BIOLOGICAL CONTROL OF BULL THISTLE USING A BENEFICIAL WEEVIL

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PLANT INDUSTRY DIVISION
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ORIGIN AND DISTRIBUTION

Thistles in the genus Carduus and Cirsium rank as the second most common weed and third most troublesome weed in pastures and haycrops in North Carolina. Bull thistle, Cirsium vulgare Tenore, is a Eurasian weed which was accidentally introduced into the United States from Europe during the 1800's. It has since spread throughout North Carolina by airborne seed or by transport of seed contaminated hay. It is now of considerable economic importance because livestock will not feed near it and, in moderate infestations, bull thistle can reduce pasture yields significantly.

CHARACTERISTICS

Bull thistle is a tall spiny plant (Figure 1). Mature leaves are less than ten inches long and moderately to coarsely lobed, with each lobe ending in a stiff yellow spine. Leaves are alternately attached along the stem. Stems are hairy and branched. One or several small, purple flowerheads terminate the branches. Flower bracts are somewhat hairy and tipped with long, sharp spines.

The life cycle of bull thistle in North Carolina is variable. It is generally classed as a biennial, but can develop as an annual or winter annual depending on local environmental conditions.

Bull thistle reproduces entirely by seed. Germination generally occurs in the fall or spring, but seeds may germinate any time moisture is sufficient. Seeds can be carried by wind currents for many miles. Studies by the NCDA have shown that a normal plant, of 5 feet in height, has an average of 90 flowerheads and approximately 25,000 seeds.

After seeds germinate, the plants develop into the rosette stage (Figure 2). The rosette grows, increasing in diameter until the onset of cold weather. Then, a fleshy tap root develops, allowing the plant to overwinter. The following spring, new leaves grow from the crown bud in the rosette. The bolting stage begins when the seed stalk begins to grow and continues until the first flower appears. Flowering begins in July and continues through August in most areas.

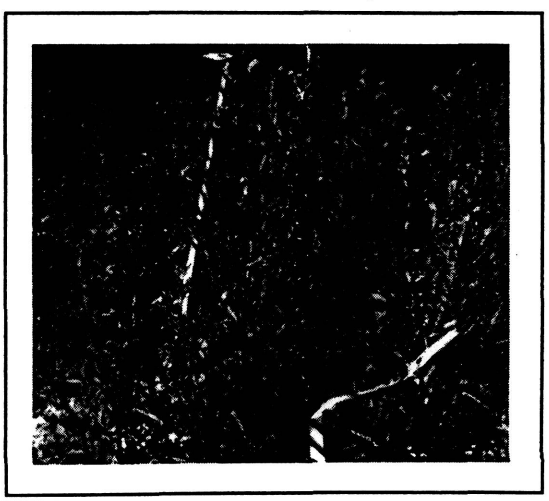

Figure 1. A mature bull thistle plant.

Bull thistle is not a serious problem in crops requiring a spring seedbed preparation. Tillage eradicates rosettes that established in the preceding summer or fall. Thistles can be a problem in fall planted crops, such as grains, alfalfa and clover. The weed is most commonly found along roadsides, railroad right-of-ways, fence lines, wastelands and in pastures.

BIOLOGICAL CONTROL

Introducing a specific natural enemy can aid in regulating the reproduction and spread of bull thistle. One such natural enemy is Trichosirocalus horridus (Panzer), the rosette weevil. This weevil feeds on the crown center of the rosette. Native to Europe, this weevil was extensively studied by the USDA to insure that it would not damage other desirable plants in the U.S.

BIOLOGY OF THE ROSETTE WEEVIL

In mid-October, adult weevils awaken from summer aestivation and begin to feed and mate on thistle rosettes. Females lay eggs along the midrib on the underside of leaves. Each female can lay up to 800 eggs. Eggs hatch in 10-12 days. The young larvae burrow into the midrib of the leaves and proceed to eat their way to the crown bud, or growing center of the thistle. There the larvae feed during the winter and early spring, causing tissue damage.

Larval feeding on the crown bud changes the growth of the thistle, if not killing it. This feeding damage causes the plant to produce fewer flowerheads and thus less seeds. Rather than having one terminal flowerhead and several lateral flowerheads growing from a central stem, the plant will be shorter and branched into several terminal flowerheads. The feeding damage also adversely affects the thistle when competing with other plants.

After larvae finish feeding in the spring, they emerge from the rosette and pupate in the leaf litter or soil for 12-20 days. During May the new generation of adults begins feeding on the thistle plants. The weevils feed until the temperature consistently rises to around 85 degrees (early June), at which point they take cover in leaf litter to aestivate until fall. Adults emerge in the fall, feed and may mate and lay eggs on the thistle rosettes. These eggs may overwinter or hatch, in which case the weevil larvae will overwinter. In general, weevils produce one generation per year.

Figure 2. A bull thistle rosette.

SPRING COLLECTION AND DISTRIBUTION

Rosette weevils are collected and distributed in mid-to-late-May. Contact your local Agricultural Extension office or the North Carolina Department of Agriculture, Plant Industry Division (919-733-3610) about collections in your area and receiving weevils for your land.

The collections are intended to distribute the rosette weevil to one or more locations in all thistle infested counties. As a result of these efforts, the weevil is expected to naturally disperse and subsequently control all bull thistle populations.

BEST AREAS FOR WEEVIL RELEASE

Studies have shown that weevils do better in areas where the following factors are present:

* The area will not be mowed or sprayed.
* The area is infested with at least one hundred bull thistle plants.

