PROJECT TITLE: Behavior and Impacts of Showy Milkweed in Sugar Beet and Barley.

PROJECT LEADER: James A. Mickelson, Weed Scientist, SARC, Huntley, MT

PROJECT PERSONNEL: Michael G. Particka, Research Associate, SARC, Huntley, MT
Tom A. Fischer, Research Specialist and Farm Foreman, SARC, Huntley, MT

COORDINATORS: Terral Balzer, Farmer Cooperator, Worden, MT
Jeff Heyd, Farmer Cooperator, Worden, MT

OBJECTIVES:
1. Identify the milkweed species (showy or common) found in irrigated barley and sugar beet fields of Montana.
2. Quantify the effects of milkweed competition on irrigated barley and sugar beet yield and quality.
3. Determine if seed production and/or vegetative reproduction significantly contribute to the survival and proliferation of milkweed populations in irrigated barley and sugar beet fields.

METHODS:

Barley Site: Plots were established in an irrigated malt barley field near Worden, MT. Chisel plowing followed by seedbed preparation was conducted in the fall of 1999. Plots were established by marking 3.3 ft wide by 6.6 ft long milkweed infested areas so that a range of low to high milkweed density areas were represented. The experiment was conducted using a paired-plot design in which a weed-free barley plot was located adjacent to each milkweed infested plot. Plots were hand cut on July 24, 2000 and barley grain was threshed with a plot combine. Milkweed shoots were also hand cut, dried, and weighed to determine the amount of milkweed biomass (dry matter) present in each plot. Barley yield, test weight, moisture content, protein content, and percent plumps and thins was determined for each plot. Percent yield loss was calculated for each pair of plots.

Sugar Beet Site: Plots were established in an irrigated sugar beet field near Worden, MT in 2000. Moldboard plowing followed by seedbed preparation was conducted in the fall of 1999. Plots were established by marking 15 ft of row in milkweed infested areas so that a range of low to high milkweed density areas were represented. The experiment was conducted using a paired-plot design in which a weed-free sugar beet plot was located adjacent to each milkweed infested plot. Plots were harvested on October 15, 2000 by hand digging the sugar beets from each plot (15 ft of row). Milkweed shoots were also hand cut, dried, and weighed to determine the amount of milkweed biomass (dry matter) present in each plot. Percent sugar beet yield loss was calculated for each pair of plots. Sucrose content was determined from a sample of beets from each plot.

RESULTS:

At each site, all milkweed present was identified to be showy milkweed (Asclepias speciosa).

At the barley site, there was a linear relationship between milkweed shoot biomass and barley yield loss (Figure 1). As milkweed biomass increased, barley yield loss also increased. Maximum barley yield loss was 47% at the highest milkweed density. Barley grain moisture, test weight, plumpness, and protein content were not affected by milkweed interference.

At the sugar beet site, there was a nonlinear relationship between milkweed shoot biomass and sugar beet yield loss (Figure 2). As milkweed biomass increased, sugar beet yield loss also increased but eventually plateaued at approximately 50% yield loss. Sugar beet percent sugar content was not affected by milkweed interference.
No milkweed seeds were found in soil samples collected from within milkweed patches at each site. Also, no milkweed shoots originating from seed were found in either field. Samples of milkweed seeds collected from mature plants at the sugar beet site were tested and found to be viable seeds. All shoots that were dug up appeared to have originated from rootstock buds. Depth of emergence of rootstocks varied from approximately 4 to 20 inches deep in the soil.

CONCLUSIONS:

Observations made at the research sites and other sites in south-central Montana indicate that milkweed in this region is showy milkweed (*Asclepias speciosa*). Data indicate that milkweed population increases within a field are likely due to vegetative reproduction, however, seeds may be partly responsible for long distance spread and establishment. Observations indicate that showy milkweed shoots can emerge from pieces of rootstock located below the plow layer, thus moldboard plowing may not be an effective management tool. The first year of barley and sugarbeet yield data suggest that within milkweed patches, milkweed is very competitive and can greatly reduce crop yields. However, a second year of yield data is necessary to confirm crop yield loss estimates.

Crop yield loss on a field scale is dependent on how much of a field is infested with milkweed patches. If estimates of crop yield loss are accurate, costly herbicide applications may be justified if they can be applied to the patches only. Broadcast applications of herbicides to fields are probably not justified unless a large portion of the field is infested with milkweed. Alternative methods of control may need to be identified in the future.

ACKNOWLEDGMENTS:

Funding for this research was provided by the Montana Noxious Weed Trust Fund.
Figure 1. Relationship between milkweed biomass and barley yield loss at Worden, MT in 2000

\[ YL = 0.102 \times B - 1.932 \]

\[ R^2 = 0.62 \]
Weed Biomass (g/m²)

\[ YL = \frac{(0.602 \times B)}{(1+((0.602 \times B)/62.3))} \]

\[ R^2 = 0.45 \]

Figure 2. Relationship between milkweed biomass and sugar beet yield loss at Worden, MT in 2000