Weetman, G.F. and Harland, R. (1964). Foliage and wood production in unthinned black spruce in northern Quebec. *Forest Sci.* 10, 80-88.
Weetman, G.F. and Webber, B. (1972). The influence of wood harvesting on the nutrient status of two spruce stands. *Can. J. For. Res.* 2, 351-369.
Rencz, A.N. and Auclair, A.N.D. (1980). Dimension analysis of various components of black spruce in subarctic lichen woodland. *Can. J. For. Res.* 10, 491-497.
Rencz, A.N. and Auclair, A.N.D. (1978). Biomass distribution in a subarctic *Picea mariana* - *Cladonia alpestris* woodland. *Can. J. For. Res.* 8, 168-176.

Canada, Quebec.	49°20'N 68°10'W -- N of Baie Comeau	54°55' N 66°55'W over 500 m 22 km NE of Schefferville
	Picea mariana	*P. mariana* with a few *Picea glauca*, *Larix laricina* and understorey shrubs
	Deep, well-drained ferro-humic podzols (Weetman and Harland 1964)	Poorly drained podzols (Rencz and Auclair 1980, 1978)
Age (years)	65	Over 80
Trees/ha		525
Tree height (m)	13.3[a]	7.5 (2 to 16)
Basal area (m^2/ha)	41.8	
Leaf area index	4.3[b]	
Stem volume (m^3/ha)	223	
Dry biomass (t/ha) Stem wood	76.9	} 8.5 (or 8.8)[d] } + 4.4[e]
Stem bark	11.6	
Branches	10.3	3.4 (or 4.6)[d]
Fruits etc.		0.7 (or 0.5)[d]
Foliage	8.3	3.8 (or 3.7)[d] + 0.7[e]
Root estimate		9.6[f] (or 7.8)[df] + 3.3[e]
CAI (m^3/ha/yr)		
Net production (t/ha/yr) Stem wood		
Stem bark		
Branches		
Fruits etc.		
Foliage	1.5[c]	0.53[g]
Root estimate		

Weetman and Harland (1964) sampled 20 trees, estimated stem volumes from yield tables, and derived biomass values for three 0.08 ha plots from regressions on D. Nutrient contents were determined (Weetman and Webber 1972). Rencz and Auclair (1980, 1978) sampled 15 trees in June-September, excavated roots and derived values for a 0.20 ha plot from regressions on D. There was 2.2 t/ha of dead branches and 9.7 t/ha of lichens and mosses.

a. Dominant tree height. *b*. All-sided LAI 9.9. *c*. Litterfall, measured over 4 years.
d. Alternative values (in brackets) using quadratic rather than logarithmic regression equations. *e*. Understorey shrubs.
f. Including root crowns, weighing 3.8 t/ha (or 1.8 t/ha using the alternative equations). *g*. Biomass of new foliage.

Moore, T.R. and Verspoor, E. (1973). Aboveground biomass of black spruce stands in subarctic Quebec. *Can. J. For. Res.* 3, 596-598.

56°30'N 69°15'W 200-500 m Canada, Quebec, Cambrian Lake.

	Picea mariana					
	Picea-lichen woodlands			*Picea*-moss forests		
Age (years)						
Trees/ha	1270	3080	2510	4840	5095	5350
Tree height (m)	3.5[a]	3.5[a]	4.5[a]	5.5[a]	7.5[a]	6.5[a]
Basal area (m^2/ha)	2.4	11.8	16.1	19.5	36.6	20.1
Leaf area index						
Stem volume (m^3/ha)						
Dry biomass (t/ha): Stem wood, Stem bark, Branches, Fruits etc., Foliage	9.6	21.1	29.3	82.3	163.4	78.4
Root estimate						
CAI (m^3/ha/yr)						
Net production (t/ha/yr): Stem wood, Stem bark, Branches, Fruits etc., Foliage						
Root estimate						

Twelve trees were sampled from the *Picea*-lichen woodlands and 10 trees were sampled from the *Picea*-moss forests. Stand values were derived from regressions on D for plots of 314 m^2 in the *Picea*-lichen woodland and 79 m^2 in the *Picea*-moss forest.
a. Approximate mean heights; the tallest trees were about twice these values.

Gordon, A.G. (1981). In: "Dynamic Properties of Forest Ecosystems" (D.E. Reichle, ed.) pp. 576-579. Cambridge University Press, Cambridge, London, New York and Melbourne.

45°14-32'N 78°16-49'W 465-503 m Canada, Ontario.

