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VEGETATION OF TAMARACK STANDS IN NORTH CENTRAL MINNESOTA^{1/}

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Tree and shrub vegetation, of select tamarack (*Larix laricina* (Du Roi) K. Koch) stands in Minnesota, were sampled as part of an investigation into the parasite complex of the larch sawfly (*Pristiphora erichsonii* Hartig). Although the vegetation was sampled to obtain descriptive information about the habitat of the larch sawfly, it also adds new descriptive information concerning the vegetation of tamarack stands.

MATERIALS AND METHODS: Vegetation was sampled in August 1972 in 16 tamarack stands; two in Beltrami County, one in Itasca, ten in Koochiching and three in Lake of the Woods. Variables used in describing the stands were: tamarack age, height, dbh, basal area and trees per acre, and the dominant plant associates (Table 1).

Vegetation Sampling: Stand density was measured using the Bitterlich point-sampling technique (Kulow, D.L. 1965. Elementary point-sampling. *W. Va. Univ. Agr. Exp. Sta. Circ. 116.* 24pp.). Ten points per stand were randomly selected from a 16-30 point grid system with one chain distance between points. Species and dbh were recorded for all trees, plus the age and height of five typical tamarack per stand. Age was determined at dbh.

Shrub information was gathered 30 ft₂ northeast of each Bitterlich point by recording species and counting all stems in a 24 ft² quadrat. All stems that arose from the layer of sphagnum moss were counted as single stems.

RESULTS: Table 1 shows the vegetation description of the sixteen tamarack stands. Table 2 includes particulars about the number of live trees/acre. Table 3 gives details of the shrub and seedling data.

No attempt was made to analyze vegetational differences. However, the paucity of vegetation data for Minnesota tamarack stands is sufficient reason to present this large body of descriptive data.

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TABLE 1. VEGETATION DESCRIPTION OF 16 TAMARACK STANDS IN NORTH CENTRAL MINNESOTA.

STAND	LEGAL DESCRIPTION				TAMARACK						DOMINANT PLANT ASSOCIATES			
					AVERAGE			BASAL AREA/ ACRE	LIVE TREES/ ACRE	SEEDLINGS PER ACRE (X 1000)	TREE+ SPP.	SHRUBS		GROUND COVER
					AGE* (YRS)	HEIGHT* (FT)	DBH (INS)					STEMS/ACRE (ALL SPP.) (X 1000)		
1	157N	25W	25	SE 1/4 OF NE 1/4	87	40	5.23	52	404	0.0	BS	SA,AR BB	46.9	MOSS#
2	67	27	36	NE 1/4 OF SE 1/4	44	49	7.22	49	195	0.0	WC,PB BS	LT,SA AR	48.4	MOSS
3	64	27	35	SE 1/4 OF SE 1/4	76	47	7.66	68	280	0.0	BS,PB	LT,AR SA	110.8	DUFF
4	149	26	17	SW 1/4 OF NW 1/4	83	51	6.55	55	251	0.0	APT	LT,SA AR,RD	60.4	MOSS
5	152	29	35	NE 1/4 OF SW 1/4	107	46	5.43	83	580	2.9	APT	LL,LT BB	53.6	MOSS
6	152	27	10	NE 1/4 OF SE 1/4	89	45	6.17	75	446	0.7	BS,BF	LT,BB	115.4	MOSS
7	154	25	20	NE 1/4 OF SE 1/4	42	36	4.46	45	661	1.3	BS,WC WP,PB	LT,LL WS,BB	91.3	MOSS
8	155	26	21	NE 1/4 OF SE 1/4	75	51	6.92	103	463	0.0	BS	AR,LT	48.7	MOSS
9	155	27	3	NW 1/4 OF SW 1/4	118	48	7.62	27	137	0.0	BS,PB BA	SA,AR LT	42.3	MOSS
10	156	28	2	SW 1/4 OF SW 1/4	90	48	5.50	96	662	11.5	PT	AR	17.8	GRASS /MOSS
11	156	29	33	SW 1/4 OF SW 1/4	107	32	5.04	71	608	3.4	APT	LL,LT BB,BR	223.1	MOSS
12	153	30	26	NW 1/4 OF NW 1/4	119	40	5.44	102	706	0.9	PT	LT,DA BB	63.4	MOSS
13	155	31	12	SE 1/4 OF NE 1/4	70	43	6.62	48	1062	0.4	BS	LT,LL BR,BB	299.5	MOSS
14	158	32	28	NE 1/4 OF SE 1/4	97	45	7.19	52	214	0.2	BS	LT,SA AR,LL	78.0	MOSS
15	159	32	10	SW 1/4 OF NW 1/4	46	51	8.09	55	185	0.9	BS,WC	LT,DA BB,HS	56.4	MOSS
16	158	33	7	NW 1/4 OF SW 1/4	72	51	6.30	102	554	0.0	APT	RD,AR CS	31.6	MOSS

* 5 TYPICAL
TREES PER
STAND

SPHAGNUM SPP.

