CANADA THISTLE: AREN'T WE THERE YET? Jerry D. Doll, Weed Scientist Emeritus, Univ. of Wisconsin, Department of Agronomy, Madison, WI 53706.

Canada thistle is an amazing plant. While not native to North America, it is found in all but eight of the US states(including Alaska) and in all the Canadian provinces. Thus it has long been the target of control efforts in North America by any and all means and is a legally declared noxious weed in more states (26) and provinces than probably any other plant species. Yet Canada thistle persists as an important weed. We know much regarding Canada thistle's growth, development, biotypes, carbohydrate physiology, morphology, reproduction and more, and yet it seems the weed is smarter than we. A complete review of the importance, biology and management of Canada thistle as of 25 years ago is found in the Proceedings of the 1981 North Central Weed Control Conference (Vol. 36, pages 152 to 182; copies available from the NCWSS headquarters).

Canada thistle is less abundant in cropped land today than in recent memory. The adoption of no tillage systems coupled with glyphosate resistant crops has resulted near eradication of Canada thistle on many farms. A three-step program is recommended to control this and other perennial broadleaf weeds in glyphosate resistant varieties/hybrids: 1) use a no tillage system; 2) apply a reduced rate of a soil-active herbicide in preemergence to suppress annual weeds for 3 to 4 weeks; 3) apply glyphosate to Canada thistle when plants reach the early flowering stage or are 24 inches tall, whichever occurs first. Using these practices for 2 to 3 years will significantly reduce Canada thistle abundance.

While great strides have been made in cropping systems, the same is not true for pastures, roadsides, CRP fields and other non-disturbed sites. Part of the reason is that soil disturbance and interference from a highly competitive crop are absent in these habitats. Even though we have very effective herbicides to apply in areas where grass is desired (pastures and roadsides for example), it is rare that one would claim eradication of Canada thistle in these sites. Mowing Canada thistle in grassy areas reduces seed production but rarely achieves long term reductions in abundance or area infested because the frequency of mowing is usually once a year which has minimal impact on long-term survival.

Canada thistle hosts several diseases. One of these, *Pseudomonas syringae pv. tagetis* (PST), occurs naturally and is noted by the chlorotic leaves and stems (caused by a toxin, tagetitoxin, produced by the bacteria which prevents chloroplast biogenesis) on the upper regions of some plants. Efforts to enhance the severity and percentage of infection usually have been unsuccessful in achieving disease levels that would cause plants to die. Perhaps combining the impact of PST with that of rust or phoma, which also attacks Canada thistle, would be more effective. This hypothesis needs testing.

The impact of animals on Canada thistle infestations is unclear. In some pastures, graziers observe a decline in Canada thistle abundance; others report that Canada thistle responds as well or better to improved pasture management practices than the forage species. Do some animal species have more impact on Canada thistle than others? Is there a particular sequence of mowing and grazing events that is more detrimental to Canada thistle than others? Are the timing and frequency of grazing related to thistle abundance? How do soil moisture levels and temperatures relate to thistle survival under grazing and mowing regimes? Could the presence of plant diseases in Canada thistle add to its demise in grazing environments? Little is known about any of these questions.

New herbicides continue to be tested for Canada thistle control. The additive diflufenzopyr synergizes dicamba, so that much less dicamba is needed when applied in combination with it. Unfortunately, this seldom results in Canada thistle control as effective as that obtained with the more expensive option, clopyralid. Research to evaluate the effectiveness of diflufenzopyr with lower rates of clopyralid to achieve the same control as conventional use rates is promising. An even more promising and economical herbicide is aminopyralid. This newly developed and registered herbicide

(received EPA approval in August 2005) is chemically related to clopyralid, but is at least four times more active molecule for molecule. It will be available for use in pastures, rangeland, CRP sites and non-crop areas such as roadsides in 2006. Long term field evaluations are needed to determine its impact on Canada thistle over time. The approval of glyphosate resistant alfalfa (also in 2005) gives another option to manage Canada thistle infestations in pastures. Producers could plant glyphosate resistant alfalfa, graze the site as appropriate, and hopefully achieve the same level of thistle control observed in glyphosate resistant soybean and corn systems. If and when Canada thistle is eradicated, other forage species could be reintroduced into the site as desired.

A weed that has survived control and management strategies for centuries will most likely continue to persist on the landscape. Sustained efforts to prevent, detect, contain, and control infestations are needed. Perhaps the NCWSS will someday have a symposium on "former noxious weeds" that would include Canada thistle. Until then, on-going attention to this and other invasive species should not wane. Perhaps one day we will indeed say, "Yes, we have arrived at our destination. The trip is over."

2005 North Central Weed Science Society Proceedings 60:175.