THE REARING PROGRAM OF THE FOREST INSECT SURVEY IN MANITOBA-SASKATCHEWAN REGION FOR 1964

by
J. C. E. Melvin

FOREST RESEARCH LABORATORY
WINNIPEG, MANITOBA
INTERNAL REPORT MS-57

FORESTRY BRANCH
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INTRODUCTION

Although the Winnipeg Forest Insect Survey was established on the campus of the University of Manitoba, the Forest Insect Survey did not become fully operational until 1943. The insect material was reared from 1943 to 1951 in a screened insectary during the summer and the pupae overwintered at 40°F in a root cellar. Overwintering larvae were placed in vials with foliage, plugged with non-absorbent cotton and buried between layers of moss in screened frames just below the surface of the ground. A light layer of earth and leaf litter was placed over the frame. A new survey building was constructed in 1951 consisting of a general office with an insectory on either side. The overwintering material was stored in a cold storage room constructed in the basement of this building in October at 35°F. The temperature was raised in mid-February 2 F. every second day until a maximum of 70°F was reached. This temperature was maintained until adult emergence was completed. In 1962 the Forest Insect Laboratory moved into the new wing of the Department of Agriculture Research Station, and the rearing program of the Forest Insect Survey was carried out in a controlled temperature and humidity room and cold storage room on the third floor of this building. This report covers the rearing results obtained in 1964 rearing program in the Manitoba-Saskatchewan region. By analyzing our rearing techniques and degree of survival it is felt that it would show how better handling and rearing procedures could be incorporated into our present rearing program.

THE REARING ROOM

All survey samples are reared in a specially designed rearing room, which measures 18' x 22'6". This room is illuminated by banks of daylight fluorescent lights controlled by a time control switch. Temperature is controlled at 70°F. and relative humidity at 60 per cent.

Working counter space with a seating capacity for five people extends across one end and along one side of this room. Above the counter, wooden shelves with sliding glass doors for storing glassware, killing vials, and other related equipment are located. Seven mobile rearing racks and metal shelving is located along the other side of the room. The metal shelves are used for holding rearing cages for mass collections and large plastic containers that will not fit into the rearing racks.

One Forest Technician supervises three Student Assistants in the rearing room during the summer months. Additional summer help in the rearing room is provided during the peak of the work load to assist in feeding mass collections. Each person feeds a group of insects on a specific host.

REARING PROCEDURES

Larval Rearing

Insects to be reared are generally placed in a sterilized, closed-top, 8-ounce jar containing fresh foliage. A survey number and rearing sheet are provided for each species of insect received. In the rearing room additional fresh foliage is added and the sample is placed in the appropriate place on the rearing rack or shelf. Fresh foliage is gathered locally three times a week but has to be gathered out in the field once a week and placed in the cold room until required for feeding. Larvae are provided fresh foliage every second day and pertinent data are recorded on the rearing sheet. In the rearing of most samples a mixture of soil, sand, vermiculite or rotten wood is placed in the jars to aid in cocoon formation. Artificial media is sometimes used in rearing wood boring insects.

A new rearing sheet has been devised at this laboratory incorporating larval, pupal and parasite information on one sheet. The larval section of this form bears the survey number, tentative insect name, stage and number of specimens, host tree, origin of sample and date collected. The pupal section is divided into laboratory reared and field collected pupae. This section contains such pertinent data such as date of pupation, number of pupae formed, sex and number of emerged adults, number killed by parasites and the order of the parasites. The back part of this rearing sheet contains all the data pertaining to egg, larval and pupal parasites. (Form A).

Rearing of larvae and pupae was carried on using the methods noted in the following table. These procedures are coded by means of a two-digit system as follows:

1st digit - Larval treatment -

1. General 2-day feeding procedure.
2. Food added as required.
3. Reared as received.
4. Fed artificial diet.
5. Other - specified.

2nd digit - Pupation medium -

1. None required.
2. Mixture sand, soil and vermiculite.
3. Peat.
4. Cork or rotted wood.

Form "A" - Larval Rearing Sheet 19__

F.I.S. 19__

Date Collected _____ Survey No. _____

Final Identifications _____ By _____ Date _____

Tentative Identifications _____ By _____

Locality _____ County _____ Forest Dist _____

Remarks _____

Host _____ Part of Host Attacked _____ Rearing Record By _____

Date	Fresh Food	Living Larvae	Dead Larvae			Host Pupae	Larvae killed by parasites	Parasites		Remarks
			?	C	M			No.	Order	

Form "B" - Rearing Sheet Laboratory Reared Pupae 19__

Date	No. of pupae added	Host Emergence			Pupae killed by par.	Parasites		Remarks
		Male	Female	?		No.	Order	

Form "B-1" - Rearing Sheet Field Collected 19__

Parasite Rearing Sheet 19__

Host _____ Rearing Record by _____

Remarks _____

Form "C-1" - Recovered from Eggs

Par. No.	Date of Recovery	Date of Pupation	Date of Emergence Male	Female	?	Remarks and parasite identification	Identified by

Form "C-2" - Recovered from Larvae
(Circle appropriate term: Ectoparasite, Endoparasite)

Form "C-3" - Recovered from Pupae
(Circle appropriate term: Ectoparasite, Endoparasite)

SANITATION AND LARVAL DISEASE

Glassware is manually cleaned and washed for three minutes in a dishwashing machine and then oven-dried at 250 F. All instruments used in the handling of insects such as forceps, scissors and probes, are usually immersed in alcohol usually after each sample has been fed or if a disease is suspected. When insects show symptoms of disease within five days of arrival they are removed from the rest of the collection. Diseased material is selected for preliminary diagnosis. The specimens and a disease enclosure slip and then forwarded to the Insect Pathology Research Institute at Sault Ste. Marie for final diagnosis.

Pupal Rearing

Following pupation the pupae are removed from the larval rearing jar and placed in a new jar layered with moistened absorbent cotton and pertinent data is recorded on the rearing sheet. The closed-top lid is replaced with a screen-top lid. When pupal parasitism occurs it is recorded on the parasite section of the rearing sheet that include such information as recovery and emergence dates, number of parasites, and the family name of each parasite.

WINTER STORAGE

From 1951 to 1962 overwintering larvae and pupae were kept in the same containers used during the summer and stored at 35 F. for approximately 125 days. Overwintering larvae are transferred to clean jars and fresh foliage is added. Since 1962 overwintering material has been stored at 45 F. for 130 days. Overwintering collections are placed in cold storage in the middle of October and removed in February and incubated at a temperature of 70 F. and 60 per cent relative humidity.

REARING RESULTS

Results of the rearing program for 1964 are summarized in Table 1. Included are 31 species of Coleoptera, 7 species of Diptera, 57 species of Hymenoptera, and 250 species of Lepidoptera. Percentages were not given for wood boring insects. Only those samples that contained 5 or more specimens are shown when percentages of rearing success was presented (Table I). Rearing success was estimated on recovery of the host or parasites. The rearing success of the various orders of insects are shown in Table 2.

COLEOPTERA

In general satisfactory results were obtained in rearing most of the wood boring insects. Rearing results were poor for late larvae or pupae of chrysomelids. Coccinellid larvae were successfully reared on either aphids or scale insects.

