

SEED WEEVIL RELEASED TO CONTROL MILK THISTLE



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MILK THISTLE, *Silybum marianum* (L.) Gaertn., is a widespread weed of increasing importance on rangeland, ditch banks, highway and railroad right-of-ways, and wasteland in California. Although reported to be a biennial, it grows mainly as a winter annual, generally invading disturbed and overgrazed land. The plant reproduces only by seed.

In an attempt to control this plant through biological means, the seed weevil, *Rhinocyllus conicus* (Froelich) (photo) was recently introduced to California from southern Italy. This insect is native to central and eastern Europe and the Mediterranean Region where it attacks several thistle species including milk thistle, musk thistle (*Carduus nutans* L.), Italian thistle (*Carduus pycnocephalus* L.) Scotch thistle (*Onopordum acanthium* L.), plus several thistles of the genus *Cirsium* Mill. *Rhinocyllus conicus* was thoroughly tested at the Commonwealth Institute of Biological Control Laboratory, Delémont, Switzerland, and at the USDA Biological Control of Weeds Laboratory, Albany, California, to insure that it would not become a pest of economically important plants (e.g., safflower, artichoke) or attack native California thistles.

The first California release of this insect, made near Ft. Bragg, Mendocino County, in June 1969, failed to establish the weevil. A second release of 1,145 weevils was made in late May 1971 on watershed land owned by the East Bay Municipal Utility District near Moraga, Contra Costa County. Shortly thereafter releases were made at Santa Barbara and on Santa Cruz Island, Santa Barbara County, by biological control of weeds

personnel of the University of California, Riverside. The weevils at the Moraga site oviposited normally and samples of dried seed heads taken in October, 1971, indicated that 13% of the heads at the original release site were infested during the first summer of colonization.

Biological studies in Europe indicate that *R. conicus* overwinters as hibernating adults, which become active in the spring. At the Moraga release site, active beetles were first observed on April 13, 1972 and one week later, 100 beetles were counted during a two hour search. The exact site of overwintering in California is unknown, although in Europe adults have been reported from under the bark of trees, under rocks and in the dried heads of the host plant. The overwintered adults feed on the spring foliage for a period of two to three weeks before they become reproductively active.

On May 9, at Moraga, 76 beetles and 528 eggs were found, and on May 31, 1,676 eggs were found. The eggs were laid on the lower surface of the bracts of the newly formed flower heads. They appear as small brown plates (1.5 mm diameter) because of a covering of masticated host-plant tissue which the female places over them at the time of oviposition. The hatching larvae bore directly through the bracts and into the flower where they feed on the developing seeds. As many as 20 larvae completed development on a single head of milk thistle at Moraga. Sixty-seven per cent of the seed heads were infested at the Moraga site in July 1972.

Pupation occurs in the head in a small cell formed by the larva either in a hollow seed or directly below the seed area. At Moraga, the new generation emerged

from the dried heads during mid-summer (July and August, 1971). Under California conditions probably only one generation per year can be expected, due to the early summer senescence of milk thistle. In Europe, a partial second generation occurs on musk thistle, *Carduus nutans*.

Subsequent shipments totaling 2,062 Italian weevils were released at five sites in California during April and May, 1972. Releases were made at two new sites on watershed land in Contra Costa County, two sites within the Point Reyes National Seashore, Marin County, and at one site ten miles north of Fort Bragg, Mendocino County.

Rhinocyllus conicus has also been released in Montana, Nebraska, and Virginia to control musk thistle, a weed of increasing importance in many states. In California this weed is established only locally and is being eradicated. The Virginia releases were made in 1969 and since then the insect has become well established and is now being collected from the original sites of colonization for movement to new areas. As in Europe, a partial second generation of the weevil occurs in Virginia. In 1968, the Canada Department of Agriculture released the weevils against musk thistle in Saskatchewan and Ontario, Canada, where the insects are now established and increasing in number.

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