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Recent (1977-1980) Releases of Imported Larch Casebearer Parasites for Biological Control

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Abstract

Releases of *Diadegma laricinellum* (Hymenoptera: Ichneumonidae), *Dicladocerus westwoodii*, *Dicladocerus japonicus*, *Chrysocharis laricinellae*, *Elachertus argissaj*, *Necremnus metalarus* (Hymenoptera: Eulophidae), and *Agathis pumila* (Hymenoptera: Braconidae) for biological control of the larch casebearer in Oregon, Idaho, and Pennsylvania included some newly imported stocks and additional release locations. More than 14,000 parasites were released at eight sites.

KEYWORDS: Parasites (insect) (-forest pest control, larch casebearer, *Coleophora laricella*, biological control (-forest pests).

Introduction

The larch casebearer, *Coleophora laricella* (Hbn.), a European pest accidentally introduced into northern Idaho in the mid-1950's (Denton 1958), has since spread throughout most of the western larch (*Larix occidentalis* Nutt.) forests of the western United States and southern British Columbia. Its population expanded rapidly in the absence of its habitual natural enemies, and the insect became an important forest pest causing repeated, severe defoliation and losses in tree growth (Denton 1979). A biological control program was undertaken in an effort to establish effective natural enemies which would reduce and hold casebearer densities at low levels. A similar effort against this insect in the eastern United States and Canada has been successful (Coppel and Mertins 1977, Laing and Hamai 1976). At present, outbreaks there are relatively local and of short duration (Webb and Quednau 1971), collapse being brought about by introduced parasites (Quednau 1970).

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The first natural enemy to be imported into Idaho in 1960 (Denton 1972, 1979) was the braconid, Agathis pumila (Ratz.), the species which was apparently the most important to become established in the Eastern and Lake States. During the 1960's, considerable effort was devoted to field rearing and redistributing A. pumila throughout the areas of Idaho, Montana, and Washington then infested (Bousfield et al. 1974). Although it had established readily, the effectiveness of A. pumila in the subsequent decade was mixed. On some sites, it apparently was effective in reducing casebearer populations. On others, even today, the parasite either has failed to become established or has not been able to expand its population sufficiently to effect host reductions, presumably because of ill adaptation to local climate. The introduction of additional natural enemies was indicated.

Additional species of parasites were imported and released starting with Chrysocharis laricinellae (Ratz.) and Dicladocerus westwoodii Westw. in 1972 (Ryan and Denton 1973), followed by four other species in 1974, Elachertus argissa (Walk.), Necremnus metalarus (Walk.), Dicladocerus japonicus Yshm., and Diadegma laricinellum (Strobl) (Ryan et al. 1975). Laboratory cultures and additional importations of these same species have enabled releases of larger numbers and releases at additional locations to increase the probability of establishing self-perpetuating field colonies. Releases through 1976 were reported previously (Ryan et al. 1977). This paper reports releases subsequent to 1976 (table 1). Evaluation of these efforts is ongoing and will be reported subsequently.

Cooperation

The field release of these parasites represents the sequential, cooperative effort of numerous persons in different agencies and countries, each totally dependent upon the successful efforts of those previously handling the material. This is illustrated by the acquisition of Diadegma laricinellum from Poland in 1978 and its eventual release in Pennsylvania in 1980. Collections of parasitized, overwintering larch casebearer larvae were made in March 1978 in Rawa Mazowiecka and Nadlesnictwo Spata, Poland, by S. K. Wiackowski, Department of Ecology and Environmental Protection, Educational University, Kielce, Poland. The material was hand carried to the European Parasite Laboratory, Sevres, France, by G. W. Harvey, Agricultural Attaché. There, it was packaged and forwarded to the United States by J. J. Drea. Once in the United States, it was received in quarantine by L. R. Ertle at the U.S. Department of Agriculture, Science and Education Administration Beneficial Insect Research Laboratory, Newark, Delaware, where, over the next several months, the parasitized host larvae were reared to maturity under quarantine conditions by Ertle and K. S. Swan. Voucher specimens of emerging parasites were sent to R. W. Carlson at the Systematic Entomology Laboratory, Washington, D.C., who

confirmed the identity of the species. Then, 17 females and 8 males were forwarded to the author in Corvallis, Oregon. With the assistance of F. H. Schmidt and N. Dieck, he was able to propagate the species in laboratory culture until numbers were sufficient for release and the casebearer population in the field was in the stage susceptible to parasitism. Parasites were then shipped back to the Beneficial Insect Research Laboratory (BIRL) where R. W. Fuester made arrangements for their release and P. B. Taylor, also of BIRL, took them to the release site. There, he and J. W. Quimby, Pennsylvania Bureau of Forestry, released the insects on Gladfelter Pulpwood Company Land, approximately 2-1/2 years after the original collection in Poland.

The release of other parasite species also represents considerable cooperation. With the exceptions of the Diadegma laricinellum related above and Dicladocerus japonicus collected near Ina, Japan, by N. Morimoto, Shinshu University, all other material was collected by K. P. Carl of the European Station, Commonwealth Institute of Biological Control, Delemont, Switzerland. Without exception, all material was processed through quarantine at BIRL.

