Moore, A.W., Russell, J.S. and Coaldrake, J.E. (1967). Dry matter and nutrient content of a subtropical semiarid forest of *Acacia harpophylla* F. Muell. (Brigalow). *Aust. J. Bot.* 15, 11-24.

27°17'S 149°45'E 287 m Australia, Queensland, 11 km SE of Meandarra.

Deep clay soils	*Acacia harpophylla* with a few *Geijera parviflora*
Age (years)	Mature
Trees/ha	1552[a]
Tree height (m)	8 (2 to 15)
Basal area (m^2/ha)	
Leaf area index	
Stem volume (m^3/ha)	
Dry biomass (t/ha) — Stem wood	84.3
Dry biomass (t/ha) — Stem bark	
Dry biomass (t/ha) — Branches	11.0
Dry biomass (t/ha) — Fruits etc.	
Dry biomass (t/ha) — Foliage	7.7[b]
Dry biomass (t/ha) — Root estimate	15.8[c]
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	
Net production (t/ha/yr) — Fruits etc.	
Net production (t/ha/yr) — Foliage	
Net production (t/ha/yr) — Root estimate	

All trees were harvested within a 0.04 ha plot including some root stumps; the biomass of the remaining root stumps was derived from a regression on D^2. There was 52.4 t/ha of standing dead wood and 58.0 t/ha of dead stumps. Nutrient contents were determined.

a. Trees at least 5 cm stem diameter; there were 1297 smaller trees per hectare.

b. Including twigs.

c. Mainly stumps.

Hingston, F.J., Turton, A.G. and Dimmock, G.M. (1979). Nutrient distribution in Karri (*Eucalyptus diversicolor* F. Muell.) ecosystems in southwest Western Australia. *For. Ecol. Manage.* 2, 133-158.

ca. 34°26'S 116°00'E 300-400 m Australia, Western Australia, near Pemberton.

		Eucalyptus diversicolor Lateritic red earth	*E. diversicolor* and *Eucalyptus calophylla* Yellow podzolic soil
Age (years)		36	Mixed
Trees/ha		440	438
Tree height (m)		30	20-30
Basal area (m^2/ha)		26.0	37.5
Leaf area index		2.6	5.0
Stem volume (m^3/ha)			
Dry biomass (t/ha)	Stem wood	183.8	207.9
	Stem bark	20.0	35.7
	Branches	14.9	31.1
	Fruits etc.	0.0	0.5
	Foliage	4.5	8.9
	Root estimate		
CAI (m^3/ha/yr)			
Net production (t/ha/yr)	Stem wood		
	Stem bark		
	Branches		
	Fruits etc.		
	Foliage		
	Root estimate		

Six trees of *E. diversicolor* and 3 trees of *E. calophylla* were sampled in winter. Stand values for the above two plots of 0.16 ha were estimated from regressions on basal area per tree. There was 1.8 t/ha of dead wood in the 36-year old stand. Nutrient contents were determined.

Cromer, R.N., Raupach, M., Clarke, A.R.P. and Cameron, J.N. (1975). Eucalypt plantations in Australia. The potential for intensive production and utilization. *Appita* 29, 165-173. (Also, in "Oslo Biomass Studies" 1976, pp. 31-40. College of Life Sciences and Agriculture, University of Maine, Orono, USA).

38°20'S 146°20'E 150 m Australia, Victoria, near Morwell.

Plantation Friable, porous brown-red earth		*Eucalyptus globulus* Fertilizers applied during first 2 years			
		No fertilizer	34 kg/ha N 15 kg/ha P	101 kg/ha N 45 kg/ha P	202 kg/ha N 90 kg/ha P
Age (years)		4	4	4	4
Trees/ha		2196	2196	2196	2196
Tree height (m)		4.3	6.5	7.2	7.8
Basal area (m^2/ha)		2.1	5.2	6.5	8.3
Leaf area index					
Stem volume (m^3/ha)					
Dry biomass (t/ha)	Stem wood	3.4	8.6	12.3	16.3
	Stem bark	0.7	1.9	2.6	3.3
	Branches	0.8	2.0	2.4	3.9
	Fruits etc.				
	Foliage	1.1	2.5	3.3	5.2
	Root estimate				
CAI (m^3/ha/yr)					
Net production (t/ha/yr)	Stem wood	1.56	3.39	4.79	6.53
	Stem bark	0.31	0.73	0.98	1.27
	Branches	0.46[a]	0.81[a]	0.93[a]	1.84[a]
	Fruits etc.				
	Foliage	0.79[b]	2.10[b]	2.85[b]	4.02[b]
	Root estimate				

Twelve trees were sampled per treatment at ages 2 and 4. Stand biomass values for four 159m^2 plots per treatment were derived from regressions on individual tree basal area. Increments refer to the period from ages 2 to 4 years. Nutrient contents were determined.

a. Including accumulated dead branches, assuming no branch litterfall.

b. Mean foliage biomass between ages 2 and 4 years.

Cromer, R.N., Williams, E. and Tompkins, D. (1980). Biomass and nutrient uptake in fertilized *E. globulus*. "Proceedings IUFRO Symp. and Workshop on Genetic Improvement and Productivity of Fast-growing Trees." Sao Pedro, Sao Paulo, Brazil.

38°20'S 146°20'E 150 m Australia, Victoria, near Morwell.

Plantation.

Friable, porous brown-red earth

		Eucalyptus globulus			
		Fertilizers applied during first 2 years			
		No fertilizer	34 kg/ha N 15 kg/ha P	101 kg/ha N 45 kg/ha P	202 kg/ha N 90 kg/ha P
Age (years)		9.5	9.5	9.5	9.5
Trees/ha		2196	2196	2196	2196
Tree height (m)					
Basal area (m^2/ha)					
Leaf area index					
Stem volume (m^3/ha)		34.9	76.5	96.2	109.6
Dry biomass (t/ha)	Stem wood	19.2	40.2	51.6	58.4
	Stem bark	4.7	9.0	11.0	11.4
	Branches	2.6	3.9	5.0	5.5
	Fruits etc.				
	Foliage	4.0	5.1	6.7	6.6
	Root estimate				
CAI (m^3/ha/yr)					
Net production (t/ha/yr)	Stem wood	2.9	5.7	7.1	7.7
	Stem bark	0.7	1.3	1.5	1.5
	Branches	0.5[a]	0.5[a]	0.7[a]	>0.5[a]
	Fruits etc.				
	Foliage	2.6[b]	3.8[b]	5.0[b]	ca.5.9[b]
	Root estimate				

Twelve trees were sampled per treatment. Stand biomass values for four 159 m^2 plots per treatment were derived from regressions on individual tree basal area. Increments refer to the period from ages 4.0 to 9.5 years. There was 0.7, 0.9, 1.0 and 1.4 t/ha of dead branches in columns left to right. Nutrient contents were determined.

a. Excluding branch mortality.

b. Mean foliage biomass between ages 4.0 and 9.5 years.

Bradstock, R. (1981). Biomass in an age series of *Eucalyptus grandis* plantations. *Aust. For. Res.* (in press).

Turner, J. and Lambert, M.J. (1981). Nitrogen cycling within a 27-year-old *Eucalyptus grandis* stand. In: "Managing Nitrogen Economies of Natural and Man-made Ecosystems" (F.J. Hingston, ed.). CSIRO Division of Land Resources Management, Mandura, Western Australia.

30°20'N 153°00'E 10-100 m Australia, New South Wales, near Coffs Harbour.

