

Establishment of *Ceuthorhynchidius horridus* (Coleoptera: Curculionidae), an Imported Thistle-Feeding Weevil, in Virginia

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ABSTRACT

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Ceuthorhynchidius horridus (Panzer), an imported European weevil which feeds on thistle rosettes, first released in the U.S. in 1974, has become established in 3 counties of Virginia. Releases at 10 selected sites infested with *Carduus* thistles were made between 1974-76; 3 on musk thistle (*Carduus nutans* L.),² 6 on plumeless thistle (*C. acanthoides* L.), and one on a mixed stand. Establishment has been confirmed in the 3 musk thistle sites, one plumeless thistle and one mixed thistle site. These are the 1st establishments of *C. horridus* in North America.

Ceuthorhynchidius horridus (Panzer), an imported European thistle rosette-feeding weevil, recommended by Frick (1969) for further quarantine testing in the U.S., was released in Montgomery and Giles Co., Virginia in 1974. Intensive host specificity testing (Ward et al. 1974, Kok 1975) and laboratory studies (Kok et al. 1975) preceded its release to ensure that it would not be a threat to economic crops, and that it has potential as a biological control agent against thistles. Officially approved for release in 1974, it became the 2nd imported weevil to be released for *Carduus* thistle control in Virginia. Damage to the thistle is caused by larvae feeding on meristemic tissues in the rosette, resulting in crown tissue necrosis. As a rosette feeder, it does not directly compete with *Rhinocyllus conicus*, a thistle head weevil, which was released in 1969 (Surles et al. 1974). Initial establishment of *C. horridus* at several sites was reported briefly by Kok and Trumble (1977). The present report gives a more detailed account of the status of *C. horridus* at the release sites up to the summer of 1978.

Methods and Materials

C. horridus adults imported from Rome, Italy via the USDA Rome Laboratory, were screened for parasites and diseases through one complete generation prior to release. Both larvae and adults reared in the insectary were used for releases. Larvae were inoculated directly into plant crowns (initially punctured by forceps) with a fine paint brush, and adults were placed among a dense patch of thistle rosettes. Releases were made in the spring or fall between 1974-76 on 10 selected sites (Fig. 1). The sites were located in 6 counties representing the north (Warren Co.), central (Montgomery, Giles and Pulaski Co.) and south (Russell and Washington Co.) portions of the areas with heavy thistle infestations in Virginia. Three of the sites were infested with musk thistle (*Carduus nutans* L.), 6 with plumeless thistle (*C. acanthoides* L.), and one with a mixture of the 2 thistle species. Observations were carried out annually in Apr.-May for signs of adult and larval feeding by individually examining 100 thistle rosettes at each site. Records of plant diam, number of leaves, number of adult feeding punctures on leaves, number of plants with necrotic

crowns, number of visible larvae, and stage of larval development were kept. All the sites were revisited in June of 1977 and 1978 to detect the presence of adults which emerged.

Results and Discussion

Details of releases at each of the sites and the current status of establishment of *C. horridus* are summarized in Table 1. Establishment is considered successful when larvae are detected in rosettes of a particular site during early spring for 2 successive yr, and subsequently confirmed by the presence of adults during the 2nd yr. Of 10 releases, 5 are confirmed establishments, 3 are doubtful, and 2 were not successful. The 5 established sites are in Montgomery, Pulaski, and Giles Co., all centrally located within the thistle belt (Kok 1978) of Virginia. These are the 3 musk thistle sites, the mixed thistle site, and one plumeless thistle site. Three of the remaining 5 plumeless thistle sites (one each at Giles, Russell, and Warren Co.) showed larval detection in 1977, but not in 1978. These sites are considered as doubtful establishments, while no recovery of larvae or adults was made at the other 2 sites. Of the latter 2 sites, one had a single release of larvae (Washington Co. site) and the other an adult release (Warren Co.). All other sites had 2 releases and one of the Warren Co. sites had 4 sequential releases. The lack of larval recovery in 1978 at this latter site was disappointing after a promising start in 1977. Although the 2 Giles Co. plumeless thistle sites were within 3 mi. of each other, only one showed establishment. The failure to detect larvae in 1978 in the 2nd site could have been due to grazing by cattle which left very few rosettes that were not trampled or covered by droppings in early spring. This probably had an adverse effect on *C. horridus* which could not find suitable oviposition sites.

Differences in rosette size (diam and number of leaves) between 1977 and 1978 reflected seasonal climatic variations, but the number of feeding punctures and necrotic centers caused by *C. horridus* was indicative of the weevil population (Table 2). Increased feeding was noticeable at 4 of the established sites and was about the same in the 5th successful site, but was either lower or was not present at the remaining sites. Fresh feeding marks are easily distinguishable and can be used as an indicator of the presence of weevil activity and abun-

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² Resembles *Carduus thoermeri*.

