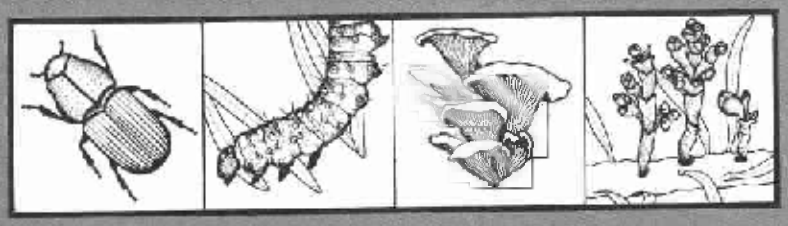
Forest Pest Management



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PARASITE COMPLEX OF THE LARCH CASEBEARER IN IDAHO AND MONTANA PROGRESS REPORT

by

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INTRODUCTION

The larch casebearer, Coleophora laricella (Hubner) was first discovered attacking western larch, Larix occidentalis Nutt. in 1957 near St. Maries, Idaho (Denton 1958). Introduced into the eastern United States from Europe in the 1880's, this insect has since spread throughout most of the range of western larch in Idaho, Montana, Washington, British Columbia, and northeastern Oregon.

Although casebearer defoliation rarely causes tree mortality, severe and repeated defoliation causes reduced radial growth and branch die back (Tunnock et al. 1969).

A biological control program was started in 1960 in the West with the introduction of the Euorpean parasite, Agathis pumila (Ratzeburg), selected because of its apparent success in controlling the casebearer in the northeastern United States and Canada. Beginning in 1972, Chrysocharis laricinellae (Ratzeburg) and Dicladocerus westwoodii were included in the control effort (Ryan and Denton 1973) and four new species were released in 1974 (Ryan et al. 1975).

A 1977 survey of parasite release and randomly selected plots in Region 1 (Flavell 1979) showed A. pumila to be the most abundant and C. laricinellae the most widespread parasites in the area.

This report deals with a larch casebearer pupal survey conducted in 1980 to determine the parasite complex in areas where no exotic parasites had been released in Montana, and to evaluate selected parasite release sites (figure 1).

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Figure 1.--Larch casebearer defoliation and pupal collection sites.

METHODS

Sampling began on June 2 when most larvae had pupated and ended June 25, except for two plots which were visited on July 21. The sites checked comprised 11 areas which contained heavy defoliation for the first time near the eastern extension of western larch on the Lolo National Forest east of Missoula, Montana, and 15 parasite release sites in Idaho and Montana.

In five of the areas, the objective was to determine parasite species present. These samples were simply placed into mass rearing without taking pupal counts or branch measurements.

In the nonrelease areas, whole branch samples were taken from three small trees (less than 3 meters). Branch length, pupal counts per fascicle, and number of fascicles were recorded.

In the parasite release sites, three 15-cm segments from each of the two branches from upper, mid, and lower crown levels were taken. Usually, five trees were sampled but the number was increased in areas with low casebearer population levels.

Casebearers were mass reared or placed in individual gelatin capsules. After moth and parasite emergence had ceased, occurrence of nonemerged parasite adults was determined by clearing pupal cases in a solution of KOH and dissecting them to determine parasite species.

RESULTS

Parasitism in the release plots was extremely variable, ranging from 8.14 percent to 61.54 percent (table 1). Although the species composition has changed somewhat (table 2), percent parasitism was comparable to the 1977 survey (Flavell 1979). Parasitism in the Lolo NF nonrelease plots was considerably lower than in release sites (table 1).

Chrysocharis laricinellae (Ratzeburg) was the most abundant parasite recovered (table 2). It was responsible for almost 90 percent of casebearers parasitized in the 1980 season. It was present in all release and nonrelease sites.

