



During the seedling stage, when the crop is susceptible to competition, weeds such as wild oats and volunteer canola, can become serious problems (Figure 2).

**Figure 2: Effect of timing of wild oat removal on canola yields (three year average)**

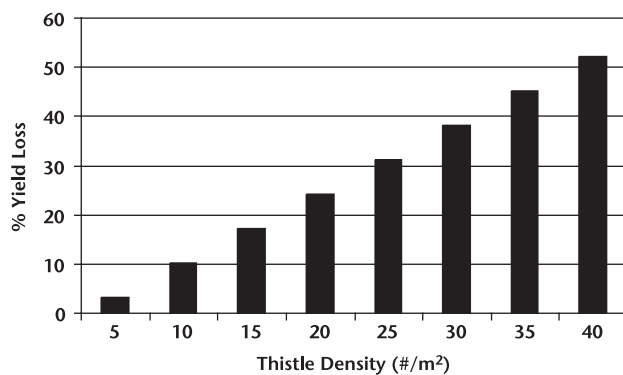


## Weeds to watch

### Canada thistle

This weed is three to four times more competitive than wild oats. Estimated yield losses caused by Canada thistle are shown in Figure 3.

**Figure 3: Canola yield losses due to Canada thistle**



Researchers from AAFC Lacombe, AB Research Centre, developed an equation to predict yield loss through competition from Canada thistle.

The equation is:

$$\text{Canola yield loss (\%)} = -3.83 + 1.4x$$

(x is the number of Canada thistle shoots/m<sup>2</sup>)

The more samples taken, the greater the accuracy in estimating yield loss; a minimum of 10 samples is recommended per quarter section. For example, if a canola field has an average of 15 Canada thistle shoots/m<sup>2</sup>, the estimate would be:

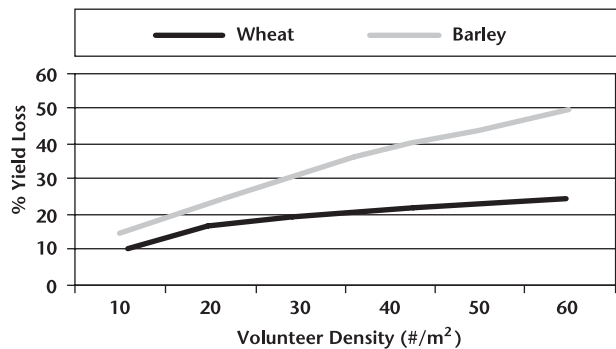
$$\text{Percent yield loss} = -3.83 + 1.4 \times 15 = 17$$

In a canola field with 30 bu/ac potential yield, a 17% yield loss would be 5 bu/ac.

### Volunteer Wheat and Barley

These volunteers are very competitive in early growth stages and may cause serious yield losses. Canola yield losses are more severe when the volunteer cereals emerge before the canola crop (Figure 4). Volunteer wheat and barley at seven to eight plants/m<sup>2</sup> can reduce canola yield by 10 to 13% as shown in studies by the University of Manitoba.

**Figure 4: Yield losses in canola from volunteer wheat and barley**





The following equation can be used to estimate the yield loss from volunteer barley.

$$\text{Canola yield loss (\%)} = 100 \times 0.032D / 1 + 0.04C + 0.032D$$

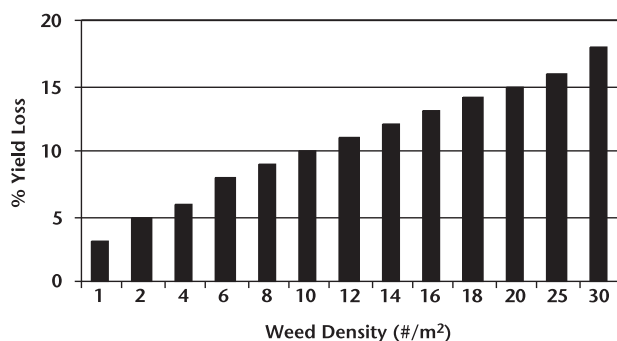
Where D = barley plants/m<sup>2</sup>

Where C = canola plants/m<sup>2</sup>

### Wild Oats

Wild oats can significantly reduce canola yields. Estimates of yield losses due to wild oats have been developed for healthy, well fertilized canola crops with good stand establishment (Figure 5).

Figure 5: Yield losses in canola caused by wild oats



An average infestation of wild oats would range from 60 to 100 plants/m<sup>2</sup>. A heavy infestation would range from 300 to 500 plants/m<sup>2</sup>.