Eucalyptus grandis

Plantations — Fertilizers applied to all stands

	Lower Permian sediments					Upper Permian granodiorite		
Age (years)	2	5	6	16	27	10	12	15
Trees/ha	996	961	810	756	790	762	830	1219
Tree height (m)								
Basal area (m^2/ha)	4.9	12.3	7.5	23.3	30.4	13.1	22.5	31.5
Leaf area index								
Stem volume (m^3/ha)								
Dry biomass (t/ha): Stem wood	6.3	30.4	16.0	137.4	328.8	60.6	147.2	131.0
Stem bark	2.1	6.1	3.6	26.5	38.2	11.1	29.9	18.5
Branches	6.0	11.2	5.9	17.8	20.8	8.5	14.8	11.4
Fruits etc.								
Foliage	3.9	4.5	2.0	5.7	6.2	4.0	4.8	3.8
Root estimate								
CAI (m^3/ha/yr)								
Net production (t/ha/yr): Stem wood					15.31[a]			
Stem bark					1.06[a]			
Branches					0.31[a]			
Fruits etc.								
Foliage					0.01[a]			
Root estimate								

Four to six trees were sampled per stand. Biomass values for 2 plots of about 400m^2 in each of the 8 stands were derived from regressions on D. Understoreys of *Acacia* spp. *et al.* weighed 2.7, 17.0, 15.6, 11.4, 4.2, 13.7, 7.1 and 23.9 t/ha in columns left to right. Nutrient contents were determined.

a. Preliminary increment values, excluding all litterfall and mortality. Understorey increment was estimated to be 2.8 t/ha/yr excluding litterfall.

Hingston, F.J., Dimmock, G.M. and Turton, A.G. (1981). Nutrient distribution in a Jarrah (*Eucalyptus marginata* Donn ex SM.) ecosystem in southwest Western Australia. *For. Ecol. Manage.* 3, 183-207.

32°45'S 116°00'E -- Australia, Western Australia, Dwellingup.

Lateritic sandy gravels

E. marginata (74%)[a] and *Eucalyptus calophylla* with understorey shrubs.

Burned 4 years previously

Age (years)		60
Trees/ha		356 + 203
Tree height (m)		25
Basal area (m^2/ha)		25.5 + 8.9
Leaf area index		2.7 + 1.0
Stem volume (m^3/ha)		
Dry biomass (t/ha)	Stem wood	148.3 + 37.9
	Stem bark	27.8 + 8.9
	Branches	25.1 + 6.2
	Fruits etc.	0.8 + 0.2
	Foliage	4.1 + 1.7
	Root estimate	+ 4.5[b]
CAI (m^3/ha/yr)		
Net production (t/ha/yr)	Stem wood	
	Stem bark	
	Branches	ca. 2.7[c]
	Fruits etc.	
	Foliage	
	Root estimate	

Ten trees of each of the two *Eucalyptus* species were sampled in autumn (May). Stand values for a 0.36 ha plot were derived from regressions on D. Values are given above for *E. marginata* plus *E. calophylla* There was 1.4 t/ha of dead wood on each of the two *Eucalyptus* species. Nutrient contents were determined.

a. Percentage of total basal area.
b. Understorey shrubs.
c. Total litterfall only.

Stewart, H.T.L., Flinn, D.W. and Aeberli, B.C. (1979). Above-ground biomass of a mixed Eucalypt forest in eastern Victoria. *Aust. J. Bot.* 27, 725-740.

Harrington, G. (1979). Estimation of above-ground biomass of trees and shrubs in a *Eucalyptus populnea* F. Muell. woodland by regression of mass on trunk diameter and plant height. *Aust. J. Bot.* 27, 135-143.

Australia	37°25'S 149°33'E 350 m Victoria, 10 km N of Genoa	30°55'S 146°30'E 100-200 m New South Wales, near Coolabah
At Genoa:	*Eucalyptus muellerana* (39%)[a]	*Eucalyptus populnea* (54%)[b]
loamy soils overlying mottled yellow clays	*Eucalyptus sieberii* (27%)[a]	*Eucalyptus intertexta* (25%)[b]
	Eucalyptus agglomerata (19%)[a] *et al.*	with understorey shrubs
Age (years)	to over 100	
Trees/ha	123	36 + 4804[c]
Tree height (m)	28-40	
Basal area (m^2/ha)	30.1	
Leaf area index		
Stem volume (m^3/ha)		
Dry biomass (t/ha): Stem wood	195.6	42.20 + 9.15[c]
Stem bark	51.3	
Branches	72.9[d] +1.9[c]	
Fruits etc.		
Foliage	5.6	1.03 + 2.34[c]
Root estimate		
CAI (m^3/ha/yr)		
Net production (t/ha/yr): Stem wood		
Stem bark		
Branches		
Fruits etc.		
Foliage		
Root estimate		

At Genoa, Stewart *et al.* (1979) sampled 31 trees in the autumn and derived stand values for 17 plots of 0.1 ha from regressions on D. At Coolabah, Harrington (1979) sampled 20 trees and derived stand values for 85 plots of 0.2 ha from regressions on D and H.

a. Percentage of the total basal area.
b. Percentage of the total biomass.
c. Understorey shrubs.
d. Comprised of 12.7 t/ha branch bark, 6.4 t/ha twigs and 53.8 t/ha branch wood.

Attiwell, P.M. (1979). Nutrient cycling in a *Eucalyptus obliqua* (L'Hérit.) forest. III Growth, biomass, and net primary productivity. *Aust. J. Bot.* 27, 439-458.

Attiwell, P.M., Guthrie, H.B. and Leuning, R. (1978). *Aust. J. Bot.* 26, 79-91.

Attiwell, P.M. (1966). *Ecology* 47, 795-804.

Attiwell, P.M. (1981). In: "Dynamic Properties of Forest Ecosystems" (D.E. Reichle, ed.). p.573. Cambridge University Press, Cambridge, London, New York.

37°25'S 145°10'E 545 m Australia, Victoria, Mt Disappointment.

Red, friable porous krasnozems pH 5.2-5.9

Eucalyptus obliqua

		a	*b*		*c*
Age (years)		43.7	50.7	60.7	66.2
Trees/ha		914	865	655	568
Tree height (m)		22-29	22-29	25-32	25-32
Basal area (m^2/ha)		49.5	57.6	62.7	64.8
Leaf area index		3.3	4.2	4.9	5.4
Stem volume (m^3/ha)					
Dry biomass (t/ha)	Stem wood	185.3	227.8	263.4	282.5
	Stem bark	37.7	44.0	47.4	49.5
	Branches	13.8	19.3	25.3	29.8
	Fruits etc.				
	Foliage	5.5	6.9	8.1	8.9
	Root estimate				
CAI (m^3/ha/yr)					
Net production (t/ha/yr)	Stem wood	7.9	4.32 + 0.37[d]		4.5
	Stem bark		0.53 + 1.11[e]		
	Branches		0.71 + 1.04[d]		
	Fruits etc.	4.0[d]			3.0[d]
	Foliage		0.15+2.13[d]+0.43[f]		
	Root estimate				

Seventy-five trees were sampled. Stand biomass values for the above plot of 809 m^2 (measured in 1955, '62, '72 and '77 in columns left to right) were derived from regressions on D. There were over 200 standing dead trees weighing about 10 t/ha, plus about 3.7 t/ha of understorey biomass. There was also 2.1, 2.8, 3.4 and 3.8 t/ha of dead branches in columns left to right. Nutrient contents were determined.

a. Woody increment and litterfall in this column refer to ages 44 to 51 years.
b. Increments and litterfall at a mean age of 51 years; taken from Attiwell (1981).
c. Woody increment and litterfall at ages 61 to 66.
d. Litterfall.
e. Mortality.
f. Consumption.