+ APT ALMOST PURE TAMARACK
BA BLACK ASH
BF BALSAM FIR
BS BLACK SPRUCE
PB PAPER BIRCH
PT PURE TAMARACK
WC NORTHERN WHITE CEDAR
WP EASTERN WHITE PINE
(PINUS STROBUS)

SEE TABLE 3 FOR SCIENTIFIC NAMES

++ AR AMERICAN RED RASPBERRY
BB BOG BIRCH
BR BOG ROSEMARY
CS CURRENT SPP.
DA DWARF ALDER
HS HONEYSUCKLE SPP.
LL LEATHER LEAF
LT LABORADOR TEA
RD RED-OSIER DOGWOOD
SA SPECKLED ALDER
WS WILLOW SPP.

SEE TABLE 3 FOR SCIENTIFIC NAMES

Table 2. Number of live trees per acre in 16 tamarack stands in north central Minnesota.

Tree species	STAND 1														Mean trees/acre	Mean BA/acre	Tree species	STAND 9														Mean trees/acre	Mean BA/acre					
	n=69																	n=75																				
B. spruce							7	3	4	2							47	17	B. ash	183	11															195	6	
Tamarack			4	1	2	6	1	1		2	2						404	52	P. birch	46	11	7	5	4	3											76	6	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14				B. spruce	46	23	51	41	45	9	7										222	36		
	Diameter class (inches)																Tamarack	46	11	7	15	19	26	4	5	4								137	27			
	Diameter class (inches)																	1	2	3	4	5	6	7	8	9	10	11	12	13	14							
	STAND 2														Mean trees/acre	Mean BA/acre		STAND 10														Mean trees/acre	Mean BA/acre					
	n=64																n=96																					
P. birch			2	3	1												38	4	Tamarack			4	1	2	3	5	6	7	8	9	10	11	12	13	14	662	96	
W. cedar			1	1	1	4	3										48	8																				
B. spruce						1											11	3																				
Tamarack				5	1	6	3	3	1	8		1	1				195	49				4	1	2	3	5	6	7	8	9	10	11	12	13	14			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14					1	2	3	4	5	6	7	8	9	10	11	12	13	14						
	STAND 3														Mean trees/acre	Mean BA/acre		STAND 11														Mean trees/acre	Mean BA/acre					
	n=72																n=73																					
P. birch						7											7	1	B. spruce			1														14	2	
B. spruce						1			3	2							16	3	Tamarack			4	6	1	8	3	1	5								608	71	
Tamarack			2	0	3	6	6	5	3	2	9	2	5	1	8	1	280	68				4	6	1	8	3	1	5										
	1	2	3	4	5	6	7	8	9	10	11	12	13	14					1	2	3	4	5	6	7	8	9	10	11	12	13	14						
	STAND 4														Mean trees/acre	Mean BA/acre		STAND 12														Mean trees/acre	Mean BA/acre					
	n=56																n=102																					
B. spruce							4										4	1	Tamarack			4	1	2	3	5	6	7	8	9	10	11	12	13	14	706	102	
Tamarack			1	1	6	6	8	1	7	2							251	55				4	1	2	3	5	6	7	8	9	10	11	12	13	14			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14					1	2	3	4	5	6	7	8	9	10	11	12	13	14						
	STAND 5														Mean trees/acre	Mean BA/acre		STAND 13														Mean trees/acre	Mean BA/acre					
	n=85																n=56																					
B. spruce						7	5										12	2	B. spruce			9	2	1	1	5	5	4							147	8		
Tamarack			4	1	2	6	4	1	2	6	1						580	83	Tamarack	5	5	1	2	5	4	1	4	1	6	7	4	4	1	1	1	1062	48	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14					1	2	3	4	5	6	7	8	9	10	11	12	13	14						
	STAND 6														Mean trees/acre	Mean BA/acre		STAND 14														Mean trees/acre	Mean BA/acre					
	n=93																n=80																					
B. fir	3	6	7	4	1	2											477	7	B. spruce			7	2	1	1	5	1	1	1	9	1					102	28	
B. spruce						1		4	1	4	2						40	11	Tamarack			7	3	4	6	2	1	2	1	1						214	52	
Tamarack			4	1	3	1	2	2	2	1							446	75				7	3	4	6	2	1	2	1	1								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14					1	2	3	4	5	6	7	8	9	10	11	12	13	14						
	STAND 7														Mean trees/acre	Mean BA/acre		STAND 15														Mean trees/acre	Mean BA/acre					
	n=78																n=87																					
W. pine							5				4						9	3	W. cedar											7	1	2	1	1	12	10		
P. birch																	41	2	B. spruce			2	3	4	1	1	9	4	2							105	22	
B. fir																	46	1	Tamarack			4	3	4	3	4	2	3	9	8	1	1				185	55	
W. cedar	7	3	3	1	8	3			3		4						943	12				4	3	4	3	4	2	3	9	8	1	1						
B. spruce						2			7	6	2				1		100	15				4	3	4	3	4	2	3	9	8	1	1						
Tamarack			1	3	1	2	1	1	6		4						661	45				4	3	4	3	4	2	3	9	8	1	1						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14					1	2	3	4	5	6	7	8	9	10	11	12	13	14						
	STAND 8														Mean trees/acre	Mean BA/acre		STAND 16														Mean trees/acre	Mean BA/acre					
	n=118																n=103																					
B. spruce						2											101	15	B. spruce											7						7	1	
Tamarack						1			5	7	6	1	1				463	103	Tamarack											2	8	1	4	5			554	102
	1	2	3	4	5	6	7	8	9	10	11	12	13	14					1	2	3	4	5	6	7	8	9	10	11	12	13	14						