DIPTERA

Rearing results for this order of insects were generally poor regardless of what instar they were received. Partial rearing success was obtained in the families Cecidomydiae and Syrphidae.

HYMENOPTERA

Fifty-seven species of Hymenoptera were reared with varying amounts of success.

Argids reared very well, with 47 per cent rearing success was recorded in this family.

Rearing results of late instar larvae and cocoons of cimbicids showed a rearing success of 33 per cent.

Particular attention was given to rearing of cynipid galls and good rearing results were obtained. No percentages were calculated for this family becuase of their type of habitat.

Rearing success of diprionid material was generally poor, and only 25 per cent were successfully reared.

Eurytomids and Pamphilids were difficult to rear and poor rearing results were recorded.

Tenthredinid larvae feeding on deciduous hosts showed very high mortality and many failed to spin cocoons. Rearing success for this group was only 14 per cent. Larvae feeding on coniferous hosts faired much better with a 33 per cent rearing success. Better rearing methods are essential in this family if rearing results are to be improved. Through experimentation it has been found that larch sawfly cocoons stored at 34 F. on moss until February and incubated at 63 F. reared more successfully than those reared under general insectary temperature and humidity. It has been found that with a lower incubating temperature adult and parasite emergence was much higher.

LEPIDOPTERA

Because of the large number of families involved only the major families of this order were assessed.

Arctiidae - In general, the rearing results were acceptable for species feeding on deciduous and coniferous hosts. Thirty-five per cent of individuals on deciduous hosts were reared successfully as compared with 25 per cent on coniferous hosts.

Gelechiidae - Thirty per cent of specimens on deciduous hosts were reared successfully but none were reared on coniferous hosts.

Geometridae - A total of 52 known species of geometers were reared and rearing results were considered as acceptable. Rearing success for geometrids feeding on coniferous hosts was 40 per cent compared to 24 per cent for those feeding on deciduous hosts. Late instar larvae generally reared successfully but early instar larvae were difficult to rear and most of them failed to pupate.

Lasiocampidae - The majority of this group was made up of moss collections of Malacosoma spp. Although there was some mortality due to disease, a rearing success of 52 per cent was recorded.

Lymantriidae - Species on deciduous host showed a rearing success of 48 per cent compared to those on coniferous hosts of 85 per cent.

Noctuidae - A total of 41 known species of owlet moths were reared. The overall rearing success of this family was considered poor with only 29 per cent rearing success on deciduous hosts and 25 per cent on coniferous hosts.

Notodontidae - Good rearing success was recorded for this particular family.

Olethreutidae - Comparatively poor success in rearing deciduous feeders was recorded but in rearing coniferous feeders the rearing success was good with 41 per cent being reared to the adult stage.

Pyralidae - Rearing results for this group was fair. Deciduous - feeding and coniferous-feeding pyralids showed a rearing success of 38 and 36 per cent respectively.

Tortricidae - Approximately 38 per cent of all the leaf rollers that were collected reared successfully. Early instar larvae in this group were difficult to rear and mortality was high.

PREPARATION OF MUSEUM MATERIAL

Adult specimens of both parasites and host insects are pinned and labelled immediately following emergence except micro-lepidoptera which are not killed until just before the specimen is to be spread. Chalcids and cecidomycids are preserved in 70 per cent alcohol. Various sizes of killing vials are used and this depends on the size of the specimen to be killed. Ethyl acetate, the killing agent, is applied to an absorbent cotton plug in the top of the vial.

CONCLUSIONS

Although the majority of samples received are late instar larvae or pupae rearing results are only fair except in occasional incidences. Generally early instar larvae are difficult to rear and mortality is usually high. Even though reasonable care is exercised by field technicians all collections do not arrive in perfect condition. Some mortality has been reduced by the use of cellophane bags to prevent deterioration of foliage and styrofoam coolers for holding F.I.S. tins until samples are mailed. The greatest mortality occurs when samples are delayed for any period of time in transit.

RECOMMENDATIONS

Improved rearing techniques are necessary for rearing some of the gall producing, wood boring and needle mining insects. Cellophane bags should be used for most samples collected. Insects should not be put on dampened foliage in the mail because they become deteriorated and become infested with disease organisms. Field collections of early instar larvae should be carefully selected and later instar larvae given preference when samples are taken. Selection of late instar larvae in the field would increase the chance of survival in the laboratory and more information on parasites and disease organisms could be obtained. Adequate foliage should always be provided because of the length of time some samples are in transit.

TABLE I

Rearing Results of Insect in 1964, Indicating the Order, Family, Genus, and Species of Material Collected in Various Stages from Deciduous and Coniferous Hosts with Rearing Results

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing ** methods and remarks
COLEOPTERA									
Buprestidae - Deciduous									
Agrilus sp.	W	Twigs infested					0		3.1
Agrilus anxius	wB	Twigs infested			1		0		3.1
Agrilus criddlei	W	Twigs infested			2		20		3.1
Agrilus poss. liragus	tA	Twigs infested					0		3.1
Buprestid sp	tA	Twigs infested			1		0		3.1
Totals -					4		20		
Cerambycidae - Deciduous									
Cerambycid spp.	W	Twigs infested					0		4.1
	ecCH	Twigs infested					1		4.1
	tA	Twigs infested			2		1		4.1
Hyperplatys sp.	W	Twigs infested			21		15		3.1
Oberea schaumi	tA	Twigs infested					0		3.1
Saperda poss. Calcarata	tA	Roots infested			1	2	5		3.1
Saperda calcarata	bPo	Twigs infested					0		3.1
Saperda concolor	tA	Twigs infested			1		0		3.1
	W				3	1	5		3.1
Saperda populnea moesta	bPo	Twigs infested					0		3.1

* EL - Early larval; LL - Late larval; P - Pupal

Dash in per cent rearing succes column means numbers too small to compute percentage

** Not given for borers, weevils, bark beetles and gall insects.

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
Saperda tridentata	wE	Tree infested			23		28		3.1
Totals -					51	3	55		
Chrysomelidae -									
Deciduous									
Calligrapha spp.	W		6				4	66	2.1
	wB		1				0	-	2.1
	Al		9				4	44	2.1
	Co		1				0	-	2.1
Chrysomela crotchi	tA		212			13	0	6	2.1
Chrysomela spp.	W		43				1	2	2.1
	Co		1				1	-	2.1
	Al		7				1	14	2.1
	Rose		11				0	0	2.1
Totals -			291		0	13	11	8	
Coccinellidae -									
Coniferous									
Coccinellid sp.	tL		2				2		5.1 Fed on aphi
Hyperaspis congener	jP		27				3	11	5.1 and scale
Totals -			29		0	0	5	17	
Curculionidae -									
Deciduous									
Curculionid sp.	wE	Twigs infested					0	-	
Magdalis sp.	wE	Twigs infested			17		7	-	