Feller, M.C. (1980). Biomass and nutrient distribution in two eucalypt forest ecosystems. *Aust. J. Ecol.* 5, 309-333.

37°38'S 145°35'E (alt. given below) Australia, 60 km NE of Melbourne.

Krasnozems to podzols pH 3.9-5.0

	Eucalyptus regnans (96%)[a] with *Acacia* spp.	*Eucalyptus obliqua* and *Eucalyptus dives* (99%)[a]
	560 m	180 m
Age (years)	39	39
Trees/ha	550[b]	830[b]
Tree height (m)	40-45	20-25
Basal area (m^2/ha)	52.1	65.8
Leaf area index		
Stem volume (m^3/ha)		
Dry biomass (t/ha): Stem wood	574.4	263.0
Dry biomass (t/ha): Stem bark		81.3
Dry biomass (t/ha): Branches	36.7	24.1
Dry biomass (t/ha): Fruits etc.		
Dry biomass (t/ha): Foliage	3.0	3.9
Dry biomass (t/ha): Root estimate	63.2	45.4
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		
Net production (t/ha/yr): Fruits etc.		
Net production (t/ha/yr): Foliage		
Net production (t/ha/yr): Root estimate		

Five or six trees of each *Eucalyptus* species and 5 *Acacias* were sampled during the autumn and winter and roots were excavated in three 1 m^2 pits per site. Stand values for the above 400 m^2 plots were derived from regressions on D and D^2H. There was 27.0 and 19.1 t/ha of standing dead wood in columns left and right, respectively. Nutrient contents were determined.

a. Percentage of total basal area.

b. There were an additional 100 and 30 trees/ha (in the left and right columns, respectively) of non-*Eucalyptus* or *Acacia* species, which were not included in the biomass estimates.

Ashton, D.H. (1976). Phosphorus in forest ecosystems at Beenak, Victoria. *J. Ecol.* 64, 171-186.

ca. 38°S 146°E 500-550 m Australia, 65 km E of Melbourne, Beenak.

		Eucalyptus regnans with understorey shrubs. Wet sclerophyll forest on south-facing slope; brown, red-brown loams.	*Eucalyptus sieberii* with understorey shrubs. Dry sclerophyll forest on north-facing slope; red podzolic soils.
Age (years)		27	27
Trees/ha			
Tree height (m)		up to 60	up to 45
Basal area (m^2/ha)			
Leaf area index		6.0 + 3.0[a]	5.2 + 5.8[a]
Stem volume (m^3/ha)			
Dry biomass (t/ha)	Stem wood	713.1 + 36.5[a]	804.1 + 40.5[a]
	Stem bark		
	Branches	71.2	67.0
	Fruits etc.		
	Foliage	8.1 + 2.2[a]	12.1 + 4.8[a]
	Root estimate		
CAI (m^3/ha/yr)			
Net production (t/ha/yr)	Stem wood		
	Stem bark		
	Branches		
	Fruits etc.		
	Foliage		
	Root estimate		

Five trees of *E. regnans* and 6 of *E. sieberii* were sampled in the autumn, and roots were excavated from 20 soil blocks. Stand values were derived from regressions on D. Phosphorus contents were determined.

a. Understorey shrubs.

Turner, J. (1980). Nitrogen and phosphorus distributions in naturally regenerated *Eucalyptus* spp. and planted Douglas-fir. *Aust. For. Res.* 10, 289-294.

35°06'S 141°01'E 680 m Australia, New South Wales, near Tumut.

Red, permeable soils.

Eucalyptus radiata, *Eucalyptus dalrympleana*, *Eucalyptus* spp. with *Acacia* spp. and other understorey shrubs

Age (years)		ca. 45
Trees/ha		1590
Tree height (m)		
Basal area (m^2/ha)		
Leaf area index		
Stem volume (m^3/ha)		
Dry biomass (t/ha)	Stem wood	70.0
	Stem bark	22.5
	Branches	6.8
	Fruits etc.	+ 29.6[a]
	Foliage	4.7
	Root estimate	
CAI (m^3/ha/yr)		
Net production (t/ha/yr)	Stem wood	
	Stem bark	
	Branches	
	Fruits etc.	
	Foliage	
	Root estimate	

Five trees were sampled, and stand values for six circular plots, each 20 m in diameter, were derived from regressions on D. Nitrogen and phosphorus contents were determined.

a. Understorey shrubs.

Rogers, R.W. and Westman, W.E. (1981). Growth rhythms and productivity of a coastal subtropical *Eucalyptus* forest. *Aust. J. Ecol.* 6, 85-98.
Westman, W.E. and Rogers, R.W. (1977a). Biomass and structure of a subtropical Eucalypt forest, North Stradbroke Island. *Aust. J. Bot.* 25, 171-191.
Westman, W.E. and Rogers, R.W. (1977b). Nutrient stocks in a subtropical Eucalypt forest, North Stradbroke Island. *Aust. J. Ecol.* 2, 447-460.
Rogers, R.W. and Westman, W.E. (1977). Seasonal nutrient dynamics of litter in a subtropical Eucalypt forest, North Stradbroke Island. *Aust. J. Bot.* 25, 47-58.

27°30'S 155°30'E 100 m Australia, Queensland, North Stradbroke Island.

Infertile podzols, with a sandy substratum.	*Eucalyptus signata* (55%)[a] *Eucalyptus umbra* (18%)[a] with *Tristania conferta*, *Banksia aemula et al.*, with understorey shrubs.

Age (years)		
Trees/ha		660
Tree height (m)		12-15
Basal area (m^2/ha)		
Leaf area index		2.46[b]
Stem volume (m^3/ha)		
Dry biomass (t/ha)	Stem wood	51.9 } + 2.6[c]
	Stem bark	6.6 }
	Branches	38.9 }
	Fruits etc.	0.2
	Foliage	2.5[d]
	Root estimate	61.9[e] + 10.0[c]
CAI (m^3/ha/yr)		
Net production (t/ha/yr)	Stem wood	7.23 } + 3.06[f]
	Stem bark	0.81 }
	Branches	5.58 }
	Fruits etc.	0.17
	Foliage	0.04 + 2.62[f] + 0.02[g]
	Root estimate	8.26

Thirty-one trees were sampled and roots were excavated. Stand biomass values for a 0.25 ha plot were derived from regressions on D. Increments were estimated by re-measurement after 2 years and by measuring tagged shoots. There was 16.5 t/ha of standing dead wood. Nutrient contents were determined.

a. Percentage of the total tree biomass.
b. The authors' 2-sided LAI value has been halved.
c. Understorey shrubs.
d. Leaves of the three major species only.
e. Including 21.7 t/ha of root crowns.
f. Mortality and litterfall, measured over 2 years.
g. Consumption.

Keay, J. and Turton, A.G. (1970). Distribution of biomass and major nutrients in a maritime pine plantation. *Aust. For.* 34, 39-48.

31°50'S 115°40'E ca. 50 m Australia, near Perth, Gnangara Plantation.