Agathis pumila (Ratzeburg) was second, although it accounted for only 2 percent of total parasitism in the release plots. This is a significant drop from that observed in 1977 when A. pumila accounted for 12.5 percent of total parasitism. This introduced parasite was present in seven of the nine nonrelease areas.

The recovery of these two introduced parasites in the areas east of Missoula is of interest, as the nearest official release points are considerable distances away. Cooper's Lake, the most easterly collection site, is over 56 kilometers from the 1969 release plot of A. pumila in the Blackfoot River area (Bousfield et al. 1974). The closest liberation of C. laricinellae was in 1974 near Evaro (Ryan et al. 1975), even further to the west.

Spilochalcis albifrons (Walsh), the most abundant and widespread native parasite collected, accounted for 1 percent of total parasitism. All remaining parasite species were rare, collectively accounting for less than 1 percent parasitism.

The number of parasites from mass rearing are presented in table 3. Again C. laricinellae was the most abundant parasite recovered, but the native S. albifrons was second and A. pumila third. Mesopolbus sp., another native species, was almost as numerous as A. pumila.

Generally, sampling schemes for the larch casebearer use 100 fascicles (spurs) as the base sample for estimating population levels (Theroux and Long 1978). Samples are taken in the outer part of the branch rather than the inner. Since foliage decreases toward the bole of the tree, additional measurements were taken in this study to determine any difference in the number of pupae between the inner and outer crown. For the nonrelease areas, in which whole branch samples were taken, total length was measured and pupae were counted for both the entire branch sample and a 100-fascicle subsample (table 4). In all cases but one, the number of pupae per branch section containing spurs, averaged over the whole branch, was lower than the average for the 100-fascicle subsample. Such a discrepancy is most important in intensive studies in which whole branches or trees are examined. Extrapolation from 100-fascicle samples to entire branches may lead to an overestimation of the casebearer population.

Further evaluation of parasite release sites is planned for the 1981 season. In addition to an analysis of the parasite complex, data on stands and understory vegetation will be collected at selected plots.

Table 1. Location of collection sites and percent parasitism.

Plot name	T.	R.	Sec.	No. of pupae	No. of parasites	Percent parasitism
Parasite release sites						
I-2-64	55 N.	3 E.	19	310	46	14.84
M-8-67	31 N.	30 W.	21	86	7	8.14
I-10-66	56 N.	4 W	33	543	95	17.50
I-17-66	56 N.	1 W.	9	1,549	482	31.12
M-31-69	11 N.	18 W.	17	5,754	1,443	25.08
M-49-69	31 N.	23 W.	24	52	12	23.08
M-61-67	15 N.	20 W.	12	14	3	21.43
M-93-68	33 N.	33 W.	19	152	43	28.29
M-93-69	13 N.	18 W.	33	1,333	351	26.33
I-98-67	64 N.	1 E.	16	746	212	28.42
I-101-68	63 N.	3 E.	32	13	8	61.54
I-105-68	65 N.	2 E.	14	387	46	11.89
Total				10,939	2,748	25.12
Lolo NF nonrelease sites						
Arkansas Ck.	13 N.	16 W.	33	3,028	156	5.15
Cooper's Lk.	15 N.	11 W.	12	3,425	712	20.79
Elk Mt.	11 N.	17 W.	6	3,960	26	0.66
Fiddlers Gl.	11 N.	17 W.	24	78	6	7.69
Green Mt.	14 N.	13 W.	12	2,138	25	1.17
Ovando Mt.	15 N.	12 W.	23	515	85	16.50
Pearson Ck.	14 N.	13 W.	14	633	20	3.16
Twin Ck.	14 N.	17 W.	21	4,238	789	18.62
Whitaker Br.	14 N.	16 W.	27	2,343	66	2.82
Total				20,358	1,883	9.25
Mass-rearing plots						
I-5-66	57 N.	1 W.	2			
I-95-67	65 N.	2 W.	36			
I-100-68	63 N.	2 E.	36			
Blackfoot R.	15 N.	11 W.	16			
Doney Lk.	15 N.	11 W.	17			

I = Idaho, M = Montana

Table 2. Percent parasitism by species.