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods **and remarks
Magdalis gentilis	W	Twigs infested			3		4	-	3.1
Totals -					20	0	11		
Curculionidae -									
Coniferous									
Pissodes sp.	jP	Twigs infested					0	-	3.1
Pissodes engelmanni	jP	Twigs infested					2	-	3.1
Pissodes strobi	wS	Twigs infested					0	-	3.1
	bS	Twigs infested					1	-	3.1
	rP	Twigs infested					14	-	3.1
	jP	Twigs infested			1	3	1	-	3.1
	wP	Twigs infested					17	-	3.1
Pissodes terminalis	jP	Twigs infested					4	-	3.1
Totals -					1	3	39		
Scolytidae -									
Deciduous									
Hylurgopinus rufipes	wE	Bark infested			1	0	1	-	3.1
Totals -					1	0	1		
Scolytidae -									
Coniferous									
Scolytid sp.	bF	Twigs infested					0	-	3.1
Ips borealis	wS	Twigs infested					4	-	3.1

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
Pityogenes									
plagiatus	scP	Twigs infested					21	-	3.1
Pityophthorus sp.	scP	Twigs infested					9	-	3.1
	jP	Twigs infested					27	-	3.1
Scolytus piceae	wS	Twigs infested					6	-	3.1
Totals -					0	0	67	-	
Tenebrionidae -									
Deciduous									
Bolitotherus									
cornutus	wE	Conk infested					19	-	3.1
Totals -					0	0	19		
DIPTERA									
Agromyzidae -									
Deciduous									
Agromyza schineri	tA		3 galls				0		3.1
Total -			3		0	0	0	0	
Cecidomyidae -									
Deciduous									
Cecidomyia spp.	W	Twigs infested					0	-	3.1
	tA	Twigs infested					0	-	

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
Phytophaga									
rigidae	W		82 galls				12	-	3.1
Rhabdophaga									
trobiloides	W		78 galls		3		7	-	3.1
Total -			160		3	0	19	-	
Cecidomyidae -									
Coniferous									
Cecidomyia									
balsamicola	bF		1		0	0	0	-	3.1
Total -			1		0	0	0	0	
Syrphidae -									
Deciduous									
Syrphid sp.	tA		5				0	0	5.1
	ecCH			2	1		0	-	5.1 fed on
	W		2				1	-	5.1 aphids
	Al		3				0	-	5.1
	bPo		7	1			0	0	5.1
	Misc		2	4	2		2	67	5.1
Total -			19	7	3	0	3	23	
Syrphidae -									
Coniferous									
Syrphid sp.	wS	1	2				3	-	5.1
	bS		1				0	-	5.1

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
	jP		4		1		3	-	5.1
Total -		1	7		1	0	6	87	
Argidae - Deciduous									
Arge spp.	wB			3			0	-	1.2
	Al			2			0	-	1.2
Arge clavicornis	W		3				0	-	1.2
	Al	1	1	1			0	-	1.2
	wB	1	12	1			4	29	1.2
Arge pectoralis	Al		82	16			61	62	1.2
	wB		19	11			7	23	1.2
Total -		2	117	34	0	0	72	47	
Cimbicidae -									
Deciduous									
Cimbex americana	Al		5		1		1	40	1.2
americana	W		4	1			2	40	1.2
	bPo		2				0	-	1.2
	tA		1				0	-	1.2
	wB		2				1	-	1.2
Trichiosoma sp	Do		1				0	-	1.2
Trichiosoma									
triangulum	wB		4				1	-	1.2
	tA		1	2			1	-	1.2
	W		14		1		4	36	1.2
Zaraea americana	Misc		15				5	33	1.2
Total -			49	3	2	0	15	33	

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
Cynipidae -									
Deciduous									
Andricus sp	bO	18 Galls					5		3.1
Cynipid sp	W	4 Galls					1		3.1
	9A	4 Galls					0		3.1
	tA	1 Galls					0		3.1
Diastrophus									
fragariae	Misc								
		4 Galls					22		3.1
Diplolepis bicolor	Rose	1 Gall					2		3.1
Disholcaspis sp	bO	8 Galls					9		3.1
Disholcaspis poss.									
spongiosa	bO	4 Galls					30		3.1
Total -		44			0	0	69		
Diprionidae -									
Coniferous									
Monoctenus									
melliceps	ewC	11					0	0	1.1
Neodiprion sp.	jP		79	2		2	18	25	1.1
Neodiprion abietis	bF		125				14	11	1.1
	wS		7	4			4	36	1.1
Neodiprion maurus	jP		100	19	3	1	27	26	1.1
Neodiprion nanulus									
nanulus	jP		50				16	32	1.1
Neodiprion virginiana									
complex	jP		91	12	4	13	22	34	1.1

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
Totals -		11	452	37	7	16	101	25	
Eurytomidae -									
Coniferous									
Eurytoma sp.	jP		1				0	-	3.2
Total -			1		0	0	0	-	
Pamphiliidae -									
Deciduous									
Neurotoma sp.	Do		1				0	0	2.2
Neurotoma									
inconspicua	pCH		72				0	0	2.2
	Se		2				0	-	2.2
	ecCH		39				0	0	2.2
Pamphilius sp	Misc								
			1				0	0	2.2
Total -			114				0	0	
Pamphiliidae -									
Coniferous									
Acantholyda spp.	bF		6				0	0	2.2
	wS		4				0	-	2.2
	S		1				0	-	2.2
	bS		2			2	0	-	2.2
	jP		2				0	-	2.2
Cephalcia sp.	jP		6				0	0	2.2
	bF		1				0	-	2.2

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
	wS		20				0	0	2.2
	bS		2				0	-	2.2
Total -			44			2	0	5	
Tenthredinidae -									
Deciduous									
Amauronematus spp.	W	43	153	1	1	1	13	7	1.2
	gA		1				0	-	1.2
	bPo		4				1	0	1.2
	wB		25			1	6	28	1.2
Caliroa sp.	bO		108				0	0	1.2
Croesus latitarsus	wB		4				1	-	1.2
	Al		3				0	-	1.2
Dimorphopteryx	W		1				1	-	1.2
pinguis									
	Al		2				1	-	1.2
	wB		46				5	11	1.2
Dolerus sp.	Fern	12					0	0	1.2
Empria coryli	Misc								
			12				0	0	1.2
Hemichroa crocea	W		5				0	0	1.2
	wB		24			1	7	33	1.2
	Al		138	5		5	23	13	1.2
Macremphytus	Do		135			1	1	1	1.4
varianus									
Nematinus unicolor	wB		34				4	12	1.2
	Al		3				0	-	1.2

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
Nematus spp.	W		59	28	1		14	17	1.2
	tA		43	13			6	11	1.2
	Al		4	5			2	22	1.2
	wB		3	10			4	31	1.2
	bPo		1	2			1	-	1.2
Nematus populi	tA		105				11	10	1.2
Nematus limbatus	bPo		7				2	28	1.2
	W		234	124	3	8	66	25	1.2
Nematus pinguidorsum	wB		1		1		0	-	1.2
Nematus ribesii	Misc								
			8	2	1		8	90	1.2
Periclista albicollis	bO	11	34				0	0	1.2
Phyllocolpa spp.	W		24	7			5	16	2.2
	tA		8	8	4		1	31	2.2
	bPo		61	17			8	10	2.2
Pontania spp.	W		168	1			23	14	3.2
Priophorus pallipes	tA		2				0	-	3.2
Pristiphora spp.	W			3			3	-	1.2
	bPo		1				0	-	1.2
	tA	1	1				0	-	1.2
	wB			2			2	-	1.2
Pristiphora siskiyouensis	Al		1				0	-	1.2
	wB		11	1			2	17	1.2
	tA		2				0	-	1.2