Plantation. Infertile soils, low in phosphate		*Pinus pinaster*[a]	
		50 kg/ha P and 55 kg/ha S applied at age 11	No fertilizers applied at age 11
Age (years)		14	14
Trees/ha		1013	1013
Tree height (m)			
Basal area (m^2/ha)			
Leaf area index		6.4[b]	5.2[b]
Stem volume (m^3/ha)		183	153
Dry biomass (t/ha)	Stem wood	59.8	50.7
	Stem bark	11.3	9.6
	Branches	25.4	19.0
	Fruits etc.		
	Foliage	24.4	19.8
	Root estimate		
CAI (m^3/ha/yr)			
Net production (t/ha/yr)	Stem wood		
	Stem bark		
	Branches		
	Fruits etc.		
	Foliage		
	Root estimate		

Four trees were sampled from each treatment in summer. Stand values for one 390 m^2 plot per treatment were derived from regressions on D. Nutrient contents were determined.

a. Both treatments received 139 k/ha superphosphate at planting, were pruned to 2.1 m height at age 10, and were thinned from 2500 to 1013 trees/ha at age 12.

b. All-sided LAI values were 17.8 and 14.6 in columns left and right, respectively.

Turton, A.G. and Keay, J. (1970). Changes in dry weight and nutrient distribution in maritime pine after fertilization. *Aust. For.* 34, 84-96.

Keay, J., Turton, A.G. and Campbell, N.A. (1970). Fertilizer response of maritime pine on a lateritic soil. *Aust. For.* 33, 248-258.

32°28'S 115°50'E 100 m Australia, SE of Perth.

Plantation.

Deep yellow, loamy, ironstone, gravelly lateritic podzols.

Pinus pinaster

Pruned to 2.1 m height at age 11

		206 kg/ha N, 90 kg/ha P at age 13	No fertilizers applied at age 13
Age (years)		16.5	16.5
Trees/ha		1800	1800
Tree height (m)			
Basal area (m^2/ha)			
Leaf area index			
Stem volume (m^3/ha)		35.2	28.6
Dry biomass (t/ha)	Stem wood	20.7	12.5
	Stem bark		
	Branches	18.4[a]	11.4[a]
	Fruits etc.		
	Foliage	12.5	4.5
	Root estimate		
CAI (m^3/ha/yr)			
Net production (t/ha/yr)	Stem wood		
	Stem bark		
	Branches		
	Fruits etc.		
	Foliage		
	Root estimate		

Six trees were sampled from each treatment in January. Stand values for three 0.081 ha plots per treatment were derived from regressions on D. Nutrient contents were determined.

a. Including stem biomass above the base of the crowns.

Forrest, W.G. and Ovington, J.D. (1970). Organic matter changes in an age series of *Pinus radiata* plantations. *J. appl. Ecol.* 7, 177-186.

Forrest, W.G. (1973). Biological and economic production in radiata pine plantations. *J. appl. Ecol.* 10, 259-267.

32°20'S 148°14'E 200-500 m **Australia, New South Wales, Tumut.**

Plantations.

Red sandy loams derived *in situ* from granite

Pinus radiata

Pruned to 3 m height at age 8

Age (years)		3	5	7	9	12
Trees/ha		1483	1492	1458	1470	1560
Tree height (m)		1.4	3.1	7.9	12.1	15.6
Basal area (m^2/ha)			2.0	16.0	25.0	32.9
Leaf area index						
Stem volume (m^3/ha)						
Dry biomass (t/ha)	Stem wood	0.3	2.1	21.1	48.2	80.7
	Stem bark	0.1	0.3	2.7	5.6	8.8
	Branches	0.2	1.2	14.9	9.9	18.7
	Fruits etc.	0.0	0.0	0.4	0.5	0.7
	Foliage	0.5	2.1	11.6	8.8	9.5
	Root estimate			ca.9.0[a]	ca.12.9[a]	
CAI (m^3/ha/yr)						
Net production (t/ha/yr)	Stem wood		0.9	9.5	13.6	10.8
	Stem bark		0.1	1.2	1.5	1.1
	Branches		0.5[b]	2.5[b]	2.5[b]	2.5[b]
	Fruits etc.		0.1	0.5	0.7	0.8
	Foliage		ca.0.7[c]	ca.3.4[c]	ca.5.1[c]	ca.4.6[c]
	Root estimate					

Nine trees were sampled per stand. Biomass values for plots of 0.101 or 0.081 ha in each stand were derived from regressions on H and basal area times H. Production values given above are increments between ages 3-5, 5-7, 7-9 and 9-12 in columns left to right.

a. Roots over 5 mm diameter, assumed to comprise 15% of the total biomass.

b. Excluding woody litterfall, and averaging branch increment during years 5 to 12.

c. Half foliage biomass.

Turner, J. (1980). Nitrogen and phosphorus distributions in naturally regenerated *Eucalyptus* spp. and planted Douglas-fir. *Aust. For. Res.* 10, 289-294.

35°06'S 141°01'E 680 m Australia, New South Wales, near Tumut.

Plantation.

Red, permeable soils.

Pseudotsuga menziesii

		Unfertilized
Age (years)		50
Trees/ha		1110
Tree height (m)		
Basal area (m^2/ha)		
Leaf area index		
Stem volume (m^3/ha)		
Dry biomass (t/ha)	Stem wood	319.1
	Stem bark	37.9
	Branches	30.5
	Fruits etc.	
	Foliage	16.7
	Root estimate	
CAI (m^3/ha/yr)		
Net production (t/ha/yr)	Stem wood	
	Stem bark	
	Branches	
	Fruits etc.	
	Foliage	
	Root estimate	

Five trees were sampled, and stand values for six circular plots 20 m in diameter were derived from regressions on D. Nitrogen and phosphorus contents were determined.

Kestemont, P. (1975). "Biomasse, Nécromasse et Productivité Aériennes Ligneuses de quelques Peuplements Forestiers en Belgique." Thesis. Faculty of Sciences, Free University of Brussels.

Belgium	50°01'N 5°05'E 265 m Mache valley Daverdisse *Alnus glutinosa* with *Carpinus* sp. *Crateagus* sp. *et al.* Infertile gley	50°28'N 4°18'E 200-300 m Hainant Chappelle-lez-Herlaimont *Betula pendula* (88%)[a] *Salix* spp., *Quercus robur*, *Castanea sativa et al.* Humus rich gley pH 5.5
Age (years)	13-18	14
Trees/ha	ca.30000[b]	4920
Tree height (m)	9	10
Basal area (m^2/ha)	23.8-39.6	20.2
Leaf area index		
Stem volume (m^3/ha)		
Dry biomass (t/ha) Stem wood, Stem bark, Branches	59.3	73.5
Dry biomass (t/ha) Fruits etc.		0.5
Dry biomass (t/ha) Foliage	2.8	3.2
Dry biomass (t/ha) Root estimate	4.3	21.3
CAI (m^3/ha/yr)		
Net production (t/ha/yr) Stem wood, Stem bark, Branches	5.87[d]	9.4 + 3.0[c]
Net production (t/ha/yr) Fruits etc.		0.5
Net production (t/ha/yr) Foliage	2.79[e]	3.2[e]
Net production (t/ha/yr) Root estimate		2.0

Many trees were sampled and roots were excavated. Stand biomass values were derived from regressions on D. There was 7.3 t/ha of standing dead wood at Chappelle-lez-Herlaimont.

a. Percentage of total woody biomass.
b. There were 5719 *A. glutinosa* per hectare.
c. Woody litterfall.
d. Excluding woody litterfall.
e. Leaf biomass; leaf litterfall was 2.5 and 2.8 t/ha/yr in columns left and right, respectively.

Kestemont, P. (1975). "Biomasse, Nécromasse et Productivité Aériennes Ligneuses de quelques Peuplements Forestiers en Belgique." Thesis. Faculty of Sciences, Free University of Brussels.