Podzols
pH 4.1 to 4.5

Picea rubens, with *Picea mariana*, *Picea glauca*, *Abies balsamea*, *Tsuga canadensis et al.*

Poorly drained

Age (years)		84	130	212	246
Trees/ha		3311	9058	3065	3879
Tree height (m)		14.9	20.7	25.6	18.3
Basal area (m^2/ha)		32.3	45.7	59.4	46.8
Leaf area index		11.6	7.1	16.9	15.0
Stem volume (m^3/ha)					
Dry biomass (t/ha)	Stem wood	76.0	125.7	344.7	189.2
	Stem bark	8.3	12.8	31.6	17.6
	Branches	21.1	20.5	64.5	36.4
	Fruits etc.	0.2	0.2	0.1	0.1
	Foliage	15.9	10.0	21.2	20.5
	Root estimate	28.0	47.5	104.5	62.0
CAI (m^3/ha/yr)					
Net production (t/ha/yr)	Stem wood	1.92 + 0.12[a]	1.02 + 0.15[a]	5.26 + 0.06[a]	3.68 + 0.10[a]
	Stem bark	0.20 + 0.11[b]	0.12 + 0.11[b]	0.52 + 0.29[b]	0.41 + 0.17[b]
	Branches	0.30 + 0.23[a]	0.35 + 0.40[a]	1.01 + 0.27[a]	0.71 + 0.68[a]
	Fruits etc.	0.25[a]	0.05[a]	0.11[a]	0.38[a]
	Foliage	0.19 + 1.20[a]	0.27 + 1.42[a]	0.35 + 2.26[a]	0.36 + 2.19[a]
	Root estimate	0.72	0.65	1.56	1.06

There was 5.8, 8.3, 18.2 and 8.5 t/ha of standing dead wood in columns left to right.

a. Litterfall, excluding frass litterfall estimated to be 0.05 to 0.19 t/ha/yr.
b. Mortality.

Hegyi, F. (1972). Dry matter production in jack pine stands in northern Ontario. *For. Chron.* 48, 193-197.
Morrison, I.K. (1973). Distribution of elements in aerial components of several natural jack pine stands in northern Ontario. *Can. J. For. Res.* 3, 170-179.
Morrison, I.K. (1974). Dry matter and element content of roots of several natural stands of *Pinus banksiana* Lamb. in northern Ontario. *Can. J. For. Res.* 4, 61-64.
Foster, N.W. (1974). Annual macro-element transfer from *Pinus banksiana* Lamb. forest to soil. *Can. J. For. Res.* 4, 470-476.

46°25'N 83°23'N ca.200 m Canada, Ontario, Mississagi River, Wellstown.

Glaciofluvial coarse stoney medium sand, of low base status, over weak podzol

Pinus banksiana

Site class I (trees 19 m tall at age 50)

Age (years)	20	20	30	30	65	65
Trees/ha	2224	1347	3002	1137	568	346
Tree height (m)	8.2	7.9	13.1	13.1	22.9	20.4
Basal area (m^2/ha)	4.8	2.8	28.9	16.6	23.7	12.5
Leaf area index						
Stem volume (m^3/ha)						
Dry biomass (t/ha): Stem wood, Stem bark, Branches, Fruits etc., Foliage	13.2	7.5	99.2	63.4	105.8	54.0
Dry biomass (t/ha): Root estimate		15.9	11.4			
CAI (m^3/ha/yr)						
Net production (t/ha/yr): Stem wood, Stem bark, Branches, Fruits etc., Foliage			ca.3.73[a]			
Net production (t/ha/yr): Root estimate						

Up to 6 trees were sampled per site (77 in all). Roots of 8 trees were excavated. Stand values for one 0.08 ha plot per stand were derived from regressions on D. Nutrient contents were determined.

a. Total litterfall measured over 2 years (from Foster 1974, for 30-year-old stand with 3285 trees/ha).

Continued from p.44.

Same as p.44.

Site class II (trees 16 m tall at age 50)

Age (years)	20	20	30	30	65	65
Trees/ha	1940	605	3842	1742	519	358
Tree height (m)	6.4	6.4	11.0	11.6	18.9	18.3
Basal area (m^2/ha)	5.9	2.4	27.6	17.6	17.8	10.5
Leaf area index						
Stem volume (m^3/ha)						
Dry biomass (t/ha): Stem wood, Stem bark, Branches, Fruits etc., Foliage	16.0	6.9	88.5	61.0	76.0	43.6
Dry biomass (t/ha): Root estimate			13.2	9.9		
CAI (m^3/ha/yr)						
Net production (t/ha/yr): Stem wood, Stem bark, Branches, Fruits etc., Foliage			ca.3.73[a]			
Net production (t/ha/yr): Root estimate						

See p.44

MacLean, D.A. and Wein, R.W. (1976). Biomass of jack pine and mixed hardwood stands in northeastern New Brunswick. *Can. J. For. Res.* 6, 441-447.