Cooperators assisting with parasite releases in the Western States were: F. Ebel, C. Johanningmeier, T. Donovan, R. Graham, G. Templeton, S. Wilde, and G. Parsons (deceased), all of Boise Cascade Corporation, La Grande, Oregon; M. Vandehey, Kinzua Corporation, Heppner, Oregon; L. Kline, Oregon Department of Forestry, Salem, Oregon; P. Joseph, Oregon Department of Forestry, La Grande, Oregon; L. F. Pettinger, Division of Forest Pest Management, Region 6, USDA Forest Service, Portland, Oregon; L. Kuchenbecker, Union R.D., WaiIowa-Whitman N.F., USDA Forest Service, Union, Oregon; and L. J. Theroux, Intermountain Forest and Range Experiment Station, USDA Forest Service, Missoula, Montana.

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Table 1—Releases of Diadegma laricinellum, Dicladocerus westwoodii, Dicladocerus japonicus, Chrysocharis laricinellae, Elachertus argissa, Necremnus metalarus, and Agathis pumila in Oregon, Idaho, and Pennsylvania, 1977-80 (Continued)

Locality	Date of release	Number released		
		Male	Female	Total
<u>Chrysocharis laricinellae</u> (Ratz.)(Hymenoptera: Eulophidae)				
22 km NNE. Elgin, Oregon (BCC plot 5)	October 12, 1977	156	28	184
45°45'N.117°50'W.	May 11, 1978	363	362	725
sec.9,T.3N.,R.40E.	July 14, 1978	142	141	283
32 km S. Heppner, Oregon				
45°6'N.119°37'W.				
sec.30,T.5S.,R.26E.	May 11, 1978	359	327	686
Hwy 204, 14 km E. Weston, Oregon				
45°48'N.118°14'W.				
sec.30,T.4N.,R.37E.	June 29, 1979	82	94	176
<u>Elachertus argissa</u> (Walker)(Hymenoptera: Eulophidae)				
22 km NNE. Elgin, Oregon (BCC plot 5)				
45°45'N.117°50'W.				
sec.9,T.3N.,R.40E.	October 5, 1977	—	12	12
<u>Necremnus metalarus</u> (Walker)(Hymenoptera: Eulophidae)				
22 km NNE. Elgin, Oregon (BCC plot 5)				
45°45'N.117°50'W.	October 5, 1977	—	22	22
sec.9,T.3N.,R.40E.	July 14, 1978	—	10	10
12 km SSE. Elgin, Oregon (BCC plot 8)				
45°28'N.117°51'W.				
sec.19,T.1S.,R.40E.	September 13, 1979	4	62	66
<u>Agathis pumila</u> (Ratz.)(Hymenoptera: Braconidae)				
22 km NNE. Elgin, Oregon (BCC plot 5)				
45°45'N.117°50'W.				
sec.9,T.3N.,R.40E.	July 14, 1978	15	12	27
Hwy 204, 14 km E. Weston, Oregon				
45°48'N.118°14'W.				
sec.30,T.4N.,R.37E.	June 29, 1979	45	66	111

i/Boise Cascade Corp. plot number.

Table 1—Releases of Diadegma laricinellum, Dicladocerus westwoodii, Dicladocerus japonicus, Chrysocharis laricinellae, Elachertus argissa, Necremnus metalarus, and Agathis pumila in Oregon, Idaho, and Pennsylvania, 1977-80

Locality	Date of release	Number released		
		Male	Female	Total
<u>Diadegma laricinellum</u> (Strobl) (Hymenoptera: Ichneumonidae)				
Catherine Creek, 19 km SE. Union, Oregon 45°6'N. 117°40'W. sec.26,T.5S.,R.41E.	August 29, 1978	—	54	54
	August 21, 1979	—	116	116
	August 27, 1979	—	191	191
	September 4, 1979	140	187	327
	September 5, 1980	283	183	466
	September 17, 1980	105	88	193
	September 23, 1980	339	246	585
	September 27, 1980	72	74	146
Porter Tract, 4.5 km S. Spring Grove, Pennsylvania 39°50'N. 76°52'W.	September 19, 1980	124	195	319
<u>Dicladocerus westwoodii</u> Westw. (Hymenoptera: Eulophidae)				
20 km N. Elgin, Oregon (BCC plot 61/) 45°45'N. 117°55'W. sec.15,T.3N.,R.39E.	May 4, 1977	314	107	421
	May 12, 1977	159	25	184
	May 19, 1977	227	34	261
	May 2, 1979	111	167	278
	May 9, 1979	176	357	533
	May 16, 1979	177	202	379
	May 23, 1979	177	344	521
	May 31, 1979	20	112	132
	May 7, 1980	40	608	648
<u>Dicladocerus japonicus</u> Yshm. (Hymenoptera: Eulophidae)				
22 km NNE. Elgin, Oregon (BCC plot 5) 45°45'N. 117°50'W. sec.9,T.3N.,R.40E.	May 4, 1977	452	152	604
	May 12, 1977	962	295	1,257
	May 19, 1977	832	405	1,237
	May 27, 1977	289	154	443
	October 26, 1977	39	54	93
	May 11, 1978	313	270	583
	May 9, 1979	158	185	343
	May 7, 1980	24	432	456
	June 19, 1980	34	357	391
	Felton Creek, 5 km NE. Moscow, Idaho 46°48'N. 116°50'W. sec.20,T.40N.,R.4W.	October 12, 1977	366	472

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