Duvigneaud, P. and Kestemont, P. (1977). "Productivité Biologique en Belgique." Publ. Ministère de l'Education Nationale et de la Culture Française et par het Ministerie van Nationale Opvoeding en Nederlandse Cultuur.

50°02'N 5°14'E 350-400 m Belgium, Mirwart.

Plantations.

Brown loams
pH 3.8-3.9

Fagus sylvatica
with *Quercus robur*, *Quercus petraea*, *Carpinus betulus*, *Acer campestre et al.*

		Woodland with herbaceous ground vegetation (Hêtraie herbeuse)	Woodland without herbaceous ground vegetation (Hêtraie nue)
Age (years)		144	ca.130
Trees/ha		160	190 (163 *Fagus*)
Tree height (m)		30.8	27-30
Basal area (m^2/ha)		31.0	28.9
Leaf area index		6.4	6.5
Stem volume (m^3/ha)			
Dry biomass (t/ha)	Stem wood	318.5[a]	213.6[a]
	Stem bark		
	Branches	50.8[a]	122.4[a]
	Fruits etc.	1.3	0.5
	Foliage	3.0	2.9
	Root estimate	74.0	68.0
CAI (m^3/ha/yr)			
Net production (t/ha/yr)	Stem wood	4.14 [d]	7.12 + 0.77[b]
	Stem bark		
	Branches	1.83 + 1.24[b]	
	Fruits etc.	1.31	0.54
	Foliage	3.00[c]	2.92[c]
	Root estimate	1.37	1.82

Many trees were sampled and roots were excavated in each plantation. Stand biomass values were derived from regressions on D. There was 1.8 t/ha of standing dead wood in the left column.

a. 'Bois fort' regarded here as stems, 'bois menu' as branches.

b. Woody litterfall.

c. Leaf biomass; leaf litterfall was 2.08 t/ha/yr in the left column.

d. Alternatively, Duvigneaud and Kestemont (1977) gave values of 6.80 and 0.93 t/ha/yr for total above-ground wood increment and woody litterfall, respectively.

Duvigneaud, P., Kestemont, P. and Ambroes, P. (1971). Productivité primaire des forêts tempérées d'essences feuillues caducifolices en Europe occidentale. In: "Productivity of Forest Ecosystems" (P. Duvigneaud, ed.) pp. 259-270. UNESCO, Paris.

Duvigneaud, P. and Froment, A. (1969). Recherches sur l'écosystème forêt. Serie E. Forêts de haute Belgique. Contribution No.5. Eléments biogènes de l'édaphotope et phytocénose forestière. *Bull. Inst. Sci. nat. Belg.* 45, 1-48.

Duvigneaud, P. and Kestemont, P. (1977). See p.24.

Belgium, the Famenne.	50°11'N 5°01'E ca.250 m Ferage	50°07'N 5°15'E ca.100 m Wavreille
	Quercus petraea with coppiced understorey of *Corylus avellana*, *Carpinus betulus*, *et al.*	*Quercus robur* with coppiced understorey of *Corylus avellana*, *Carpinus betulus*, *et al.*
	Mull soil, pH 5.4	Mull soil, pH 6.2
Age (years)	117 10[a]	120 20[a]
Trees/ha	163 + 1500[a]	111 + 12000[a]
Tree height (m)	24 4[a]	27 7[a]
Basal area (m^2/ha)		
Leaf area index	5.7	
Stem volume (m^3/ha)	300	304
Dry biomass (t/ha) Stem wood	161.7	210.0
Stem bark	18.5 + 18.1[a]	+ 29.3[a]
Branches	58.3	88.2
Fruits etc.	1.2	1.0
Foliage	3.5	4.0
Root estimate	53.0	51.2
CAI (m^3/ha/yr)		
Net production (t/ha/yr) Stem wood	2.31	2.22
Stem bark	0.16 + 2.06[ab]	+ 2.20[ab]
Branches	5.39[b]	5.12[b]
Fruits etc.	1.24	1.02
Foliage	3.50[c]	3.96[c]
Root estimate	1.68	0.80

Many trees were sampled and roots were excavated. Stand biomass values were derived from regressions on D. Stumps and big root biomasses were estimated as 12% and 30%, respectively, of the above-ground biomass of the trees plus understorey.

a. Understorey shrubs; values given for LAI, foliage, roots and fruits etc. (but not stem volumes) include the understorey.

b. Including woody litterfall, estimated as 2.0 and 2.3 t/ha/yr in the 1971 paper, in columns left and right, respectively, but total wood death estimated as 8.5 t/ha/yr at Wavreille in the 1977 report.

c. Leaf biomass; leaf litterfall was about 3.1 and 3.5 t/ha/yr in columns left and right, respectively.

Duvigneaud, P., Kestemont, P. and Ambroes, P. (1971). Productivité primaire des forêts tempérées d'essences feuillues caducifolices en Europe occidentale. In: "Productivity of Forest Ecosystems" (P. Duvigneaud, ed.) pp. 259-270. UNESCO, Paris.

Duvigneaud, P. and Froment, A. (1969). Recherches sur l'écosystème forêt. Serie E. Forêts de haute Belgique. Contribution No.5. Eléments biogènes de l'édaphotope et phytocénose forestière. *Bull. Inst. Sci. nat. Belg.* 45, 1-48.

Duvigneaud, P. and Kestemont, P. (1977). See p.24.

Belgium, the Famenne.	50°09'N 5°06'E ca.50 m Villers[d]		50°03'N 4°59'E ca.100 m Vonêche
	Quercus robur, Quercus petraea with coppiced understorey of *Corylus avellana, Carpinus betulus et al.* 'Moder' and pseudo-gleys, pH 5.2		*Q. petraea, Q. robur, Betula pubescens* with coppiced understorey of *Corylus avellana, Carpinus betulus, et al.* Acid podzols and gleys, pH 3.5
Age (years)	90	20[a]	135
Trees/ha	185	8780[a]	422 1170[a]
Tree height (m)	20		22
Basal area (m^2/ha)			
Leaf area index	4.6		
Stem volume (m^3/ha)	148		188
Dry biomass (t/ha) Stem wood	93.2	+ 26.7[a]	120.9 + 2.0[a]
Dry biomass (t/ha) Stem bark			
Dry biomass (t/ha) Branches	37.0		75.8
Dry biomass (t/ha) Fruits etc.	0.8		0.8
Dry biomass (t/ha) Foliage	3.2		3.2
Dry biomass (t/ha) Root estimate	31.1		36.2
CAI (m^3/ha/yr)			
Net production (t/ha/yr) Stem wood	1.33	+ 2.31[ab]	0.67 + 0.13[ab]
Net production (t/ha/yr) Stem bark			
Net production (t/ha/yr) Branches	3.40[b]		4.17[b]
Net production (t/ha/yr) Fruits etc.	0.79		0.83
Net production (t/ha/yr) Foliage	3.19[c]		3.16[c]
Net production (t/ha/yr) Root estimate	1.03		0.57

Many trees were sampled and roots were excavated. Stand biomas values were derived from regressions on D. Stumps and big roots biomasses were estimated as 12% and 30% respectively, of the above-ground biomass of the trees plus understorey.

a. Understorey coppices; values given for LAI, foliage, roots and fruits etc. (but not stem volume) include the understorey.

b. Including woody litterfall, estimated as about 1.8 t/ha/yr in both stands in the 1971 paper.

c. Leaf biomass; leaf litterfall was about 2.8 t/ha/yr in both stands.

d. Averages given here of two sites at Villers.