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
	wB		3				0	-	1.2
	Al		1				0	-	1.2
Pristiphora									
sycophanta	W		9				3	33	1.2
Rhogogaster spp.	tA		16				0	0	1.2
	bPo		2				0	-	1.2
	Do		1				0	-	1.2
	W		1				0	-	1.2
	bO		1				0	-	1.2
	Misc		2				0	-	1.2
	Al		1				0	-	1.2
Tenthredinid spp.	Misc								
		1					0	-	1.2
	ecCH		1				0	-	1.2
	Se		3				0	-	1.2
	bO	1	1				0	-	1.2
	Do		4	1			0	-	1.2
	bPo	7	5	4	1		4	31	1.2
	tA	10	14	14	3		9	32	1.2
	Al	9	30	9			3	6	1.2
	wB		25	12		1	2	8	1.2
	W	34	33	89	2		33	22	1.2
Tenthredo sp.	Al		10				0	0	1.2
	W		5				1	20	1.2
	bPo		3				0	-	1.2
	tA		2				0	-	1.2
	Do		1				0	-	1.2

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
	ecCH		1				0	-	1.2
	wB		7				1	14	1.2
Tethida coridgera	gA		12				0	0	1.2
Trichiocampus									
viminalis	W		90			2	1	3	1.2
Total -		129	1760	358	17	20	283	14	
Tenthredinidae -									
Coniferous									
Ametastegia poss									
recens	tL		1				1	-	1.2
Anoplonyx luteipes	tL	34	10				0	0	1.3
Pikonema alaskensis	wS		283	33	4	97	60	51	1.1
	S		19			8	2	53	1.1
	bS		151	6	2	4	67	47	1.1
Pikonema									
dimmockii	bS		12				3	25	1.1
	wS		6			1	1	33	1.1
Pristiphora									
erichsonii	tL		633	223		89	122	25	1.3
Tenthredinid spp.	wS		3	1			0	-	1.1
	bF		1	1	1		0	-	1.1
	tL		1				0	-	1.3
	bS		1				0	-	1.1
Total -		34	1111	264	7	199	256	33	

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
LEPIDOPTERA									
Aegeriidae -									
Deciduous									
Aegeriid sp.	bPo	Roots infested					0		3.1
	W	Roots infested					1		3.1
Total -							1		
Alucitidae -									
Deciduous									
Alucita huebneri	Misc								
			27				7	26	2.1
Total -			27				7	26	
Arctiidae -									
Deciduous									
Arctiid sp.	wB		1				1	-	1.1
	Al	1					0	-	1.1
	W		1					-	1.1
	bPo	1					0	-	1.1
Diacrisia virginica	W		1				1	-	1.1

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
Halisidota									
maculata	W		3				1	-	1.1
	waB		1				0	-	1.1
	wB		2				1	-	1.1
	Misc			1		1	0	-	1.1
Haploa sp.	uknown		1				0	-	1.1
Haploa confusa	tA		4				3	-	1.1
Hyphantria cunea	W		41		8		10	44	1.1
	Co		38		1		7	21	1.1
	Al		23		3		9	48	1.1
	wB		9		1		2	33	1.1
	bPo		5		5		0	100	1.1
	ecCH		38		33		0	87	1.1
	pCH		6		6		0	100	1.1
	wE		5		5		0	100	1.1
Isia isabella	Grass		1				0	-	1.1
	Co		1				1	-	1.1
Total -		2	181	1	63	1	36	35	
Arctiidae -									
Coniferous									
Arctiid spp.	bS		2	1			0	-	1.1
	bF		1				0	-	1.1
	jP		1				0	-	1.1
Apantesis									
parthenice	tL		1				1	-	1.1
Lexis bicolor	jP		1				0	-	1.1

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
	bS		2	1			1	-	1.1
	wS		2				1	-	1.1
Totals -			10	2			3	25	
Coleophoridae -									
Deciduous									
Coleophora sp.	wB		2				0	-	1.1
Totals -			2					0	
Cossidae -									
Deciduous									
Cossid sp.	tA		1				0	-	1.1
Totals			1				0	0	
Drepanidae -									
Deciduous									
Drepana bilineata	wB			1			1	-	1.1
Totals -				1			1		
Gelechiidae -									
Deciduous									
Compsolechia									
niveopulvella	tA	7	6				6	46	2.1
Gelechiid sp.	tA		7	2			0	0	2.1
	bPo		1				0	-	2.1
	W	2	16		1		7	44	2.1
	wB	1	9		1		2	30	2.1

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
	waB			1			1	-	2.1
	Al		9				5	56	2.1
	bO		9	1			1	10	2.1
	Se	4	3				0	0	2.1
	Co		2				0	-	
Totals -		14	62	4	2		22	30	
Gelchiidae -									
Coniferous									
Evagora sp	jP		3				0	-	3.1
	lP		4				0	-	3.1
Gelechiid sp.	tL		1	3				-	1.1
	jP			1			0	-	1.1
Totals -			8	4			0	0	
Geometridae -									
Deciduous									
Alsophila									
pometaria	wE	41	14				3	5	1.2
	mM	4	28		5		4	28	1.2
	ecCH		24		1		4	21	1.2
Anacamptodes									
larvaria	Al		1				1	-	1.2
Anacamptodes									
vellivolata	wB		1				1	-	1.1
Anavitrinella									
pampinaria	W		1				1	-	1.1

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
Biston cognataria	W		10				2	20	1.1
	tA		6				1	17	1.1
	bPo		1		1		0	-	1.1
	Co		2				0	-	1.1
	wB		2				2	-	1.1
	Al		1				1	-	1.1
	Misc		7				0	0	1.1
Campaea perlata	wB		1				1	-	1.1
	W		3				0	-	1.1
Cosymbia pendulinaria	waB		2				1	-	1.1
	wB		3	1			2	-	1.1
	tA		1				0	-	1.1
Deilinia sp.	W	1					0	-	1.1
Deilinia erythemaria	W		14				12	86	1.1
Deilinia variolaria	W		10				5	50	1.1
Deuteronomos magnarius	tA		2				0	-	1.1
	wB		1				1	-	1.1
	W		1				1	-	1.1
	gA		1		1		0	-	1.1
Ectropis crepuscularia	W		1				1	-	1.1
	Al		1				0	-	1.1
Erannis tiliaria	wE	92	21				7	6	1.2