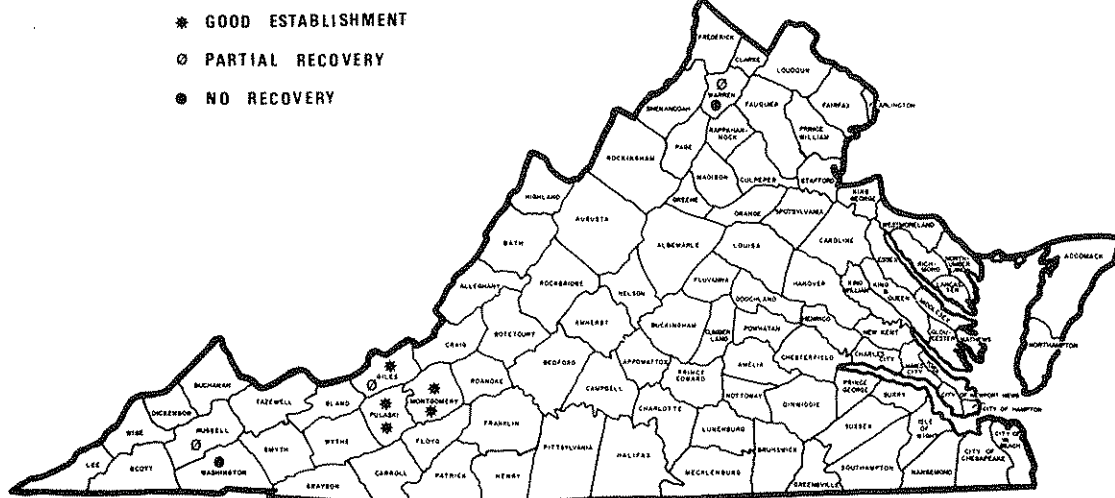


FIG. 1.—Release and establishment sites for *Ceuthorrhynchidius horridus* in Virginia.

dance. A better indicator is the characteristic necrotic crowns of infested rosettes. The percentage of rosettes showing infestation, as represented by this character, ranged from 19–51% in the 5 successful sites for 1978 as compared to 0–6% in the other sites. When rosettes with necrotic centers revealed no larvae on closer examination, it was due to either larval migration to the soil for pupation, or to death of the larvae. The best confirmation of infestation by *C. horridus* is detection of live larvae within the top 2 cm of the thistle crown. Surface counts of visible larvae in rosettes at all sites were made to obtain an estimate of the weevil population. The number of live larvae and range of instars detected in Apr. were found to be reliable indicators of the

abundance of adults and timing of adult emergence in June. Detection surveys conducted in June 1977 and 1978 revealed the presence of adults in established sites. Random 30-min counts conducted in 1977 and 1978 yielded a range of 1–9 and 4–58 adults, respectively, in the 5 established sites. The presence of larvae as well as adults in these sites for at least 2 successive seasons confirmed that they are the 1st establishments of *C. horridus* in North America.

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Table 1.—Release and establishment of *C. horridus* on *Carduus* thistles in Virginia.

County (location)	Thistle ^a species	Date released	No. released (larvae; adults)	Recovery of larvae ^b		
				1976	1977	1978
Montgomery I (Prices Fork)	M	Oct. 1974 Apr. 1975	2,000L; 30A 50A	+	+	+
Montgomery II (Rt. 663)	M	Mar. 1975 Nov. 1975	30A 100A	+	+	+
Pulaski I (Rt. 611)	M	Apr. 1975 Nov. 1975	409L 100A	—	+	+
Pulaski II (Belspring)	M, P	Apr. 1975 Nov. 1975	334L 100A	—	+	+
Giles I (Newport-P)	P	Oct. 1975 Mar. 1976	100A 192A	—	+	+
Giles II (Newport-F)	P	Sept. 1974 Nov. 1975	400L 100A	—	+	—
Russell (Copper Creek)	P	Nov. 1975 June 1976	100A 290A	—	+	—
Warren I (Rt. 639)	P	Oct. 1975 Apr. 1976 May 1976 June 1976	200L; 100A 63A 60A 120A 160A	—	+	—
Warren II (Rt. 661)	P	June 1976	160A	—	—	—
Washington (Saltville)	P	Apr. 1975	956L	—	—	—

^a M = musk thistle; P = plumeless thistle.

^b + = recovery of larvae in rosettes; — = no recovery.

Table 2.—Establishment of *C. horridus* in Virginia 1977—78.

County	Yr-mo	Mean/rosette ^a			% rosettes with		
		Diam (cm)	No. Leaves	No. adult feeding punctures	Necrotic center	Live larvae	No. visible larvae ^b (instar or pupa)
Montgomery I	1977 Apr.	25.8	11.6	0.30	35	16	18(1-2)
	1978 May	32.6	17.2	.52	23	23	26(1-3)
Montgomery II	1977 Apr.	17.5	8.5	.34	56	20	29(1-2)
	1978 May	24.5	13.5	.87	51	54	88(1-3)
Pulaski I	1977 Apr.	24.5	13.3	.24	4	5	5(1-2)
	1978 May	21.3	12.2	.30	19	9	9(1-2)
Pulaski II	1977 Apr.	28.9	16.0	.14	27	23	26(2-3)
	1978 May	31.0	17.5	.24	20	31	46(3-P)
Giles I	1977 May	31.5	12.3	.34	17	15	17(2-3)
	1978 May	32.5	13.8	.31	23	21	24(1-3)
Giles II	1977 May	27.5	9.3	0	3	3	4(1-2)
	1978 May	16.1	9.6	0	6	0	0
Russell	1977 May	27.5	12.0	0	3	3	3(1-3)
	1978 May	20.4	10.7	0	5	0	0
Warren I	1977 May	22.1	9.9	.62	13	9	16(2-3)
	1978 May	17.9	8.9	.28	4	0	0
Warren II	1977 May	16.8	8.7	.15	0	0	0
	1978 May	24.4	13.0	0	2	0	0
Washington	1977 May	16.4	12.0	0	0	0	0
	1978 May	17.6	13.3	0	0	0	0

^a Based on 100 rosettes.

^b P = pupa; 1, 2, 3 = 1st, 2nd, and 3rd instars, respectively.

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