

Status of *Rhinocyllus conicus* (Coleoptera: Curculionidae): A Biological Control Agent of *Carduus nutans* (Compositae) Established in Kentucky

LEE H. TOWNSEND,¹ JOHN C. PARR,¹
J. D. GREEN,² AND B. C. PASS¹

ABSTRACT

Rhinocyllus conicus Froelich, the larvae which destroy seeds developing within the flower heads of nodding thistle (*Carduus nutans* L.), was introduced into Kentucky at 2 locations in 1974 as a biocontrol agent. This insect was recovered in 13 central and 4 southern Kentucky counties during surveys in 1988-1990. Adults were collected and released on thistle stands in other areas to extend the distribution of the weevil in areas infested with the weed.

INTRODUCTION

Carduus nutans L., known as nodding or musk thistle, was accidentally introduced into the United States from Europe in the early 1900s (1). Subsequently, it has spread over much of North America and has become a significant problem weed, especially in pastures, noncrop land and along rights-of-way. In pastures, this spiny plant competes with desirable forages and discourages cattle from grazing in or near infested areas (2). This plant has been identified as one of the 10 most troublesome weeds in Kentucky (3). Nodding thistle may be controlled with herbicides and an integrated approach utilizing cultural, chemical, and mechanical practices (4). Infestations often occur in rough terrain where neither chemical treatment nor mowing are feasible. The use of biological control agents provides a promising means of managing this noxious weed.

Larvae of the curculionid *Rhinocyllus conicus* Froelich develop within the seed head of musk and plumeless thistle and reduce the number of viable seeds produced by infested plants (5). This insect is one of the species that attack thistles in Europe and was introduced into the United States as a biological control agent. Successful establishment of the weevil has been reported in Virginia (6), Missouri (7), Montana (8), and southern California (9) to augment other weed control practices. Adults of this weevil were released at single sites in

Fayette and Warren counties in Kentucky in 1974. Documentation of specific sites and numbers of insects involved in the releases are not available and no studies on the establishment and spread of this insect have been conducted. In June 1988, a landowner in eastern Fayette County submitted samples of *Carduus nutans* seed heads that were being damaged by an insect, which was subsequently identified as *Rhinocyllus conicus*. This paper reports the results of a survey to determine the distribution of this beetle in Kentucky.

MATERIALS AND METHODS

Surveys for the presence of *R. conicus* were conducted during late May and early June 1988-1990 by examining thistle flowers along roadside rights-of-way and pastures in central and southern Kentucky. At that time, adults were feeding on thistle stems and leaves, and females were ovipositing on the bracts of flower heads. The weevils can be found easily by examining flower heads. The location (road and mile marker) of each site where adults were found was recorded. Stops were made at approximately 8 km intervals along a route until examination of at least 20 plants at 2 consecutive thistle stands failed to yield the insects. At this point, another route was selected. Sites at which weevils were found were mapped and subsequent trips were planned to further define the distribution of the insect.

RESULTS AND DISCUSSION

The known distribution of *Rhinocyllus conicus* is shown in Figure 1. Surveys in 1988 were

¹ Department of Entomology, ² Department of Agronomy, University of Kentucky, Lexington, Kentucky 40546-0091.