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
	mM	3	34				15	41	1.2
	wB	1					0	-	1.2
	Al		1				1	-	1.2
	ecCH	8	2				0	0	1.2
Eupithecia ravocostaliata	W	4	6				2	20	1.1
Geometrid spp.	Misc		2				0	-	1.1
	wE		4				2	-	1.1
	Haw	1					0	-	1.1
	ecCH	1					0	-	1.1
	gAs	8					0	-	.1.
	mM	4					0	-	1.1
	bO	7	3				1	10	1.1
	Sc	2	2				1	-	1.1
	Co	10	3				3	23	1.1
	W	43	32	1	2		7	12	1.1
	tA	40	22				10	16	1.1
	Al	7	12	1	2	1	2	25	1.1
	wB	10	28		1	3	6	24	1.1
Hydrelia albifera	Co		13	1			7	62	1.1
Hydrelia inorata	Al		1				1	-	1.1
Hypagyrtis spp.	mM	1					0	-	1.1
	Al		2				0	-	1.1
	W		2				0	-	1.1
	wB		2				0	-	1.1
	Misc		1				0	-	1.1
	Co		1				0	-	1.1

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
Hypagyrtis	W		1	1			2	-	1.1
nubecularia	tA		1				1	-	1.1
	Co		1				1	-	1.1
	wB		1				0	-	1.1
Hyperetis	Co		2				0	-	1.1
amicaria	W		11				3	27	1.1
	Al		3				1	-	1.1
	wB		2		1		0	-	1.1
Itame loricaria	W	1	10			2	2	36	1.1
	bPo		1				1	-	1.1
	tA		14				7	50	1.1
Lambdina									
fiscellaria	tA		1				0	-	1.1
fiscellaria	wB		1				0	-	1.1
Melanolophia									
canadaria	W		1				0	-	1.1
	mM		8				3	37	1.1
	moM		1				0	-	1.1
	wB		3				0	-	1.1
	tA		1				0	-	1.1
	gA		2				0	-	1.1
	Co		1				1	-	101
	wE		1				1	-	1.1
Nemoria mimosaria	wB		1				0	-	1.1
	Do		1		1		0	-	1.1
	Al		1				0	-	1.1
	W		4				2	-	1.1

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
Operophtera									
bruceata	tA		21			1	4	24	1.2
	W		12		6		2	66	1.2
	mM		1				0	-	1.2
	ecCH		3				0	-	1.2
Paleacrita									
vernata	wE		31				4	13	1.2
	mM		15				3	20	1.2
	W		2				0	0	1.2
	bO		1				0	0	1.2
Pero									
morrisonarius	wB		1				1	-	1.1
Philobia									
aemulataria	wB		1				1	-	1.1
	W		2	1			2	-	1.1
	Al		1				1	-	1.1
Plagodis									
alcoolaria	tA		2				1	-	1.1
	bPo		1				1	-	1.1
	wB		11		4	2	2	73	1.1
	W		4				0	-	1.1
	Al		2				2	-	1.1
Prochoerodes	wB		4				0	-	1.1
transversata	W		1				0	-	1.1
	bO		2				1	-	1.1
	tA		2		1		0	-	1.1
	bPo		5				1	20	1.1

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
Protitame sp.	Do		1				0	-	1.1
Protitame virginalis	tA		12	1			6	46	1.1
	bPo		2				0	-	1.1
	wB		1				0	-	1.1
	Do		1				1	-	1.1
Protobormia	Misc		1				1	-	1.1
porcelaria indicataria	W		1				1	-	1.1
	wB		3				1	-	1.1
Rheumaptera hastata gothica	wB		4		1		1	-	1.1
Semiothisa sp.	Do		1				0	-	1.1
Semiothisa hebetata	W		3				2	-	1.1
Semiothisa mellistrigata	W		1				1	-	1.1
Totals -		289	563	6	27	9	174	24	
Geometridae - Coniferous									
Abbottana clemataria	tL		1				0		1.1
Anacamptodes vellivolata	scP		1				1	-	1.1
Biston cognataria	tL		1				1	-	1.1

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
Caripeta sp.	jP		1		1		0	-	1.1
Caripeta									
angustiorata	bF		1		1		0	-	1.1
	bS		1		1			-	1.1
	jP		2				1	-	1.1
Caripeta									
divisata	wS		1				1	-	1.1
Ectropis									
crepuscularia	tL		5			1	1	40	1.1
Eufidonia									
notataria	tL		4				0	-	1.1
	bF		1				0	-	1.1
	wS		2				1	-	1.1
	jP		2				1	-	1.1
Eupithecia spp.	bS		7				4	57	1.1
	bF		4				2	-	1.1
	tL		1				1	-	1.1
	wS		1				0	-	1.1
Eupithecia luteata	wS		21				4	19	1.1
	bS		6				1	17	1.1
	bF		1				0	-	1.1
Eupithecia palpata	jP		1				1	-	1.1
Geometrid sp.	tL		9	2	2	1	2	45	1.1
	bS		3				0	-	1.1
	bF		3			1	0	-	1.1
	wS		7			1	2	43	1.1

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
Hydriomena									
divisaria	wS		2				0	-	1.1
Hypagyrtis piniata	wS		2				1	-	1.1
	jP		1				0	-	1.1
	bS		1				0	-	1.1
Lambdina fiscellaria									
fiscellaria	bS		1				1	-	1.1
	tL		1				0	-	1.1
	wS		2				2	-	1.1
	bF		13			2	7	69	1.1
Nepytia canosaria	wS		14				0	0	1.1
	bS		4				2	-	1.1
	bF		1				1	-	1.1
	jP		2				0	-	1.1
Protoboarmia	tL		2				1	-	1.1
Porcelaria									
indicataria	jP		10				5	50	1.1
	wS		6				4	67	1.1
	bS		8				1	12	1.1
	bF		1				1	-	1.1
Semiothisa									
bicolorata	jP		3				0	-	1.1
Semiothisa oweni	tL		1				0	-	1.3
Semiothisa									
sexmaculata	tL		20		6	4	2	60	1.3
Semiothisa signaria	bF		2		1		0	-	1.1
dispuncta	bS		8				2	25	1.1

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods **and remarks
	wS		1				0	-	1.1
	tL		2		1		0	-	1.1
Sicya macularia	bS			1			1	-	1.1
Totals -			192	3	13	10	55	40	
Gracillariidae -									
Deciduous									
Gracillaria sp.	Al		1				0	-	3.1
	bO	11					0	0	3.1
Totals -		11	1					0	
Lasiocampidae -									
Deciduous									
Epicnaptera	tA		2				1	-	1.1
americana	Al		2			1	0	-	1.1
	wB		1				0	-	1.1
	bO		1			1		-	1.1
	W		1	1		1	1	-	1.1
Malacosoma	ecCH		286	2	2		14	5	5.1 feeding
americanum									more than
									once a da
Malacosoma	tA		897	1007	6	846	696	80	5.1 some mort
disstria	bPo		96	98	1	105	14	62	lity due
	ecCH		42				0	0	5.1 disease
	Al		112			60	40	89	5.1
	W		20	163	1	106	31	75	5.1
	Misc		65	8	1	65	5	97	5.1