TABLE 3. MEAN STEMS PER ACRE (IN THOUSANDS) FOR SHRUBS AND TREE SEEDLINGS IN 16 TAMARACK STANDS IN NORTH CENTRAL MINNESOTA. *

	STEMS PER ACRE OVER STANDARD ERROR															
	STAND															
LOW SHRUBS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
LEDUM GROENLANDICUM (LABORADOR TEA)	1.1 1.1	13.5 3.7	47.3 21.1	18.0 3.0	11.3 9.0	101.3 28.9	56.3 11.2	9.0 3.7	6.8 3.4	0.0	33.8 9.6	36.0 12.2	170.9 28.1	38.3 11.7	36.0 12.2	0.0
RUBUS STRIGOSUS (AMERICAN RED RASPBERRY)	4.0 2.2	11.7 7.0	36.5 8.2	11.0 5.0	5.4 3.1	0.2 0.2	1.8 1.8	39.2 8.4	9.2 2.7	15.6 4.9	0.0	4.7 2.2	0.4 0.4	9.7 2.6	0.0	7.0 3.1
CORNUS STOLONIFERA (RED-OSIER DOGWOOD)	1.1 0.9	6.5 2.1	0.0	7.7 2.2	2.9 2.1	0.0	0.7 0.7	0.0	2.9 1.4	0.4 0.4	0.5 0.5	2.2 1.5	0.0	0.2 0.2	2.5 1.9	9.0 5.5
LONICERA SPP. (HONEYSUCKLE SPP.)	2.2 1.1	0.0	0.4 0.4	0.9 0.9	0.0	2.0 2.0	0.0	0.0	0.2 0.2	0.0	0.0	0.7 0.6	0.0	0.4 0.4	4.0 2.1	2.2 1.4
CHAMAEDAPHNE CALYCOLATA (LEATHERLEAF)	0.0	0.7 0.7	3.8 2.8	0.0	18.2 6.0	3.1 1.6	14.9 6.3	0.0	0.0	0.0	48.4 31.6	0.0	68.0 27.2	8.5 5.4	0.0	0.0
RIBES SPP. (CURRENT SPP.)	0.0	1.6 1.1	0.7 0.4	6.3 2.6	0.0	0.0	0.5 0.4	0.0	2.9 1.2	0.0	0.5 0.5	0.0	0.0	0.0	0.4 0.4	5.8 2.7
ANDROMEDA GLAUCOPHYLLA (BOG ROSEMARY)	0.0	0.0	0.0	0.0	4.1 1.9	0.7 0.7	0.0	0.0	0.0	0.0	9.0 9.0	3.4 2.5	34.5 21.9	0.0	0.0	0.0
RHAMNUS ALNIFOLIA (DWARF ALDER)	0.0	0.7 0.6	0.0	0.0	0.0	0.0	0.4 0.4	0.0	2.9 2.7	0.0	0.0	7.7 5.5	0.0	0.0	9.0 9.0	0.0
VACCINIUM MYRTILLOIDES (VELVET-LEAF BLUEBERRY)	0.0	0.0	0.0	1.4 1.4	0.4 0.4	0.0	0.9 0.9	0.0	1.3 0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ROSA SPP. (ROSE SPP.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4 0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOW SHRUB TOTAL	8.4 2.8	34.7 8.3	88.7 22.8	45.3 6.9	42.3 11.6	107.3 29.0	75.5 13.1	48.2 9.1	26.6 5.5	16.0 4.9	192.2 34.3	54.7 13.9	273.8 44.8	57.1 13.1	51.9 15.4	24.0 7.0
HIGH SHRUBS																
BETULA PUMILA (BOG BIRCH)	3.6 1.8	0.9 0.6	1.4 1.1	0.7 0.6	9.0 2.5	7.7 5.0	6.3 3.5	0.0	0.4 0.4	1.8 1.1	28.4 9.9	7.2 6.0	25.0 9.0	6.5 2.6	4.3 1.7	4.0 3.6
