Management Strategies for Dandelion

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Dandelion has always been recognized as a significant weed in lawns and forage crops. Dandelion tends to thrive in weak grass stands. There are many cultural and chemical options that are well understood for managing dandelion problems in lawns. In forage crops, stands tend to weaken over time. This is especially true for alfalfa. This is important because the average length of alfalfa stands is 6.5 years (Entz et al., 1995). In both lawns and forage crops, dandelion quickly develops into a significant pest because of its low growth habit, making defoliation difficult.

Dandelion has more recently become an important pest of annual crops. In the Prairie Provinces over the last ten years, dandelion has increased from being present in six percent of fields in 1986-9 to being present in twenty percent of fields in 1995-7 (Thomas et al., 1997. AAFC- Saskatoon). It is widely theorized that dandelion occurrence has become more widespread due to the increased adoption of zero- and reduced-tillage practices in Western Canada. In general, tillage intensity has been decreasing in Western Canada over the past 20 years.

A research project was begun in 1999 to: 1) Determine if there is an effective measure of dandelion infestations, 2) Determine the competitive influence of dandelion on canola, and 3) Provide an effective system for controlling dandelion in annual cropping systems.

Several fields were surveyed to determine the distribution of dandelion. Seven fields were surveyed and it was observed that dandelion could be present in both low and high densities throughout fields. Also, in some fields dandelion was present sporadically whereas in others, populations were uniform throughout fields. This was the case in both zero and conventional tillage fields.

To determine the competitiveness of dandelion, several 1 m^2 quadrats established in each of the surveyed canola fields. In each quadrat, several measurements of dandelion were taken: In-crop- Density, % ground cover and leaf diameter; At harvest- Density, root diameter, leaf area and above-ground biomass. These measures of dandelion were then correlated with measure of canola: In-crop- Density and % ground cover; At harvest- grain yield.

In conventional tillage fields, no relationship was observed between any measure of dandelion infestation and canola yield.

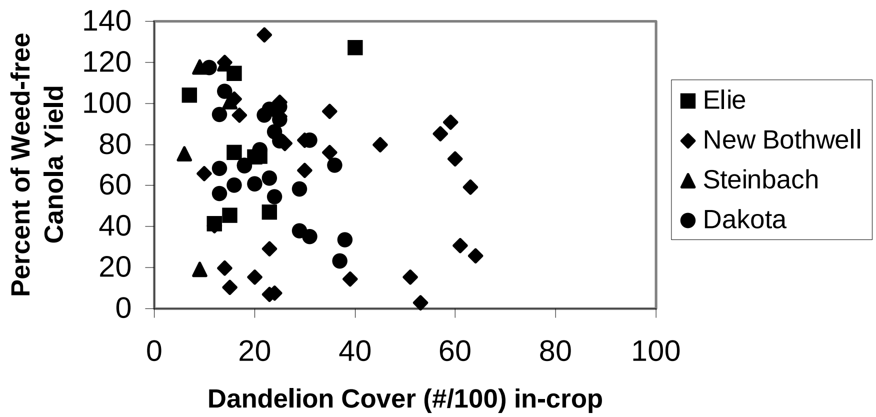

Figure 1. Relationship between dandelion ground cover and canola yield in conventional tillage fields.

In zero tillage fields, reduction in canola yield was strongly correlated with dandelion ground cover.