Kestemont, P. (1971). Productivité primaire des taillis simples et concept de nécromasse. In: "Productivity of Forest Ecosystems" (P. Duvigneaud, ed.) pp. 271-279. UNESCO, Paris.

Kestemont, P. (1975). "Biomasse, Nécromasse et Productivité Aériennes Ligneuses de quelques Peuplements Forestiers en Belgique." Thesis. Faculty of Sciences, Free University of Brussels.

Belgium	49°53'N 4°55'E 250 m Semois region, Orchimont	50°02'N 5°14'E 350-400 m Mirwart
	Quercus robur (75%)[a] *Betula pendula* (15%)[a] *Sorbus aucuparia* (3%)[a]	*Q. robur* (86%)[a] *Quercus petraea*, *Fagus sylvatica et al.*
	Brown mull-gley, pH 3.9-4.5	Plantation Brown soils, pH 3.8-3.9
Age (years)	20-25	66
Trees/ha	6050[b]	958
Tree height (m)	8	22
Basal area (m^2/ha)		32.1
Leaf area index		
Stem volume (m^3/ha)		
Dry biomass (t/ha) Stem wood	71.4 + 5.3[c]	130.5[d]
Dry biomass (t/ha) Stem bark		
Dry biomass (t/ha) Branches		36.9[d]
Dry biomass (t/ha) Fruits etc.	0.8	0.5
Dry biomass (t/ha) Foliage	3.1	3.6
Dry biomass (t/ha) Root estimate	19.2	41.8
CAI (m^3/ha/yr)		
Net production (t/ha/yr) Stem wood	6.64 + 0.75[e]	3.58
Net production (t/ha/yr) Stem bark		
Net production (t/ha/yr) Branches		3.58 + 1.07[e]
Net production (t/ha/yr) Fruits etc.	0.77	0.49
Net production (t/ha/yr) Foliage	3.07[f]	3.60[f]
Net production (t/ha/yr) Root estimate	1.28	1.70

Many trees were sampled, and roots were excavated, in each stand. Stand biomass values were derived from regressions on D. There was 2.9 t/ha of standing dead wood at Mirwart.

a. Percentage of the total biomass.
b. There were 7000 stems/ha.
c. Understorey coppice, mainly of *Corylus avellana*; all other biomass values and production values in this column include the understorey.
d. 'Bois fort' regarded here as stems, 'bois menu' as branches.
e. Woody litterfall.
f. Leaf biomass; leaf litterfall was 2.7 and 3.0 t/ha/yr in columns left and right, respectively.

Froment, A. and 8 others (1971). La chênaie mélangée calcicole de Virelles-Blaimont, en haute Belgique. In: "Productivity of Forest Ecosystems" (P. Duvigneaud, ed.) pp.635-665. UNESCO, Paris.
Duvigneaud, P., Danaeyer-de-Smet, S., Ambroes, P., and Timperman, J. (1969). Aperçu préliminaire sur les biomasses, la productivité et le cycle des éléments biogènes. *Bull. Soc. bot. Belg.* 102, 317-323.
Ambroes, P. (1969). La biomasse aèrienne de la strate arborescente. *Bull. Soc. bot. Belg.* 102, 325-338.

50°04'N 4°21'E 245 m Belgium, Blaimont region, Virelles.

Humus over calcareous rock. pH 6.4-7.4

Quercus robur (35%),[a] *Carpinus betulus* (32%)[a] *Fagus sylvatica* (25%)[a] and *Acer campestre* (3%)[a] with understorey coppice of *Corylus avellana et al.*

Age (years)		35-75	
Trees/ha		1486[b]	
Tree height (m)		11-23	0.5-3.0[c]
Basal area (m^2/ha)			
Leaf area index		6.8	
Stem volume (m^3/ha)		129	
Dry biomass (t/ha)	Stem wood	64.5	+ 2.5[c]
	Stem bark	8.8	
	Branches	35.9	
	Fruits etc.	0.5	
	Foliage	3.5	
	Root estimate	34.6 + 0.7[c]	
CAI (m^3/ha/yr)			
Net production (t/ha/yr)	Stem wood	2.64	+ 0.22[c]
	Stem bark	0.34	
	Branches	3.14 + 1.81[d]	
	Fruits etc.	0.26	
	Foliage	3.46[e]	
	Root estimate	2.00 + 0.33[c]	

Forty-eight trees were sampled in September-October and roots were excavated. Stand biomass values were derived from regressions on D. Nutrient contents were determined.
a. Percentage of total above-ground tree biomass.
b. Including 260 dominants.
c. Understorey; LAI and foliage increment values include the understorey; tree age and stem volume data refer to the overstorey only.
d. Woody and miscellaneous litterfall.
e. Leaf biomass; leaf litterfall was 3.17 t/ha/yr.

Kestemont, P. (1975). "Biomasse, Nécromasse et Productivité Aériennes Ligneuses de quelques Peuplements Forestiers en Belgique." Thesis. Faculty of Sciences, Free University of Brussels.

Duvigneaud, P. and Kestemont, P. (1977). "Productivité Biologique en Belgique." Publ. Ministère de l'Education Nationale et de la Culture Française et par het Ministerie van Nationale Opvoeding en Nederlandse Cultuur.

50°02-03'N 5°16'E 340-400 m Belgium, Mirwart.

Plantations. Acid brown soils, pH 3.9		*Picea abies*	*Pseudotsuga menziesii* with a few *Fagus sylvatica*
Age (years)		55	70
Trees/ha		1061	217
Tree height (m)		19	36.5
Basal area (m^2/ha)		41.5	58.4
Leaf area index			
Stem volume (m^3/ha)			
Dry biomass (t/ha)	Stem wood	168.4 (or 166.4)[a]	334.0
	Stem bark	1.6	33.0
	Branches	16.6	29.0
	Fruits etc.	0.1	0.1
	Foliage	16.1	7.7
	Root estimate	31.0 (or 70.0)[a]	67.0
CAI (m^3/ha/yr)			
Net production (t/ha/yr)	Stem wood	6.63	14.0
	Stem bark	0.30	1.0
	Branches	3.61 + 0.41[b] (or 4.08)[a]	5.0 + 0.2[b]
	Fruits etc.	0.09 (or 0.32)[a]	0.1
	Foliage	2.27[c] (or 2.46)[a]	2.0[c] (or 2.6)[a]
	Root estimate	1.77 (or 4.08)[a]	3.4 (or 3.9)[a]

Many trees were sampled, and roots were excavated, in each plantation. Stand biomass values were derived from regressions on D. There was 7.8 and 10.3 t/ha of standing dead wood in the left and right columns, respectively.

a. Updated values, given by Duvigneaud and Kestemont (1977).

b. Woody litterfall.

c. New foliage; foliage litterfall measured over one year was 2.78 and 0.95 t/ha/yr in the left and right columns, respectively.

Klinge, H. (1978). Litter production in tropical ecosystems. *Malay. Nat. J.* 30, 415-422.
Klinge, H. (1977). Fine litter production and nutrient return to the soil in three natural forest stands of eastern Amazonia. *Geo. Eco. Trop.* 1, 159-167.
Klinge, H., Rodrigues, W.A., Brunig, E. and Fittkau, E.S. (1975). Biomass and structure in a central Amazonian rain forest. In: "Tropical Ecological Systems. Trends in Terrestrial and Aquatic Research" (F.B. Golley and E. Medina, eds) pp.115-122. Springer-Verlag, New York, Heidelberg and Berlin.

ca.3°06'S 60°00'W 100 m Brazil, Manaus, Walter Engler Forest Reserve.