Plot name	CHLA	AGPU	SPAL	MESO	DICL	GETE	OTHER
Parasite release sites							
I-2-64	10.0	0.6	3.2	1.0	0	0	0
M-8-67	7.0	0	0	0	0	0	1.2
I-10-66	13.1	3.1	0.5	0.2	0	0.5	0
I-17-66	17.2	8.0	0.5	2.7	0	0.3	2.5
M-31-69	24.8	0	0.1	0	0.1	0	0.2
M-49-69	19.2	1.9	0	0	0	1.9	0
M-61-67	7.1	7.1	0	0	0	7.1	0
M-93-68	22.4	0	1.3	0	0	3.3	1.3
M-93-69	19.3	6.1	0.8	0	0	0.1	0
I-98-67	27.5	0	0.1	0.7	0	0	0.1
I-101-68	61.5	0	0	0	0	0	0
I-105-68	10.6	0	0.8	0.5	0	0	0
Total	21.8	2.1	0.4	0.5	0.1	0.1	0.5
Lolo NF nonrelease sites							
Arkansas Ck.	4.6	0.2	0.1	0	0.2	0	0.1
Cooper's Lk.	20.3	0.3	0	0	0	0.2	0.1
Elk Mt.	0.6	0.1	0	0	0.1	0.1	0
Fiddlers Gl.	6.4	0	0	0	0	0	1.3
Green Mt.	0.2	0.5	0.4	0	0	0	0.1
Ovando Mt.	15.2	0	0	0	0.4	0.4	0.6
Pearson Ck.	2.2	0.2	0.6	0	0.2	0	0
Twin Ck.	17.5	0.5	0.1	0.1	0.1	0	0.3
Whitaker Br.	1.6	0.1	1.1	0	0	0	0
Total	8.2	0.3	0.2	0.1	0.1	0.1	0.1

CHLA = Chrysocharis laricinellae, AGPU = Agathis pumila, SPAL = Spilochalcis albifrons, MESO = Mesopolobus sp., DICL = Dicladocerus sp., GETE = Gelis tenellus, OTHER = other and undetermined species, I = Idaho, M = Montana.

Table 3. Parasitism by species for mass-rearing plots.

Plot name	CHLA	AGPU	SPAL	MESO	TETR	HABR	OTHER
I-5-66	207	26	53	28	2	3	1
I-95-67	232	17	2	15	21	0	1
I-100-68	56	1	9	8	0	0	2
Blackfoot R.	57	16	37	0	4	0	0
Doney Lk.	1	0	4	0	0	0	0
Total	553	60	105	51	27	3	4

CHLA = Chrysocharis laricinellae, AGPU = Agathis pumila, SPAL = Spilochalcis albifrons, MESO = Mesopolobus sp., TETR = Tetrastichus sp., HABR = Habrocytus sp., OTHER = other species, I = Idaho.

Table 4. Branch measurements and pupal means for the Lolo NF nonrelease sites.

Plot name	Total length of samples (cm)	Mean length per 100 spurs	Total no. of pupae	Mean of pupae	
				100-spur subsample	Total branch
Arkansas Ck.	8,412	66.8	3,028	34.5	24.1
Cooper's Lk.	8,980	91.0	3,425	21.8	34.7
Elk Mt.	6,670	101.1	3,960	65.2	60.0
Fiddlers Gul.	1,218	93.7	78	11.3	6.0
Green Mt.	7,573	89.9	2,138	29.0	25.4
Ovando Mt.	9,634	95.8	515	9.0	5.1
Pearson Ck.	5,313	101.8	633	18.9	12.1
Twin Ck.	13,725	94.5	4,238	50.9	29.2
Whitaker Br.	5,843	111.0	2,343	58.6	44.5

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