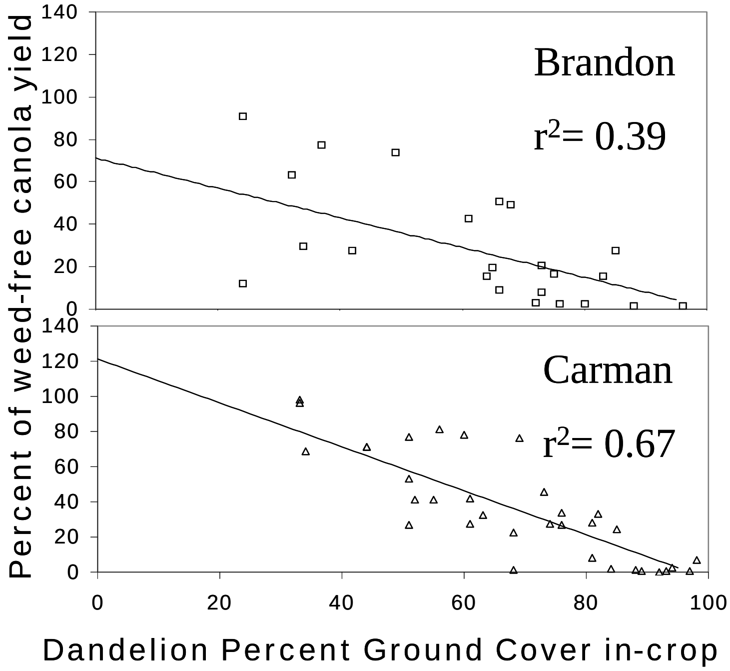

Figure 2. Relationship between dandelion ground cover and canola yield in zero tillage fields.

As dandelion ground cover increased, canola yield decreased. In both cases, with roughly 50% dandelion ground cover, canola yield was reduced by roughly 50%. When all measures of dandelion infestation were plotted relative to reduction in canola yield, the strongest relationships with reduction in canola yield were found with measures of dandelion ground cover. Thus, the most accurate measure to quantify a dandelion infestation is ground cover.

Dandelion control experiments considered the effect of 3 factors on residual dandelion populations: 1) Spring tillage – no tillage vs. spring tillage, 2) Glyphosate Timing – pre-seed, 0-3 leaf stage of canola, 4-6 leaf stage of canola, pre-harvest and post-harvest, and 3) Glyphosate Rate – 0.5 to 3 liters per acre. A total of 5 site years were completed and results have been averaged across all sites. Dandelion control was determined by measuring residual dandelion populations in all treatments, the year following treatments.

Spring tillage reduced residual dandelion biomass by roughly 50%, yet did not reduce dandelion density.

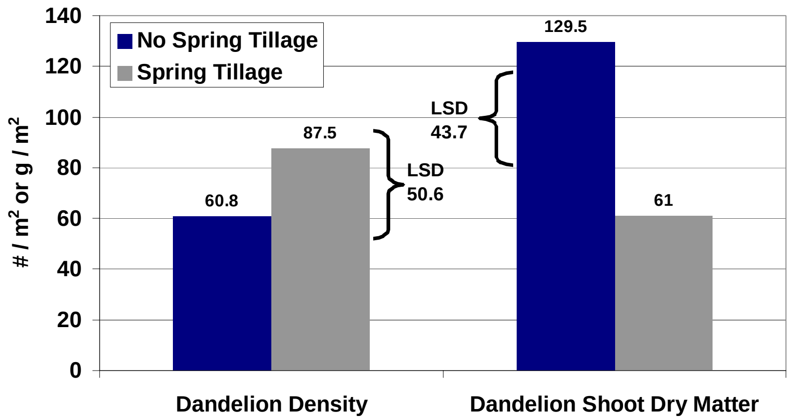

Figure 4. The influence of spring tillage on residual dandelion density and shoot dry matter

The optimum time for glyphosate applications was clearly post-harvest. Dandelion density was reduced by 88% and shoot dry matter by 96% with a 1 L application of glyphosate post-harvest. All other timings reduced biomass by roughly 50%.

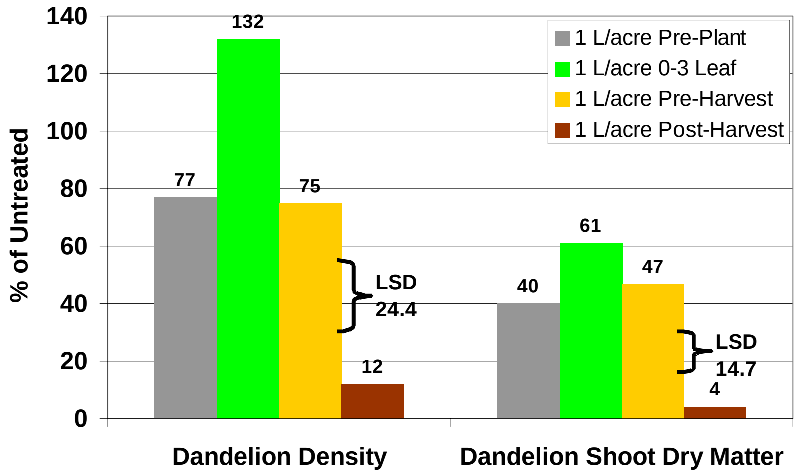

Figure 5. The influence of glyphosate timing on residual dandelion density and shoot dry matter

Generally, increasing the rate of glyphosate did not increase dandelion control. The only exception was at the pre-harvest timing, where increasing rate from 1 to 2 liters per acre significantly reduced dandelion shoot dry matter. At the pre-harvest timing, translocation to roots is occurring however there would have been considerable crop interception. Increasing rate would have doubled the concentration of glyphosate reaching dandelion plants, explaining the increase in control.