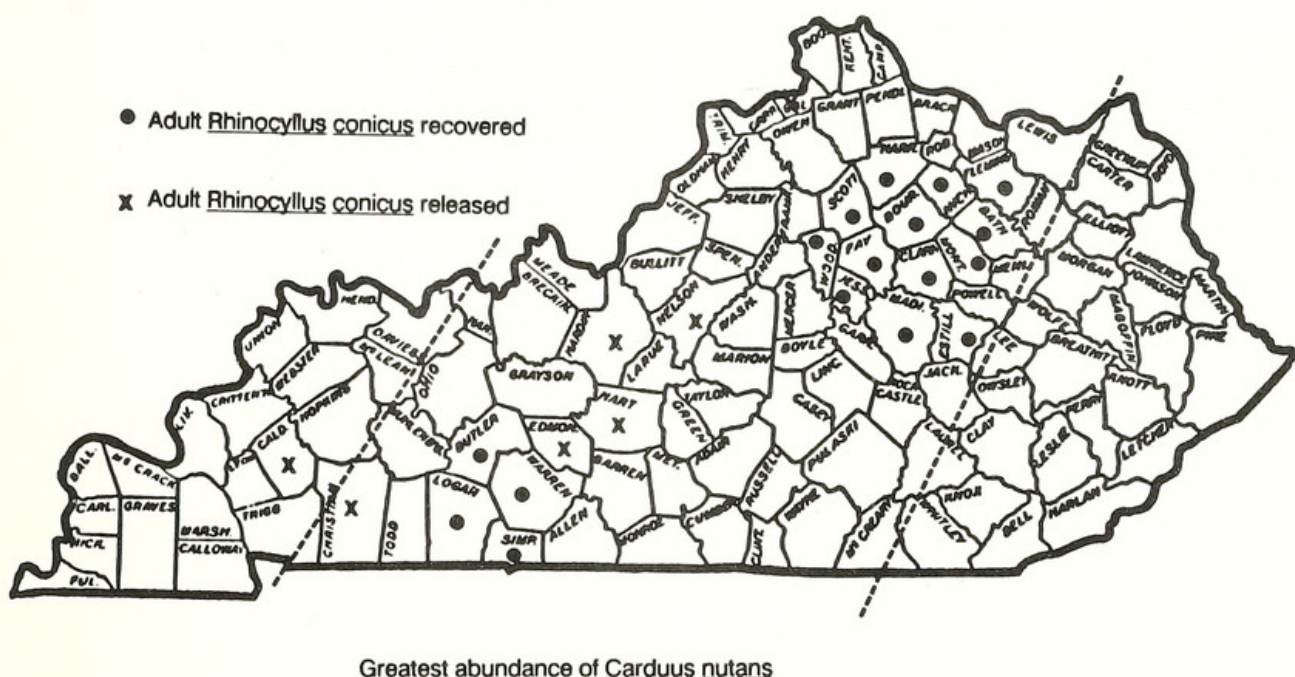


FIG. 1. Recovery and release sites of *Rhinocyllus conicus* and general distribution of *Carduus nutans* in Kentucky, 1988–1990.

limited to the southeastern portion of Fayette County where infested flower heads were discovered. The initial detection of the insect of 1988 was late in its activity period. Adults emerging from flower heads aestivate and are not active until oviposition the following spring (10). The cessation of adult activity coupled with the onset of extensive mowing of pastures and rights-of-way greatly reduced the efficiency of survey activity. During June 1989 and 1990, the survey was expanded in the central Kentucky area. Adults were found in 12 counties, indicating establishment and dispersal of the insect over about a 4,700 km² area. Adults were found in June 1990 in southeastern Warren, northern Simpson, northeastern Logan, and southern Butler counties, an area of about 570 km².

Neither weevils nor characteristic oviposition scars on flower heads were found during examination of thistles along the rights-of-way of Interstate 64 between Lexington and Louisville, on the Blue Grass Parkway between Lexington and Elizabethtown, nor along Interstate 65 between Elizabethtown and Bowling Green during June 1989 and 1990. While these results do not preclude the presence of the weevil in these areas, thistles were abundant in pastures and along rights-of-way and

weevils, if present in moderate numbers, should have been detected.

Information on the distribution of the weevil has resulted in identification of collection sites as well as release sites, where weevils were not found, to aid in a more even distribution of this insect. Groups of ca. 100 weevils were released on thistle infestations during June 1990 (Fig. 1). Spring releases of non-diapausing weevils have resulted in better colonization than were obtained from late summer introductions (11). These locations will be monitored to determine whether or not successful colonization occurs. Additional studies are needed to determine the impact of the weevil in terms of seed destruction in infested heads.

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