The Saskatchewan Integrated Noxious Weeds Management Program

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In April 1999, a new 3-year integrated control program for noxious weeds was initiated in Saskatchewan. The control program emphasizes the need for biological control. This program focuses primarily on scentless chamomile, which is a noxious weed that is spreading in Saskatchewan.

Why Control the Weed?

In three experiments, 25 scentless chamomile plants per m^2 reduced the yield of spring wheat 55 to 80% in cool-wet to moderately moist years. In hot-dry years, the yield of spring wheat was reduced 20 to 30%. Producers can not tolerate these losses. While scentless chamomile is spreading in Saskatchewan, there are acres of land that are scentless chamomile free. Therefore, an integrated weed control program was started to control the weed and prevent spread.

There are two main areas of concern. Scentless chamomile is spreading along roadsides. Also, the weed is being seeded with crops that are not thoroughly cleaned of weed seeds.

Integrated Weed Control Plan

The first step in the control program is to know the distribution of the weed in the province. In the fall of 1999, a survey was initiated to document the distribution of scentless chamomile along roadsides. Reeves, councillors, administrators, and equipment operator in 397 rural municipalities (RMs) were asked to mark the presence of scentless chamomile on grid maps. Each RM used a 'highlighter' pen to mark road right-of-ways that are infested with the weed.

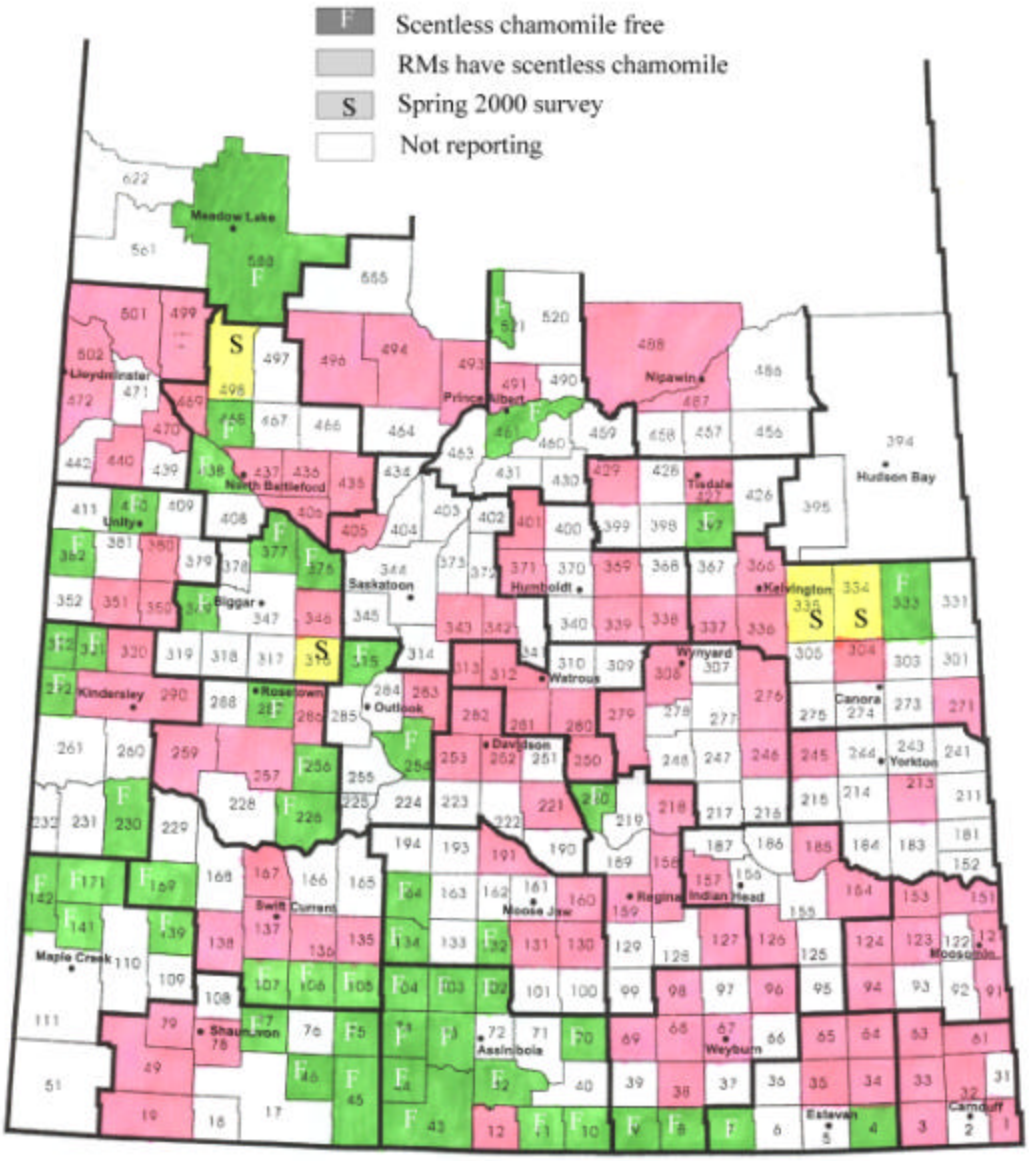
One hundred and fifty five RMs returned their distribution survey grid maps (Figure 1). Ninety-nine RMs have scentless chamomile growing in their jurisdiction. Most of the scentless chamomile is growing along road right-of-ways but in a few cases, the weed was reported in rural communities and farm fields. Fifty-two of the RMs are scentless chamomile free.

