TRANSGENIC CROPS: ARE MILKWEEDS AND BUTTERFLIES IN TROUBLE?

Jerry D. Doll[1]

Two years ago a brief article in Science raised the questions as to whether or not the advent of transgenic crops, in particular glyphosate resistant corn and soybeans, might mean the Monarch butterfly (*Danaus plexippus* L.) is in trouble (Anon. 1999). It is well known that the larvae of the Monarch butterfly feed exclusively on a few species of the milkweed family. In our part of the world, their food is essentially common milkweed (*Asclepias syriaca* L.). The article estimated that nearly half the monarchs in North America migrate to overwintering sites in Mexico through the Midwest region. They also assumed that much of the milkweed that monarch larvae depend on was found in crop land that would be treated with glyphosate and this could "... devastate monarch food supplies."

After this article appeared, the focus of transgenic crops and monarch butterflies rapidly shifted to the impact that pollen from Bt corn might have on the monarch larvae feeding on milkweed covered with Bt pollen. The issue of herbicide resistant crops and their possible impact on monarchs was quickly relegated to the back burner, but the question remains and needs to be considered. In this paper I will address the following questions related to milkweeds and monarchs: How important are milkweeds in Wisconsin's agriculture? Do herbicide resistant crops give us new milkweed control options? If there are fewer milkweeds in cropped land, will there be fewer monarchs? Are most milkweeds found in cropped or noncropped land?

Surveys I conducted on the importance of perennial weeds in Wisconsin from 1977 to 1994 found that milkweeds were rated as only a slight problem in the majority of both tilled and no-till fields (Doll, 1994). It tends to be more of a problem in no-till fields as expected. In my more than 20 years as an extension weed scientist, rarely has anyone described a situation where milkweeds were an economic problem and sought advice on how to control them. Travels around the state during this period confirm that milkweeds are commonly found but seldom reduce crop yields. Weed scientists and ag professionals agree that most of our milkweeds are found in non-crop land areas.

It is true that before the advent of glyphosate resistant crops producers had few means of significantly reducing milkweed infestations. Moldboard plowing and the suppression afforded by 2,4-D and dicamba sufficed to keep the weed in check in these cropping systems. Nevertheless, milkweed is a survivor and it is unlikely that many producers have eradicated established infestations from fields. We have speculated that the importance of livestock in Wisconsin has also suppressed milkweed and other broadleaf perennials with spreading root systems by the repeated mowings done in the forage phase of the rotation. The loss of forages on some farms and the adoption of no-tillage systems have given milkweed an opportunity to become more common in some fields.

Even so, it is rare to see a field that would be suitable for a research trial on common milkweed in the upper Midwest. Most infestations consist of a few plants scattered in rather random, low population patches in fields. If fact, I have been challenged by crop consultants that spot-treating fields of either conventional or glyphosate resistant corn or soybeans infested with milkweed is highly impractical because the weed is seldom found in easily identifiable patches. The relatively low level of milkweed infestations in cropped land is further reinforced by the fact that farmers seldom if ever develop a weed management plan in a given field targeted primarily at milkweed.

Is it true that milkweed is more commonly found in non-crop land areas? This was the focus of a survey on common milkweed distribution done in Iowa in 1999. The researchers found that 71% of the roadsides had common milkweed infestations and 50% of the corn and soybeans were infested (Hartzler and Buhler, 2000). Stated differently, corn and soybean fields had 85% fewer milkweed patches than

[1]Extension Weed Scientist, Department of Agronomy, University of Wisconsin-Madison.

roadsides. Land in the CRP had the highest percentage of milkweed infestations. The authors also estimated the area infested with milkweed in these habitats. The greatest area of common milkweed infestation was CRP fields. Approximately 2% of the land area in CRP had milkweed while less than 0.3% of the corn and soybean land area was infested. Thus on both the basis of percentage of sites infested and the area within these habitats that have common milkweed, corn and soybean fields are in last place.

This still does not mean that controlling milkweed in transgenic crops would have no impact on food for monarch larvae. It is true that using glyphosate in transgenic soybeans or corn can eliminate much of the milkweed foliage the season they are treated and may reduce the infestation for several years thereafter. However, this requires an adjustment in the timing of the glyphosate application to coincide with the flowering of common milkweed. In two field trials done on milkweed in glyphosate resistant soybeans in Waupaca County, glyphosate was applied to flowering milkweed on June 25, 1997, and July 2, 1998. The milkweed pressure was reduced approximately 50% one year after the 1997 treatments and by 95% after the 1998 treatments Doll, 1998 and 1999). Most growers are not likely to delay the glyphosate application for the scattered and low density nature of most milkweed infestations. Thus the second year results would be similar to the early applications in my trials which allowed significant milkweed regrowth the year after treatment (treated plots similar to the check following the 1997 applications and a 75% reduction after the 1998 treatments). In summary, monarch larvae may go hungry the year glyphosate is applied to milkweed in transgenic crops, but the weed would still be present in these fields the following year unless the time of application was delayed (Doll, 2000).

Because no producer plants the entire acreage on their farm to only one crop, farms that have common milkweed populations and use glyphosate resistant soybeans would still have at least half the cropped acreage where milkweed would be minimally affected. Add to this the presence of milkweed in fence rows, pastures, roadsides, CRP sites, prairie planting and other non-disturbed sites, it is unlikely that the adoption transgenic herbicide resistant crops will significantly impact monarch butterflies.

References

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