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
Malacosoma									
lutescens	ecCH		576	34	6	8	77	15	5.1
Malacosoma pluviale	Rose		57		1		0	2	5.1
	ecCH		65		2		1	4	5.1
	pcH		253				10	4	5.1
	bPo		59				0	0	5.1
	wB		95			2	3	5	5.1
	W		103				0	0	5.1
Totals -			2731	1303	20	1195	893	52	
Lasiocampidae -									
Coniferous									
Lasiocampid sp.	wS		1				0	-	5.1
Totals -			1					0	
Lycaenidae -									
Deciduous									
Lycaenid spp.	tA		1				0	-	1.1
	Co		2				1	-	1.1
	W		1				1	-	1.1
	bO		2				0	-	1.1
	wB		1				0	-	1.1
Strymon liparops	ecCH		1				1	-	1.1
Strymon falacer	bO		2				2	-	
Totals -			10				5	50	

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
Lycaenidae -									
Coniferous									
Callophrys niphon	jP		9			1	2	33	1.1
clarki									
Lycaenid sp.	tL		2				2	-	1.1
Totals -			11			1	4	36	
Lymantriidae -									
Deciduous									
Lymantriid sp.	W		2				1	-	1.1
Parorygia vagans	W		1				0	-	1.1
Orgyia antiqua	Al		1				1	-	1.1
	W		20				10	50	1.1
	wB		7				2	29	1.1
	Al		11		1		5	55	1.1
Totals -			42		1		19	48	
Lymantriidae -									
Coniferous									
Orgyia antiqua	wS		1				0	-	1.1
Parorygia									
plagiata	bF		1				1	-	1.1
	jP		1		1		0	-	1.1
	wS		10		3		4	70	1.1
Totals -			13		4		5	85	

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
Lyonetiidae -									
Deciduous									
Bucculatrix	wB		71		3		0	4	3.1
canadensisella	Al		11		2		6	73	3.1
Totals -			82		5		6	13	
Noctuidae -									
Deciduous									
Acronicta spp.	wB		3				1	-	1.1
	tA		4		1		0	-	1.1
	mM		1				0	-	1.1
	W			1			1	-	1.1
	bO		1				1	-	1.1
Acronicta									
americana	wB	1	7				1	12	1.1
	mM	3					0	-	1.1
Acronicta	bPo	1					0	-	1.1
dactylina	tA	2	1	1	1		0	-	
	Al		12		11		0	93	1.1
	W		7		5		0	71	1.1
	unknown		1		1		0	-	1.1
Acronicta fragilis	wB		7				2	29	1.1
	W		10				3	30	1.1
Acronicta									
funeralis	Al		3			1	1	-	1.1
Acronicta									
furcifera	ecCH		1				1	-	1.1

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks.
Acronicta	wB		5				3	60	1.1
grisea	waB		1				0	-	1.1
	bPo		1				0	-	1.1
	W		4				2	-	1.1
	Al		7				2	29	1.1
Acronicta	ecCH		1				0	-	
impressa	tA		4				1	-	1.1
	wB	3	1				1	-	1.1
	Misc		1				0	-	1.1
	W		1				0	-	1.1
Acronicta inclara inconstans	bO		3				3	-	1.1
Acronicta innotata	tA		2				0	-	1.1
	Al		1				0	-	1.1
	wB		3				1	-	1.1
	unknown		1				0	-	1.1
Acronicta leporina	tA		4				2	-	1.1
	bPo		2				0	-	1.1
	wB		2				2	-	1.1
Acronicta oblinita	pCH		1				1	-	1.1
	W		1				1	-	1.1
Acronicta quadrata	wB		2				0	-	1.1
Catocala sp.	bO	9					0	0	1.1
	W	2					0	-	1.1
Catocala grotiana	tA		1				1	-	1.1
Catocala relicta	tA		5			1	2	60	1.1

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
	wB		1				0	-	1.1
	W		3			1	0	-	1.1
Cosmia calamia	bO		1				1	-	1.1
Enargia decolor	tA	6					0	0	1.1
	Co	1					0	-	1.1
Eupsilia sp.	mM		1				0	-	1.1
Eupsilia tristig-									
mata	wE	1					0	-	1.1
	W		2				2	-	1.1
	mM	2	1				1	-	1.1
	wB		2				2	-	1.1
	bO	1					0	-	1.1
	Misc								
		1					0	-	1.1
Homoglaea hircina	tA		6				4	67	1.1
	mM		1				1	-	1.1
	Cotton-								
	easter		3				3	-	1.1
Lithophane spp.	tA		15				0	0	1.1
	bPo		2		1		0	-	1.1
	W		25		10		4	56	1.1
	wB		7				0	0	1.1
	Al		2				0	-	1.1
	mM		7		1		3	57	1.1
	gAs		4				0	-	1.1
	wE		10				2	20	1.1
	bO		4				1	-	1.1

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
	Co		1				0	-	1.1
	ecCh		4		1		0	-	1.1
	Se		1				0	-	1.1
Lithophane amanda	wB		8				2	25	1.1
	W		10	1			7	64	1.1
	tA		2				0	-	1.1
Lithophane bethunei	mM		1				1	-	1.1
Lithophane disposita	W		17				5	29	1.1
Lithophane georgii	W		1				1	-	1.1
	wB		1				1	-	1.1
	mM		6				2	33	1.1
Lithophane pexata	Al		1				1	-	1.1
Lomanaltes eductalis	Al		20	1			7	33	1.1
	Co		3				0	-	1.1
	W		1				1	-	1.1
	wB		1				0	-	1.1
	Se		1				0	-	1.1
Othosia hibisci	tA		3				3	-	1.1
	mM		5				1	20	1.1
	wB		1				1	-	1.1
Plathpena scabra	tA		1				0	-	1.1
Noctuid spp.	W	12	15	1		1	4	8	1.1
	tA	25	13				3	8	1.1

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
	bO	9	3				2	17	1.1
	Do	8	3				3	27	1.1
	mM		5				1	20	1.1
	gAs		3				0	-	1.1
	Al	5	2				1	14	1.1
	Misc	3	1				0	-	1.1
	wB	10	1				1	9	1.1
	Se	4	0				1	-	1.1
	wE	2					0	-	1.1
	bPo	3	1				0	-	1.1
	ecCH		1				0	-	1.1
Palthis angulalis	wB		2				0	-	1.1
Polia lutra	wB		2				2	-	1.1
Pyrrhia umbra experimens	bPo		5				1	20	
Raphia frater	W		5				0	0	1.1
	bPo		1				0	-	1.1
	tA		8				1	12	1.1
Syngrapha spp.	W	4					0	-	1.1
	wB	1					0	-	1.1
	mM		1				0	-	1.1
	Al	1					0	-	1.1
Xylomyges dolosa	tA		15				2	13	1.1
Zenobia pleonectusa manitobae	tA		4				0	-	
Totals -		120	391	5	32	4	112	29	