This winter, fourteen technical talks were presented in Saskatchewan, outlining how the weed can be controlled. The main emphasis was directed to the RMs that are scentless chamomile free. The focus of the talks was on awareness, education and action.

Awareness concentrated on knowing how to identify the weed, understanding how the weed can travel to a rural area and appreciating the significance of projected crop losses. Education featured knowing how to control the weed. The tools that can be used are biocontrol, cultivation, competition, herbicides, mow and pick-bag-burn. Action must then be taken to control the spread of the weed. Roadside right-of-ways are one of the first areas where the weed should be controlled.

The general plan for weed control along roadsides is based on integrated weed control. First, pick-bag-burn the weed when ever possible. When the weed infestation is extensive, use herbicides to kill scentless chamomile along road shoulders. In the

Figure 1. Distribution of scentless chamomile in Saskatchewan by rural municipality



remainder of the right-of-way, competition from perennial vegetation is extremely important. In areas of the right-of-way where the seed is likely to spread quickly to adjacent non-weed infested sites, spot spray with herbicides. In environmental sensitive areas, mowing can be useful to control seed production but the density of scentless chamomile shoots could increase. As biocontrol agents become available, release them into the right-of-way. After any control treatment, it is important to monitor for success.

The preferred habitats for scentless chamomile are often disturbed sites where there is little competition from established vegetation. These habitats include roadsides, farmyards and townsites, fences, lanes and powerlines, low areas, cropland, and beside permanent wetlands[1]. Because of the difficulties in locating all the plants of scentless chamomile and controlling them in these diverse habitats, biocontrol is the best option for control.

Biocontrol of Scentless Chamomile

Three biocontrol agents are licensed for release in Canada. *Omphalapion hookeri* is a seed weevil that was released in 1992, *Microplontus edentulus* is a stem weevil that was released in 1997 and *Rhopalomyia* N. Sp. is gall midge that was released in 1999. The extent of the damage that the three organisms will inflict on scentless chamomile is unknown because the populations are still expanding and increasing their density.

The Scentless Chamomile Seed Weevil (*Omphalapion hookeri*) eats the seeds of the weed (Figure 2). The insect damages the weed by the larva eating seeds in the seed

Figure 2. Biocontrol of scentless chamomile with the Scentless Chamomile Seed Weevil

•Scentless Chamomile Seed Weevil (*Omphalapion hookeri*)
•The weevil was released in 1992

• One larva eats 11 seeds
• The weevil has moved 7 km in 7 years

Activity	Year 1993	1996
Number of weevil larva per weed head	>1	3
% Seed heads attacked	6	40

head. Adults eat the leaves of scentless chamomile but this impact on the weed is minimal. The insect was released in 1992. The insect readily moves from the release point, with one population moving 7 km in 7 years. One seed weevil larva will eat an average of 11 seeds and four years after release there are an average of 3 larva per scentless chamomile head. An average scentless chamomile seed head has 171 seeds. Also, after four years, 40% of the seed heads were attacked. The amount of feeding by the insect is not aggressive enough to significantly reduce seed production, but the population is spreading throughout the countryside and density is increasing. Therefore, in the future, the number of larva per seed head could increase.