Loamy yellow latosol, unflooded

About 470 species of trees with a stem diameter of at least 25 cm.

Tropical rainforest

'Terra firma'

Age (years)		Mature
Trees/ha		400
Tree height (m)		25
Basal area (m^2/ha)		ca.30.7
Leaf area index		
Stem volume (m^3/ha)		385
Dry biomass (t/ha)	Stem wood	299
	Stem bark	
	Branches	98
	Fruits etc.	
	Foliage	9.3
	Root estimate	130
CAI (m^3/ha/yr)		
Net production (t/ha/yr)	Stem wood	
	Stem bark	
	Branches	$1.4^a + 7.6^a$
	Fruits etc.	0.4^a
	Foliage	5.6^a
	Root estimate	

The fresh weight of all vegetation was determined in 43 plots, each 50 m^2, and dry biomass values were estimated from fresh/dry weight ratios.
a. Litterfall only, measured over 2 years; woody litterfall is divided into small (1.4 t/ha/yr) plus estimated large woody litterfall (7.6 t/ha/yr).

Garelkov, D. (1973). Biological productivity of some beech forest types in Bulgaria. In: "IUFRO Biomass Studies", pp. 307-314. College of Life Sciences and Agriculture, University of Maine, Orono, USA.

42-43°N 23-25°E 1400-1600 m Bulgaria, W. Balkan Mountains.

Plantations.

Brown forest soil *Fagus sylvatica*

Age (years)		ca.100	ca.100	ca.100
Trees/ha		2580	2000	1200
Tree height (m)		14.5	17.2	23.7
Basal area (m^2/ha)		38.5	41.8	48.3
Leaf area index				
Stem volume (m^3/ha)		273	352	460
Dry biomass (t/ha)	Stem wood	169.6	280.0	364.7
	Stem bark			
	Branches	24.2	31.6	49.1
	Fruits etc.			
	Foliage	3.8	2.9	4.7
	Root estimate	54.7	37.5	49.7
CAI (m^3/ha/yr)		2.3	3.6	4.7
Net production (t/ha/yr)	Stem wood	1.7	2.8	3.6
	Stem bark			
	Branches	(6.3)[a]	(5.4)[a]	(9.3)[a]
	Fruits etc.			
	Foliage	3.8	2.9	4.7
	Root estimate			

Eighteen trees were sampled and roots were excavated. Stand biomass values were derived using regression methods.

a. Tentative estimates of total net production including branches and roots, but excluding woody litterfall and any mortality.

Rozanov, B.G. and Rozanova, I.M. (1964). Biological circulation of nutrient elements of bamboo in the tropical forests of Burma. *Bot. Zbl.* 49, 348-357. [Quoted by Bazilevich, N.I. and Rodin, L.E. (1966) in *For. Abstr.* 27, 357-368, and (1967) In: "Production and Mineral Cycling in Terrestrial Vegetation." (Table 46). Oliver and Boyd, Edinburgh and London.]

16-20°N 94-97°E -- Burma.

Yellow-brown latosols

		Oxytenanthera albociliata Wet-zone bamboo	*Dendrocalamus strictus* Dry-zone bamboo
Age (years)			
Trees/ha			
Tree height (m)			
Basal area (m^2/ha)			
Leaf area index			
Stem volume (m^3/ha)			
Dry biomass (t/ha)	Stem wood	168.5	41.0
	Stem bark		
	Branches		
	Fruits etc.		
	Foliage	10.6	7.2
	Root estimate		
CAI (m^3/ha/yr)			
Net production (t/ha/yr)	Stem wood	7.0 + 2.0[a]	2.7 + 0.8[a]
	Stem bark		
	Branches		
	Fruits etc.		
	Foliage	10.5[a]	7.2[a]
	Root estimate		

Nutrient contents were determined.
a. Litterfall.

Post, L.J. (1970). Dry matter production of mountain maple and balsam fir in north western New Brunswick. *Ecology* 51, 548-550.

ca.47°30'N 68°20'W 300 m Canada, New Brunswick, Green River.

Silty clay loams derived from soft shale

Acer spicatum

Stands which had been clear-felled in different years.

Age (years)		8	11	13	16	18	21	23	26
Trees/ha		33300	22800	18300	18400	8500	6700	6700	6800
Tree height (m)		1.9	2.7	3.2	3.4	4.7	5.5	5.3	5.4
Basal area (m^2/ha)									
Leaf area index									
Stem volume (m^3/ha)									
Dry biomass (t/ha)	Stem wood	7.6	9.0	12.5	13.7	11.8	17.4	16.3	20.9
	Stem bark	2.0	2.2	2.9	3.1	2.6	3.7	3.5	4.5
	Branches	2.4	3.9	6.8	7.5	7.2	11.2	10.4	13.7
	Fruits etc.								
	Foliage	0.9	0.9	1.0	1.1	0.9	1.2	1.1	1.4
	Root estimate								
CAI (m^3/ha/yr)									
Net production (t/ha/yr)	Stem wood								
	Stem bark								
	Branches								
	Fruits etc.								
	Foliage								
	Root estimate								

Forty-four trees were sampled, and stand values for three plots of 0.004 to 0.010 ha in each stand were derived from regressions on D^2H. Stands measured at ages 8, 13, 18 and 23 were measured again after 3 years giving the values for ages 11, 16, 21 and 26. Mean annual increments between ages 4 and 26 were about 1.1 t/ha/yr of foliage, and 0.81, 0.15 and 0.51 t/ha/yr of stem wood, stem bark and branches, respectively, excluding mortality and woody litterfall.

MacLean, D.A. and Wein, R.W. (1977). Nutrient accumulation for postfire jack pine and hardwood succession patterns in New Brunswick. *Can. J. For. Res.* 7, 562-578.

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

Acer rubrum, *Betula papyrifera*, *Prunus pensylvanica* and *Populus tremuloides*

Age (years)		7	7	7	10	13	17
Trees/ha		2960	7120	12590	9160	7200	10040
Tree height (m)							
Basal area (m^2/ha)		0.1	0.3	1.5	1.9	2.5	2.1
Leaf area index							
Stem volume (m^3/ha)							
Dry biomass (t/ha)	Stem wood	0.4	0.6	3.0	3.0	3.3	2.5
	Stem bark						
	Branches	0.4	0.9	4.9	4.9	5.8	4.4
	Fruits etc.						
	Foliage						
	Root estimate						
CAI (m^3/ha/yr)							
Net production (t/ha/yr)	Stem wood						
	Stem bark						
	Branches			0.2[a]			0.2[a]
	Fruits etc.						
	Foliage			1.9[a]			1.0[a]
	Root estimate						

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

Continued from p.34.

Same as p.34.

Age (years)	18	20	25	29	37
Trees/ha	4490	16960	5720	7680	4920
Tree height (m)					
Basal area (m^2/ha)	2.0	7.0	6.1	12.2	10.2
Leaf area index					
Stem volume (m^3/ha)					
Dry biomass (t/ha) Stem wood	2.6	8.8	6.2	12.8	9.0
Dry biomass (t/ha) Stem bark					
Dry biomass (t/ha) Branches	4.8	19.8	16.4	27.4	21.1
Dry biomass (t/ha) Fruits etc.					
Dry biomass (t/ha) Foliage					
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		0.1[a]		0.2[a]	
Net production (t/ha/yr) Fruits etc.					
Net production (t/ha/yr) Foliage		1.5[a]		1.4[a]	
Net production (t/ha/yr) Root estimate					

See p.34

James, T.D.W. and Smith, D.W. (1977). Short-term effects of surface fire on the biomass and nutrient standing crop of *Populus tremuloides* in southern Ontario. *Can. J. For. Res.* 7, 666-679.
Bray, J.R. and Dudkiewicz, L.A. (1963). The composition, biomass and productivity of two *Populus* forests. *Bull. Torrey bot. Club* 90, 298-308.