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
Noctuidae -									
Coniferous									
Anomogyna sp.	jP		1				0	-	1.1
Anomogyna elimata	jP		6		1		3	67	
Anomogyna perquiritata	wS		1				0	-	1.1
Epizeuxis americalis	wS		13				2	15	1.1
	bF		1				0	-	1.1
	bS		4				0	-	1.1
Feralia jocosa	bS		6				0	-	1.1
	wS		8			2	2	50	1.1
	jP		7				1	14	1.1
	bF		3				1	-	1.1
Lithophane spp.	tL		1				0	-	1.1
	wS		3				1	-	1.1
Noctuid spp.	wS		3				1	-	1.1
	bS	3					0	-	1.1
	jP	4					0	-	1.1
	tL	6		3	1		0	11	1.1
Palthis angulalis	bS		3				2	-	1.1
	wS		7	1			6	75	1.1
	bF		1				0	-	1.1
Panthea furcilla	jP		5	3		2	1	37	1.1
Syngrapha sp.	bS		2				0	-	1.1
Syngrapha alias	wS		2				1	-	1.1
Syngrapha selecta	wS		1				1	-	1.1

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
Zale duplicata	jP	5	18	1			3	12	1.1
largera									
Totals -		18	96	8	2	4	25	25	
Notodontidae -									
Deciduous									
Cerura spp.	tA		2		1		0	-	1.1
	bO		1				0	-	1.1
Cerura occidentalis	W		6				0	0	1.1
	tA		1				1	-	1.1
Datana ministra	W		41			6	2	19	1.1
	wB		14			5	3	57	1.1
Gluphisia	tA		3				3	-	1.1
septentrionalis	wB		2			1	0	-	1.1
	bPo		1				0	-	1.1
Haterocampa	W		1				0	-	1.1
guttivitata	wE		1				0	-	1.1
	bO		1				1	-	1.1
Ichthyura	W		5			1	2	60	1.1
albosigma	tA		6	1			4	57	1.1
	bPo			1			1	-	1.1
Lophodonta	wB		1				1	-	1.1
ferruginea reducta									
Nadata gibbosa	Do		4				2	-	1.1
	wB		9			1	2	22	1.1
Notodontid spp.	wB		7			1	1	29	1.1
	Al		4			1	0	-	1.1

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
	W		5			1	2	60	1.1
	tA		9		1	2	0	33	1.1
	bO		2				0	-	1.1
Pheosia rimosa	wB		2				1	-	1.1
	tA		1				1	-	1.1
Schizura spp.	wB		3				0	-	1.1
	Do		1				0	-	1.1
	W	24	1				0	0	1.1
	Al		2				0	-	1.1
	Misc								
			1				0	-	1.1
Schizura concinna	W		71		47		2	69	1.1
Schizura ipomoeae	bO		1				0	-	1.1
	ecCH		1				0	-	1.1
Schizura leptinoides	W		1				1	-	1.1
Schizura unicolor	tA		1				0	-	1.1
	wB		1				0	-	1.1
	W		1		1		0	-	1.1
Schizura unicornis	wB		1	1			1	-	1.1
Totals -		24	215	16	50	19	31	39	
Notodontidae -									
Coniferous									
Notodontid sp.	wS		1		1		0	-	1.1
Schizura sp.	bS		1				0	-	1.1

Insect	Host tree	No. received by stage EL	IL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
Totals			2		1			-	
Nycteolidae -									
Deciduous									
Nycteola cinereana	bPo		5	5	1		5	60	1.1
Nycteola frigidana	W		1	1			0	-	1.1
Totals -			6	6	1		5	50	
Nymphalidae -									
Deciduous									
Limenitis									
arthemis	tA		1				0	-	1.1
Nymphalis antiopa	bPo		11				0	0	1.1 Disease
	tA		120				2	2	1.1
	wB		4	1			1	20	1.1
	W		101	27	6	32	15	49	1.1
Polygonia comma	gA			1			1	-	1.1
Totals -			237	29	6	32	19	21	
Nymphalidae -									
coniferous									
Nymphalis spp.	jP		1				0	-	1.1
	bS		2			1	0	-	1.1
Totals -			3			1		33	
Oecophoridae -									
Deciduous									

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
Agonopteryx									
argillacea	W		2	1			3	-	1.1
Bibarrambla									
allenella	waB		1		1		0	-	1.1
	Al		7	1			6	75	1.1
Depressaria									
betulella	wB		3				2	-	1.1
Depressaria									
groteella	Misc								
			3				1	-	1.1
Psilocoris sp.	bO		11				3	27	1.1
Semioscopis									
inornata	tA		5			1	2	60	1.1
Totals -			32	2	1	1	17	56	
Olethreutidae -									
Deciduous									
Aphania capreana	W		6				5	83	1.1
Aphania dextrana	tA		4	2			5	83	1.1
Badebecia urticana	tA		1				1	-	1.1
	wB		3		1		1	-	1.1
	bPo		1				1	-	1.1
	Al			1			1	-	1.1
	bO		2				0	-	1.1
	Misc		1				0	-	1.1
	ecCH		1				0	-	1.1
Epinotia spp.	tA	21	5		3		3	23	1.1

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
	Al	2					0	-	1.1
	W	1					0	-	1.1
	Haw	1			1		0	-	1.1
Epinotia									
solandriana	tA	8					0	0	1.1
Epinotia nisella	tA		3				1	-	2.1
criddleana									
Olethreutid spp.	tA	2					0	-	1.1
	W	1	1				1	-	1.1
Proteoteras									
willingana	mM		96				6	6	3.1
Pseudexentera									
oregonana	W	51	65				2	2	2.1
Sciaphila duplex	wB		1				0	-	1.1
	tA		9	2	4		4	73	1.1
Totals -		87	198	5	9		31	14	
Olethreutidae -									
Coniferous									
Eucosma gloriola	jP		11				4	36	3.2
Griselda radicana	wS		5		2	1	0	60	1.1
Laspeyresia									
youngana	wS		4				0	-	3.1
Olethreutid sp.	jP	3					0	-	1.1
Petrova									
albicapitana	jP		14				1	7	3.1

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods **and remarks
Zeiraphera									
ratzeburgiana	wS		7				5	71	1.1
Zeiraphera									
fortunana	wS		7				4	57	1.1
Totals -		3	48		2	1	18	41	
Papilionidae									
Deciduous									
Papilio glaucus	tA		1				0	-	1.1
canadensis	wB		1				0	-	1.1
Totals -			2					0	
Pyralidae -									
Deciduous									
Acrobasis betulella	wR		81	7	6	1	27	37	1.1
Acrobasis									
rubrifasciella	Al		15			1	10	73	1.1
Pyralid sp.	W		2			1		-	1.1
	bPo		2				0	-	1.1
	tA		2				1	-	1.1
	ecCH			1			1	-	1.1
Tetralopha	W		6				2	33	1.1
asperatella	bO		19				0	0	1.1
	tA		2		2		0	-	1.1
Totals -			129	8	8	3	41	38	

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
Pyralidae -									
Coniferous									
Dioryctria sp.	jP		3				0	-	3.1
	P		1				0	-	3.1
Dioryctria									
abietivorella	jP		1				0	-	3.1
Dioryctria									
reniculella	bF			1			1	-	1.1
	wS		4	21	1		12	52	1.1
	bS		1				0	-	1.1
Dioryctria									
zimmermani	jP		2				0	-	3.1
	rP		1				0	-	3.1
Herculia									
thymetusalis	bS		1				1	-	1.1
Pyralid spp.	wS		1				0	-	1.1
	jP		1				0	-	1.1
Tetralopha									
robustella	jP		40			1	12	32	2.1
Totals -			56	22	1	1	26	36	
Saturnidae -									
Deciduous									
Actias luna	wB		7	1			5	62	1.1
	W		2		1		0	-	1.1
	tA		2				0	-	1.1
	Misc		1				0	-	1.1