Researchers at the AAFC Lacombe Research Centre developed an equation to predict canola yield losses from wild oats:

$$\text{Canola yield loss (\%)} = 3.22 \times (\text{square root of } X)$$

Where X = wild oats/m<sup>2</sup>

If a field had 15 wild oats/m<sup>2</sup> on average, the percent yield loss would be:

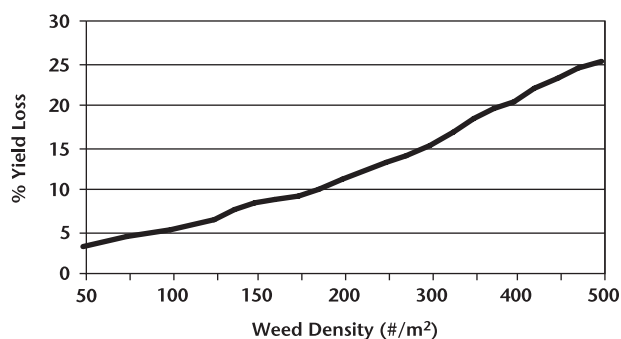
$$\begin{aligned} \text{Percent yield loss} &= 3.22 \times (\text{square root of } 15) \\ &= 3.22 \times 3.9 \\ &= 12.5\% \end{aligned}$$

A field with a 30 bu/ac potential yield with 12.5% yield loss would result in 3.8 bu/ac loss.

### Green Foxtail

Research by the Alberta Research Council (ARC) in Vegreville, AB, has shown canola yield losses caused by green foxtail (Figure 6). Green foxtail can result in significant yield losses because it emerges ahead of or with the canola crop. If green foxtail density is less than 100 plants/m<sup>2</sup> and the majority of the weeds have emerged more than one week after the crop, yield loss would be expected to be insignificant. Green foxtail is a poor competitor in cooler regions.

Figure 6: Yield losses in canola due to green foxtail

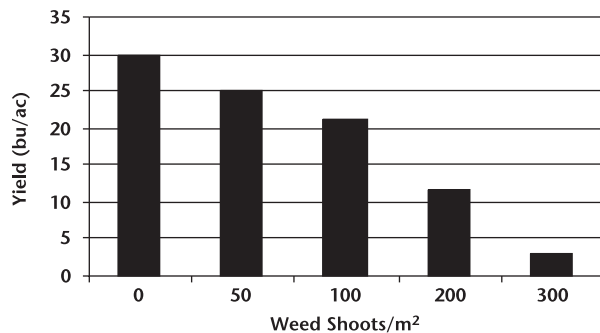


### Quackgrass

Research by the Vegreville ARC estimated yield losses in canola due to quackgrass density (Figure 7). The economic threshold in canola is about 20-25 quackgrass shoots/m<sup>2</sup>, but it varies with the price of canola. Quackgrass usually occurs at high densities in localized patches within a field but can spread quickly by its underground rhizomes.



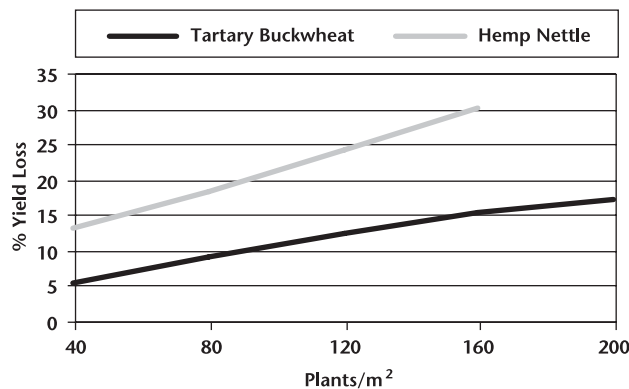
**Figure 7: Effect of quackgrass on canola yield**



**Other Broadleaf Weeds**

Canola is more competitive against Tartary buckwheat than barley, wheat or flax. Canola yield losses from wild buckwheat are similar to Tartary buckwheat. Canola yield losses due to smartweed, hempnettle and lamb's quarters may be higher due to the taller growth habits of these weeds (Figure 8).

**Figure 8: Effect of Tartary buckwheat and hempnettle on canola**



Make your decision to spray on the basis of economics using the current herbicide cost and canola prices. If your decision is not to spray, you must consider the possible level of infestation that could occur the following year.