MacLean, D.A. and Wein, R.W. (1978). Litter production and forest floor nutrient dynamics in pine and hardwood stands of New Brunswick, Canada. *Holarctic Ecol.* 1, 1-15.

47°30'N 65°15'W 15-170 m Canada, New Brunswick, Gloucester and Northumberland Counties

Glacial till *Pinus banksiana*

Age (years)	13	16	29	29	31	37
Trees/ha	3040	2320	3040	6560	2200	2520
Tree height (m)						
Basal area (m^2/ha)	0.2	0.3	13.5	24.7	13.0	20.4
Leaf area index						
Stem volume (m^3/ha)						
Dry biomass (t/ha) Stem wood	0.3	0.6	9.8	19.0	8.9	13.5
Stem bark						
Branches	0.4	1.2	32.6	59.4	31.3	51.9
Fruits etc.						
Foliage						
Root estimate				10-16	10-16	10-16
CAI (m^3/ha/yr)						
Net production (t/ha/yr) Stem wood						
Stem bark						
Branches		0.1[a]	0.1[a]			
Fruits etc.						
Foliage		0.3[a]	1.5[a]			
Root estimate						

Over 200 trees were sampled in July-August. The biomass of ten 25 m^2 plots per stand were derived from regressions on D. Nutrient contents were determined.
a. Litterfall only.

Continued from p.46.

Same as p.46.

Age (years)	37	38	40	44	49	57
Trees/ha	4840	2600	6000	3440	3480	2440
Tree height (m)						
Basal area (m^2/ha)	26.7	11.5	28.2	28.4	17.8	24.8
Leaf area index						
Stem volume (m^3/ha)						
Dry biomass (t/ha): Stem wood, Stem bark	19.0	8.7	21.7	18.3	13.3	15.9
Dry biomass (t/ha): Branches, Fruits etc., Foliage	64.2	27.1	67.9	65.4	43.1	60.2
Dry biomass (t/ha): Root estimate						
CAI (m^3/ha/yr)						
Net production (t/ha/yr): Stem wood						
Net production (t/ha/yr): Stem, bark						
Net production (t/ha/yr): Branches					0.2[a]	0.4[a]
Net production (t/ha/yr): Fruits etc.						
Net production (t/ha/yr): Foliage					1.4[a]	1.4[a]
Net production (t/ha/yr): Root estimate						

See p.46.

Doucet, R., Berglund, J.V. and Farnsworth, C.E. (1976). Dry matter production in 40-year-old *Pinus banksiana* stands in Quebec. *Can. J. For. Res.* 6, 357-367.

47°05'N 73°30'W 420 m Canada, Quebec, NW of Trois Rivières, Mattawin River.

Deep fluvio-glacial sandy podzols

Pinus banksiana, with some *Picea mariana et al.*

'Good quality' sites

Age (years)		44	44	44	44	44	44
Trees/ha		3163	3163	2026	2026	1235	1186
Tree height (m)		15.6	14.6	15.4	15.7	15.0	15.3
Basal area (m^2/ha)		26.3	26.7	25.5	25.9	17.3	20.1
Leaf area index							
Stem volume (m^3/ha)							
Dry biomass (t/ha)	Stem wood	74.6	78.6	70.7	74.0	44.4	53.7
	Stem bark	7.7	8.0	7.7	7.8	5.0	5.9
	Branches	9.1	8.5	10.4	10.1	7.1	7.7
	Fruits etc.	0.3	0.3	0.3	0.3	0.2	0.2
	Foliage	4.8	4.5	5.1	4.8	3.4	3.7
	Root estimate						
CAI (m^3/ha/yr)							
Net production (t/ha/yr)	Stem wood	2.42[a]	2.53[a]	2.33[a]	2.37[a]	1.48[a]	1.72[a]
	Stem bark	0.16[a]	0.15[a]	0.16[a]	0.16[a]	0.11[a]	0.12[a]
	Branches	0.64[a]	0.63[a]	0.67[a]	0.67[a]	0.42[a]	0.47[a]
	Fruits etc.	0.03	0.02	0.02	0.02	0.08	0.05
	Foliage	1.36[b]	1.36[b]	1.43[b]	1.45[b]	0.92[b]	1.08[b]
	Root estimate						

Six trees were sampled in August-September in each stand, plus 6 *P. mariana* and 2 trees of each of the broadleaved species. Stand biomass values for two 0.02 ha plots per stand were derived from regressions on D and H.

a. Excluding woody litterfall and any mortality.

b. New foliage biomass.

Continued from p.48.

Same as p.48.