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
Antheraea									
polyphemuus	bO		2				0	-	1.1
	tA		1				0	-	1.1
	wE		1				0	-	1.1
Hyalophora									
cecropia	Al		1				0	-	1.1
Saturniid sp.	Al		2				0	-	1.1
	tA		1				0	-	1.1
Totals -			20	1	1		5	29	
Sphingidae -									
Deciduous									
Celerio sp.	Al		1				0	-	1.1
Hemaris sp.	tA		1				0	-	1.1
Sphinx									
drupiferarum	W		1				1	-	1.1
Smerinthus sp.	W		1				0	-	1.1
	gAs		1				0	-	1.1
	tA		1				0	-	1.1
Smerinthus									
jamaicensis									
geminatus	W		2				2	-	1.1
Smerinthus cerisyi	tA		1				0	-	1.1
	bPo		1			1	0	-	1.1
Sphingid spp.	W		4			1	2	-	1.1
	tA		2		1		0	-	1.1
	bO		1				0	-	1.1

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
	gAs		1				0	-	1.1
Totals			18		1	2	5	44	
Sphingidae -									
Coniferous									
Lapara bombycoides	jP		6				5	83	1.1
Sphinx gordius	tL		2				0	-	1.1
Sphinx sp.	tL		1				0	-	1.1
Totals -			9				5	55	
Stenomidae -									
Deciduous									
Stenoma algidella	W		3				2	-	1.1
	Misc			1			1	-	1.1
Totals -			3	1			3	75	
Tortricidae -									
Deciduous									
Acleris spp.	Al		4				1	-	1.1
	wB		4				1	-	1.1
	bPo		1				0	-	1.1
	tA		3				1	-	1.1
	W		8		1		7	100	1.1
Acleris braunana	Al		1				1	-	1.1
Acleris calignosana	Al		1				1	-	1.1
Acleris cornana	Do		1				1	-	1.1
Acleris gallicolana heindelana	W		12	15			14	52	1.1

Insect	Host tree	No. received by stage EL	IL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
Acleris hastiana	W		5				3	60	1.1
Acleris hudsoniana			10				5	50	1.1
Acleris logiana	wB		13	4	2		10	72	1.1
	Al	1	1				1	-	1.1
Acleris nigrolinea	tA		3				3	-	1.1
Archips Sp.	wB	2				1	0	-	1.1
	ecCH	1		2			1	-	1.1
	bO	1					1	-	1.1
	wE		3				2	-	1.1
	lPo		1				1	-	1.1
	tA	5	1				1	17	1.1
	W	9					0	0	1.1
Archips fervidana	bO		29		2	2	6	34	1.1
Archips negundana	mM		2	2	1		2	-	1.1
Argyrotaenia quercifoliana	bO		2				1	-	1.1
Choristoneura conflictana	tA		3				1	-	1.1
Choristoneura rosaceana	wB		4		1		2	-	1.1
	bPo		3			1	2	-	1.1
	tA		1				0	-	1.1
	W		4				1	-	1.1
	mM		1				1	-	1.1
	ecCH		2				1	-	1.1
	Misc		1				0	-	1.1

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
Clepsis Persicana	W		2				2	-	1.1
	bO			1			1	-	1.1
	wB		1				1	-	1.1
Pandemis									
canadana	Haw		1				1	-	1.1
	gAs		1				1	-	1.1
	bO		1				1	-	1.1
	Misc		1				0	-	1.1
	Ap		1				1	-	1.1
	bPo		3				2	-	1.1
	W		5				3	60	1.1
	wB		3				1	-	1.1
	tA		19	2			9	43	1.1
Pandemis limitaria	Misc								
				1			1	-	1.1
Sparganothis									
directana	ecCH		2				1	-	1.1
Sparganothis	bO		2				1	-	1.1
pettitana									
Tortricid spp.	Misc	7			1		0	14	1.1
	Ap	4					0	-	1.1
	Haw		1				0	-	1.1
	Rose		1				1	-	1.1
	Misc								
			1				0	-	1.1
	Se		1				0	-	1.1
	gAs		3	1			1	-	1.1

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
	mM	2	1				0	-	1.1
	ecCH		7	1	1		1	12	1.1
	wE	2	2				0	0	1.1
	Do		8				2	25	1.1
	bO	14	9				3	13	1.1
	wB	13	10	1		1	8	37	1.1
	tA	20	12	5	6	1	3	27	1.1
	bPo		8	1			3	33	1.1
	Al	7	7	1			3	20	1.1
	W	30	15	14	4		16	34	1.1
Totals -		118	252	51	19	6	139	39	
Tortricid -									
Coniferous									
Acleris variana	bF		50			1	17	36	1.1
	wS		35	4	2		13	38	1.1
	bS		22	4	6	2	12	75	1.1
Amorbia humerosana	jP		3		3		0	-	1.1
Archippus									
albertus	bS		2				0	-	1.1
Archippus									
packardianus	wS		10				6	60	1.1
Archippus									
strianus	wS		2				0	-	1.1
Argyrotaenia									
tabulana	jP		17		1		5	35	1.1

Insect	Host tree	No. received by stage EL	LL	P	Number of parasites Hym	Dip	Number reared to adult	Per cent rearing success	Code of rearing methods ** and remarks
Choristoneura									
fumiferana	bF		36	36	1	6	24	43	1.1
	bS		60	18	1	3	32	46	1.1
	wS		310	209	4	43	222	52	1.1
Choristoneura									
pinus	scP		2	1	1		2	-	1.1
	lP		8	1			8	89	1.1
	rP		3				2	-	1.1
	jP		370	522	30	16	207	28	1.1
Sparganothis									
tristriata	jP		5				4	80	1.1
Tortricid spp.	tL		8	1			4	44	1.1
	wS	4		2		1	0	-	1.1
	jP			2	1	1	0	-	1.1
	bF		3				1	-	1.1
Totals -		4	946	800	50	73	559	38	

TABLE II

Total Rearing Results by Order, Various Stages from Deciduous and Coniferous Hosts, Number of Parasites and Adults Reared, Total Percent Emergence and Overall Percentage.

Order	Host	No. of Insects by Stage			No. of Parasites		No. Reared to Adult	Total per cent emergence
		El	LL	P	Hym.	Dip.		
Coleoptera	Deciduous		291		0	13	11	8
	Coniferous		29		0	0	5	17
Diptera	Deciduous		19		3	0	3	23
	Coniferous	1	7		1	0	6	87
Hymenoptera	Deciduous	131	2040	395	19	20	370	16
	Coniferous	45	1680	301	14	217	262	25
Lepidoptera	Deciduous	665	5197	1449	246	1272	1571	42
	Coniferous	25	1395	839	74	95	695	38
Totals		867	10586	2984	357	1617	2923	
Overall percentage								34

* EL - Early larval; LL - Late larval; P - Pupal