The Scentless Chamomile Stem Weevil (*Microplontus edentulus*) was released in 1997 (Figure 3). Larvae of the Stem Weevil feed on the stems of scentless chamomile, resulting in internal tunnels (Figure 3 and 4). In 1997, 16 scentless chamomile plants, known to contain the larva of the Stem Weevil, were transplanted into a patch of scentless chamomile growing in a field. It is estimated that 2000 larvae were present in the transplanted weed. Two years later, stems with tunnels were found 100 m from the release point. This indicates the Stem Weevil can easily spread in areas with the weed. At the sample site, 100 m from the release point, 60% of the stem were attacked with an average of 2 cavities (call mines) per attack. While the tunnel damage to the weed is being documented, it is too early to know the impact the Stem Weevil will have on the vigor of scentless chamomile.

Figure 3. Biocontrol of scentless chamomile with the Scentless Chamomile Stem Weevil

• Scentless Chamomile Stem Weevil (*Microplontus edentulus*)
• The stem weevil was released in 1997

•Below, larvae tunneling in the stem of scentless chamomile

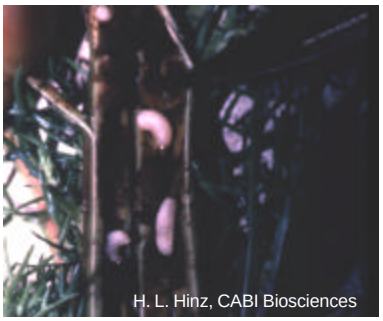


Figure 4. Tunnels in scentless chamomile

•Tunnels in Scentless Chamomile made by the Stem Weevil (*Microplontus edentulus*)

• When 16 scentless chamomile plants, which were known to harbour the stem weevil, were transplanted into a field, a estimated 2000 larvae were thought to be present in the stems

• Two years after release of the the stem weevil, it had moved 100 m from release point

• 62% of the stems were attacked by an average of 2 mines per attack

The Scentless Chamomile Gall Midge (*Rhopalomyia* n. sp.) was released in 1999 (Figure 5). Gall Midges lay eggs in the growing points of scentless chamomile plants. Larvae hatch and feed on the meristematic tissues, causing the tissue to swell into a gall. Gall formation stunts growth and reduces flowering. After a few weeks adults emerge from a gall. Pictures of galls in the shoot tip and flower of scentless chamomile are presented in Figure 5. In the first year of release, there were 2 to 3 generations of the

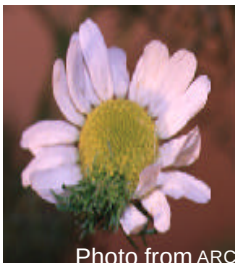
Gall Midge produced, and 74% of the release sites established. It is not known if the Gall

Figure 5. Biocontrol of scentless chamomile with the Scentless Chamomile Gall Midge

• Scentless Chamomile Gall Midge (*Rhopalomyia* n. sp.)
• The gall midge was released in 1999

• There are 2 - 3 generations of gall midges produced per year
• In 1999, 74% of the release sites established

•Below, galls formed in the apex and the flower



Midge can overwinter on the Canadian prairies and the impact the organism will have on the vigor of scentless chamomile

Conclusion:

An integrated plan to control scentless chamomile has been developed and is being delivered to the 397 rural municipalities in Saskatchewan. The program starts with a weed distribution survey, followed by control and finally monitoring for control. The completed weed distribution survey has documented were the weed grows along the roads of 99 rural municipalities in Saskatchewan. Fifty-two RMs are scentless chamomile free.

Scentless chamomile grows in numerous habitats. Often, the weed is difficult to nearly impossible to control by cultivation, herbicides and mowing. Also, the weed may be too abundant to be picked, bagged and burned. Biocontrol is the solution for controlling scentless chamomile in many habitats but weed control person must be patient while the populations of biocontrol agents increase.

References:

[1] Douglas, D. Scentless Chamomile, Crop Yield Losses. Leaflet produced under the Canada/Saskatchewan Economic and Regional Development Agreement (ERDA).

[2] Kessler, D. Scentless Chamomile, Habitats. Leaflet produced under the Canada/Saskatchewan Economic and Regional Development Agreement (ERDA).

[3] McClay, A. The information presented is from numerous telephone calls and printed material that the senior author obtained from A. McClay, Alberta Research Council (ARC).