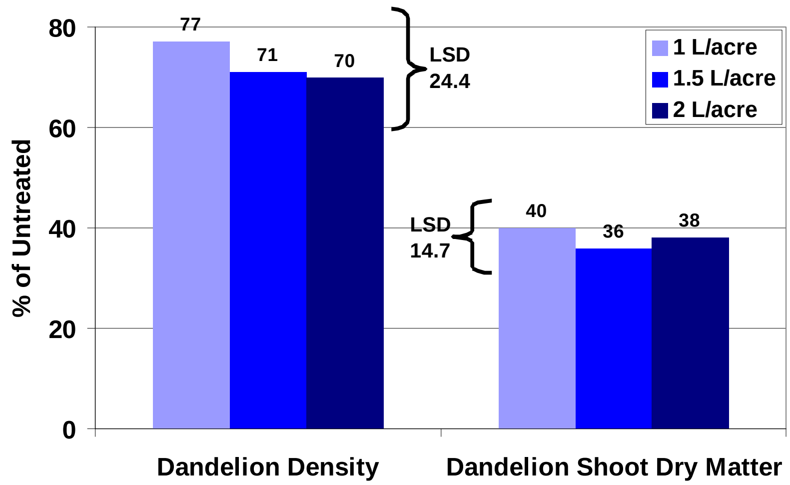

Figure 6. The influence of increasing glyphosate rate at the pre-seed timing on dandelion density and shoot dry matter

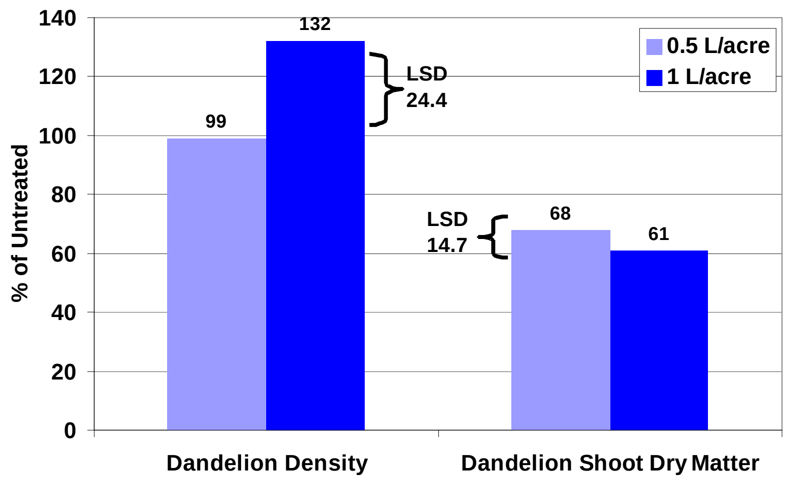

Figure 7. The influence of increasing glyphosate rate at the 0-3 leaf timing on dandelion density and shoot dry matter

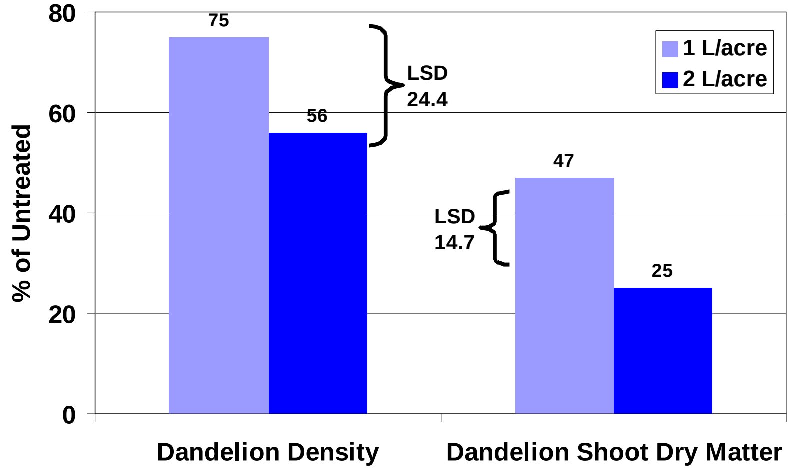

Figure 8. The influence of increasing glyphosate rate at the pre-harvest timing on dandelion density and shoot dry matter