SALIX SPP. (WILLOW SPP.)	0.5 0.5	0.2 0.2	0.0	1.1 1.1	1.6 0.8	0.0	9.0 2.1	0.0	0.0	0.0	2.5 1.0	1.3 0.6	0.2 0.2	1.1 0.7	0.2 0.2	3.6 6.8
ALNUS RUGOSA (SPECKLED ALDER)	33.3 5.9	12.6 2.9	20.3 5.0	12.0 4.8	0.0	0.4 0.4	0.0	0.0	12.4 4.0	0.0	0.0	0.0	0.0	13.1 2.9	0.0	0.0
AMELANCHIER SPP. (JUNE BERRY SPP.)	1.1 1.1	0.0	0.4 0.2	0.0	0.7 0.7	0.0	0.5 0.5	0.0	0.2 0.2	0.0	0.0	0.0	0.5 0.5	0.0	0.0	0.0
CORYLUS CORNUTA (BEAKED HAZELNUT)	0.0	0.0	0.0	1.3 1.3	0.0	0.0	0.0	0.5 0.5	2.7 1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PRUNUS SPP. (CHERRY SPP.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2 0.2	0.0	0.2 0.2	0.0	0.0
HIGH SHRUB TOTAL	38.5 6.3	13.7 2.9	22.1 5.1	15.1 5.1	11.3 2.7	8.1 5.0	15.8 4.1	0.5 0.5	15.7 4.1	1.8 1.1	30.8 9.9	8.7 6.1	25.7 9.0	20.9 3.9	4.5 1.7	7.6 3.6
GRAND SHRUB TOTAL	46.9 6.9	48.4 8.8	110.8 23.4	60.4 8.6	53.6 12.0	115.4 29.4	91.3 13.7	48.7 9.2	42.3 6.9	17.8 5.0	223.1 35.7	63.4 15.1	299.5 45.7	78.0 13.7	56.4 15.5	31.6 7.9
TREE SEEDLINGS																
LARIX LARICINA (TAMARACK)	0.0	0.0	0.0	0.0	2.9 1.7	0.7 0.7	1.3 0.5	0.0	0.0	11.5 5.0	3.4 1.4	0.9 0.7	0.4 0.2	0.2 0.2	0.9 0.7	0.0
PICEA MARIANA (BLACK SPRUCE)	0.2 0.2	0.0	0.0	0.0	0.7 0.7	0.7 0.7	0.9 0.9	0.4 0.2	0.4 0.2	0.0	0.4 0.2	0.0	0.0	0.0	0.9 0.6	0.5 0.3
THUJA OCCIDENTALIS (NORTHERN WHITE CEDAR)	0.0	1.8 1.6	0.0	0.0	0.0	0.0	4.5 2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ABIES BALSAMEA (BALSAM FIR)	0.2 0.2	0.0	0.0	0.0	0.2 0.2	0.0	0.2 0.2	0.0	0.2 0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.4 0.4
BETULA PAPYRIFERA (PAPER BIRCH)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2 0.2	0.0	0.0	0.0	0.0	0.0	0.2 0.2
FRAXINUS NIGRA (BLACK ASH)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3 0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SEEDLING TOTAL	0.4 0.3	1.8 1.6	0.0	0.0	3.8 1.9	1.4 1.0	6.9 2.7	0.4 0.2	1.9 0.5	11.7 5.0	3.8 1.4	0.9 0.7	0.4 0.2	0.2 0.2	1.8 0.9	1.1 0.5

* 10 GROUND PLOTS PER STAND (EACH 24 SQ.FT.)