'Medium quality' sites

Age (years)		44	44	44	44	44	44
Trees/ha		5140	3954	3311	2718	1631	1433
Tree height (m)		13.2	13.6	13.0	13.8	13.2	13.4
Basal area (m^2/ha)		26.8	27.0	21.7	23.4	16.2	15.0
Leaf area index							
Stem volume (m^3/ha)							
Dry biomass (t/ha)	Stem wood	62.1	65.4	49.3	57.7	39.2	36.5
	Stem bark	7.8	8.0	6.1	6.7	4.5	4.2
	Branches	12.3	11.7	12.3	11.4	10.5	10.3
	Fruits etc.	0.9	1.0	0.8	1.2	0.9	0.9
	Foliage	7.8	7.3	7.1	6.9	5.8	5.7
	Root estimate						
CAI (m^3/ha/yr)							
Net production (t/ha/yr)	Stem wood	2.71[a]	2.77[a]	2.10[a]	2.38[a]	1.58[a]	1.48[a]
	Stem bark	0.21[a]	0.20[a]	0.16[a]	0.16[a]	0.11[a]	0.10[a]
	Branches	0.80[a]	0.76[a]	0.78[a]	0.73[a]	0.67[a]	0.65[a]
	Fruits etc.	0.03	0.03	0.03	0.04	0.04	0.03
	Foliage	1.71[b]	1.74[b]	1.69[b]	1.87[b]	1.64[b]	1.58[b]
	Root estimate						

See p.48.

Johnstone, W.D. (1972). Total standing crop and tree component distributions in three stands of 100-year-old lodgepole pine. In: "Forest Biomass Studies", pp. 81-89. College of Life Sciences and Agriculture, University of Maine, Orono, USA.

51°06'N 115°04'W 1400 m Canada, Alberta, Kananakis Forest Research Station.

Well-drained, calcareous, grey podzol — *Pinus contorta*, with few *Picea glauca var. albertiana*

			[a]	
Age (years)		100	100	100
Trees/ha		2521	717	12257
Tree height (m)		16.7	20.3	5.7
Basal area (m^2/ha)		52.3	34.9	35.9
Leaf area index				
Stem volume (m^3/ha)		445	357	182
Dry biomass (t/ha)	Stem wood	213.3	153.1	68.2
	Stem bark			
	Branches	13.9	23.5	14.0
	Fruits etc.			
	Foliage	12.5	14.6	7.4
	Root estimate	42.2[b]	35.1[b]	20.5[b]
CAI (m^3/ha/yr)				
Net production (t/ha/yr)	Stem wood			
	Stem bark			
	Branches			
	Fruits etc.			
	Foliage			
	Root estimate			

Over 300 trees were sampled and 72 root systems were excavated. Stand values for plots of 0.04 ha (two left columns) or 0.08 ha (right column) were derived from regressions on D^2H.

a. 31% of the basal area of this stand was removed as thinnings at age 70.

b. Including stumps to 30 cm above ground level.

Webber, B.D. (1977). Biomass and nutrient distribution patterns in a young *Pseudotsuga menziesii* ecosystem. *Can. J. For. Res.* 7, 326-334.

Webber, B.D. (1973). "Plant Biomass and Nutrient Distribution in a young *Pseudotsuga menziesii* Forest Ecosystem." Unpublished Ph.D. thesis, Oregon State University, and Canadian For. Service, Victoria, B.C, Internal Report BC-41.

ca.48°30'N 123°20'W 300 m Canada, Vancouver Island, near Victoria.

Orthic, dystric brunisol over glacial till, pH 5.2-6.0

Pseudotsuga menziesii (97%),[a] *Thuja plicata* and *Tsuga heterophylla*, with understorey shrubs

Age (years)		15-20	
Trees/ha		3000[b]	
Tree height (m)		2-12	
Basal area (m^2/ha)			
Leaf area index			
Stem volume (m^3/ha)			
Dry biomass (t/ha)	Stem wood	42.9	+4.0[c]
	Stem bark	7.0	
	Branches	12.7	
	Fruits etc.		
	Foliage	9.6 (or 10.9)[d]	
	Root estimate		
CAI (m^3/ha/yr)			
Net production (t/ha/yr)	Stem wood		
	Stem bark		
	Branches		
	Fruits etc.		
	Foliage	2.09[e] (or 2.78)[de]	
	Root estimate		

Over 50 trees were sampled in late summer, including 7 large *P. menziesii*. Stand values for a 0.04 ha plot were derived from regressions on D^2H. Nutrient contents were determined.

a. Percentage of the total tree biomass.
b. Stems over 5 cm diameter; there were 13000 smaller trees per hectare.
c. Understorey shrubs.
d. Alternative values taken from Webber (1973).
e. New foliage biomass.