It is also important that you:

* Put all weevils in the same area (5-10 per plant);
* Release weevils away from livestock, and
* **Remember it takes an average of 5 to 7 years for weevil populations to build to a point where thistle control occurs.**

WHY IS BIOLOGICAL CONTROL OF THISTLES A GOOD OPTION?

1. It is non-toxic.
2. It is non-polluting.
3. It is sustainable; little additional effort is required once the weevils are established, while other control methods must be applied periodically.
4. It is self dispersing.
5. It can reduce the threat of ground-water pollution from herbicides.

SUMMARY

* Rosette weevils can contribute to a substantial reduction in bull thistle populations in 5 to 7 years.

* Weevils can overwinter in the adult, egg or larval stage.

* Rosette weevil damage changes the architecture of the thistle plant from a tall stem with many flowers to shorter multiple stems with fewer flowers.

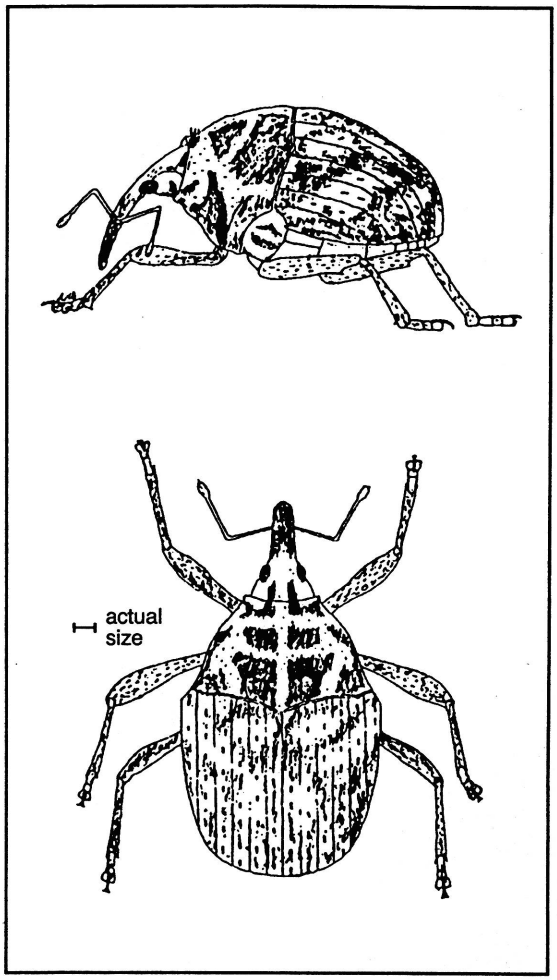

Figure 3. The adult rosette weevil.

Figure 4. A thistle rosette with damage caused by the rosette weevil larva (arrow).

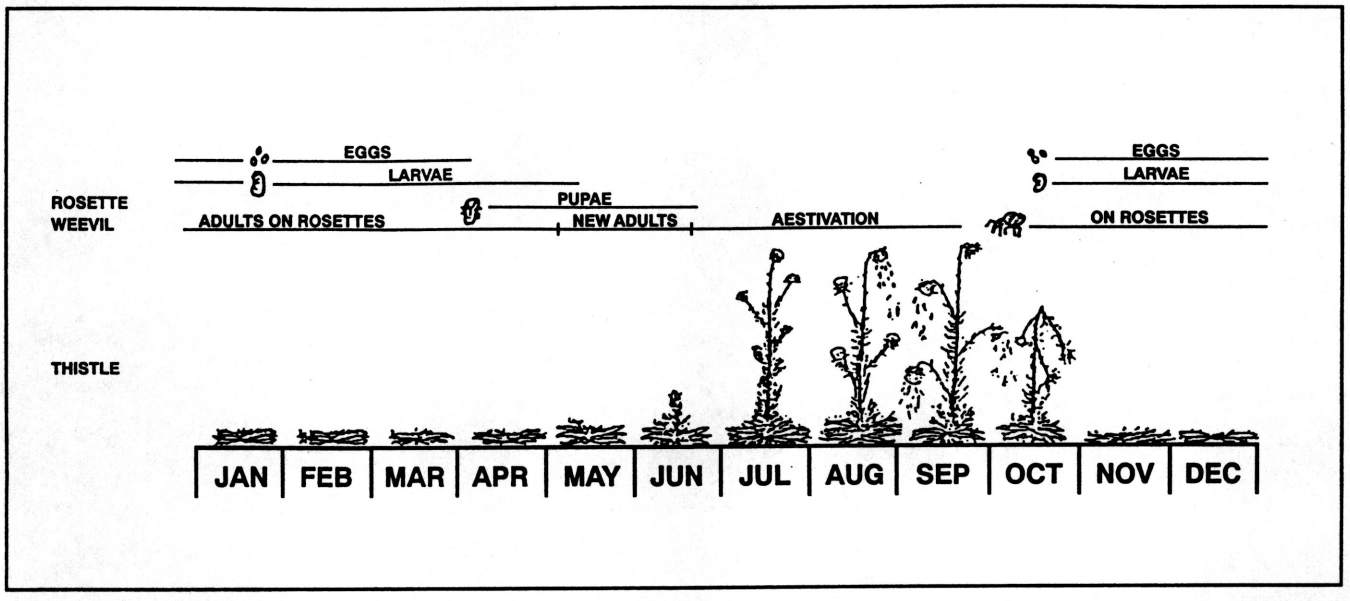

Figure 5. Time line showing the annual development of the rosette weevil and bull thistle.

For more information about obtaining the rosette weevil to reduce bull thistle populations, write or call:

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