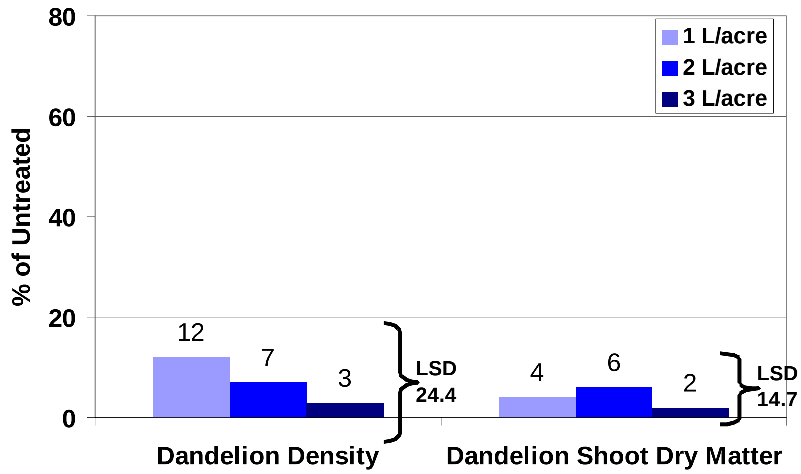

Figure 9. The influence of increasing glyphosate rate at the post-harvest timing on dandelion density and shoot dry matter

Yields were also collected in the control trials. The competitive effect of dandelion is very apparent with this data. Spring tillage reduced the effect of spring tillage effectively, however the highest yields were observed in plots receiving a pre-seed or early in-crop glyphosate treatment. While not significant, yields in pre-harvest plots were higher than in those receiving a 0-3 leaf treatment.

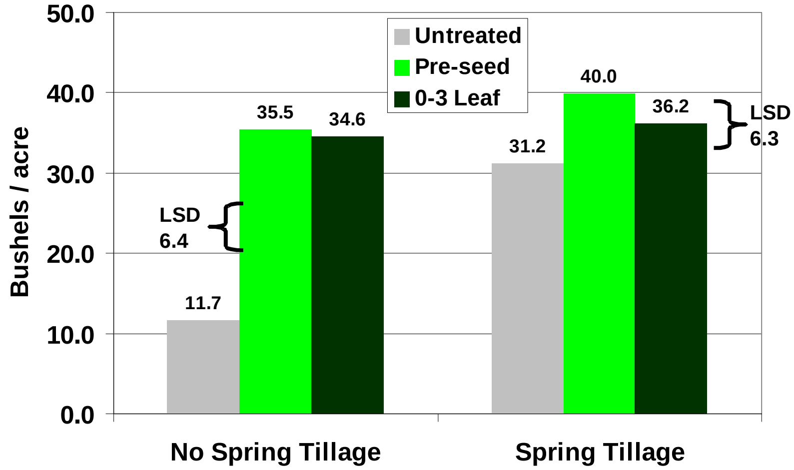

Figure 10. The influence of tillage and glyphosate timing on canola yields.

In conclusion, dandelion is no longer only a pest of lawns and forage crops. Dandelion has become an important weed in annual cropping systems. Dandelion can dramatically reduce canola yield, although it's difficult to predict. Generally, the greater the ground cover of dandelion, the greater the competitive influence.

It is possible to effectively manage dandelion populations in an annual cropping system. Spring tillage will reduce dandelion biomass. If ground is not cultivated before seeding, dandelion populations must be managed with a pre-emerge or in-crop herbicide treatment in order to minimize yield losses. Post-harvest applications of glyphosate provide the greatest efficacy and can result in near-complete control. A rate of one liter per acre rate is sufficient at this timing.

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