Canada	43°55'N 80°30'W 420-460 m Ontario, West Luther.		ca.45°14'N 78°55'W 200-400 m Dorset.
	Populus tremuloides		*Populus grandidentata* (67%)[a] *P. tremuloides* (26%)[a] *et al.*
	Poorly drained organic soil		Sandy uplands
	Lightly burned	Unburned	(Bray and Dudkiewicz 1963)
Age (years)	30	30	ca.40
Trees/ha	110[b]	144[b]	1036
Tree height (m)	9	9	
Basal area (m^2/ha)			18.4
Leaf area index	0.37	0.37	
Stem volume (m^3/ha)			
Dry biomass (t/ha) Stem wood	5.0	6.1	47.2
Dry biomass (t/ha) Stem bark			
Dry biomass (t/ha) Branches	1.6	2.4	9.1
Dry biomass (t/ha) Fruits etc.			
Dry biomass (t/ha) Foliage	0.3	0.4	1.6
Dry biomass (t/ha) Root estimate			
CAI (m^3/ha/yr)			
Net production (t/ha/yr) Stem wood			>1.3[c]
Net production (t/ha/yr) Stem bark			
Net production (t/ha/yr) Branches			>0.2[c]
Net production (t/ha/yr) Fruits etc.			
Net production (t/ha/yr) Foliage			1.6
Net production (t/ha/yr) Root estimate			

At West Luther 5 ramets were sampled in each of two burned and two unburned 2250 m^2 plots in July-August. Stand values were derived from regressions on D. Nutrient contents were determined.
At Dorset three *P. grandidentata* were sampled, and 6 *P. tremuloides* were sampled elsewhere, all during July-September. Stand biomass values were derived by assigning biomass in proportion to the 'effective canopy area' per tree of 4 trees at each of 40 random points.
a. Percentage of the total basal area.
b. Numbers of ramets.
c. New twigs, plus old wood biomass divided by its age, and excluding woody litterfall and mortality.

Peterson, E.B., Chan, Y.H. and Cragg, J.B. (1970). Aboveground standing crop, leaf area, and calorific value in an aspen cline near Calgary, Alberta. *Can. J. Bot.* 48, 1459-1469.

ca.51°N 115°W 1430 m Canada, Alberta, 72 km W of Calgary.

On 40° west-facing slope

Populus tremuloides

		Top of slope	Mid-slope	Mid-slope	Bottom of slope
Age (years)		66-89	66-89	66-89	66-89
Trees/ha		3800	3800	1200	1000
Tree height (m)		6.7	8.7	11.2	15.1
Basal area (m^2/ha)		16.0[a]	26.2[a]	13.2[a]	49.2[a]
Leaf area index		1.5	1.8	0.8	3.1
Stem volume (m^3/ha)					
Dry biomass (t/ha)	Stem wood	31.6	51.5	31.3	153.7
	Stem bark				
	Branches	5.7	6.2	2.7	19.1
	Fruits etc.				
	Foliage	1.4	1.7	0.7	2.9
	Root estimate				
CAI (m^3/ha/yr)					
Net production (t/ha/yr)	Stem wood				
	Stem bark				
	Branches				
	Fruits etc.				
	Foliage				
	Root estimate				

Forty-nine trees were sampled in August. Stand values, for four 50 m^2 plots in each of the four stands, were derived from regressions on D^2H and stem diameter at the base of the crowns. There was 2.6, 3.5, 1.9 and 11.3 t/ha of dead branches in columns left to right.

a. Estimated from the authors' data on stem diameter frequency distributions.

Pollard, D.F.W. (1972). Above-ground dry matter production in three stands of trembling aspen. *Can. J. For. Res.* 2, 27-33.

46°00'N 77°26'W 121-300 m Canada, Ontario, near Chalk River.

Sandy soils *Populus tremuloides et al.*

Age (years)		5	15	52
Trees/ha		31200	9400	494
Tree height (m)		2.0-7.5	4.0-13.6	20-26
Basal area (m^2/ha)				
Leaf area index		2.4	2.9	1.6
Stem volume (m^3/ha)				
Dry biomass (t/ha)	Stem wood, Stem bark, Branches	21.5	51.2	91.8
	Fruits etc.			
	Foliage	2.6	2.6	1.5
	Root estimate			
CAI (m^3/ha/yr)				
Net production (t/ha/yr)	Stem wood, Stem bark, Branches	7.2[a]	6.2[a]	0.8[a]
	Fruits etc.			
	Foliage	2.6	2.6	1.5
	Root estimate			

Sixteen to 26 trees (or stems) were sampled per age. Stand biomass values for plots of 100 m^2 (ages 5 and 15) or 400 m^2 (age 52) were derived from regressions on D.

a. Excluding any woody litterfall and mortality.

Kimmins, J.P. and Krumlik, G.J. (1973). Comparisons of the biomass distribution and tree form of old virgin forests at medium and high elevations in the mountains of south coastal British Columbia, Canada. In: "IUFRO Biomass Studies", pp. 315-335. College of Life Sciences and Agriculture, University of Maine, Orono, USA.

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.

Canada	49°41'N 122°55'W 1500 m British Columbia, Squamish. *Abies amabilis* (69%)[a] *Tsuga mertensiana* (31%)[a] Leached humic podzols pH 3.7-4.6	46°07'N 74°36'W -- Quebec, near St Jovite. *Abies balsamea* *Picea rubens* Deep well-drained ferro-humic podzols (Weetman and Webber 1972)
Age (years)	300-350	Mixed
Trees/ha	221	
Tree height (m)	28-31	
Basal area (m^2/ha)		
Leaf area index		
Stem volume (m^3/ha)		174[c]
Dry biomass (t/ha) Stem wood	370.0	92.4
Dry biomass (t/ha) Stem bark	90.5	
Dry biomass (t/ha) Branches	53.3	16.0
Dry biomass (t/ha) Fruits etc.		
Dry biomass (t/ha) Foliage	28.4[b]	23.6
Dry biomass (t/ha) Root estimate		
CAI (m^3/ha/yr)		6[c]
Net production (t/ha/yr) Stem wood		
Net production (t/ha/yr) Stem bark		
Net production (t/ha/yr) Branches		
Net production (t/ha/yr) Fruits etc.		
Net production (t/ha/yr) Foliage		
Net production (t/ha/yr) Root estimate		

Twenty trees were sampled at Squamish, and stand values for a 1.16 ha plot were derived from regressions on D and D^2H. Stand values at St Jovite were estimated by using published regressions of biomass on D and H; nutrient contents were determined.

a. Percentage of the total tree number.
b. Including twigs.
c. Merchantable volume.

Baskerville, G.L. (1965). Dry matter production in immature balsam fir stands. *Forest Sci. Monogr.* 9.

Baskerville, G.L. (1966). Dry matter production in immature balsam fir stands: roots, lesser vegetation, and total stand. *Forest Sci.* 12, 49-53.

47°51'N 68°20'W 500 m Canada, New Brunswick, Green River Watershed.

Podsolized, slightly stoney silt loam

Abies balsamea (89-98%),[a] *Picea mariana* and *Picea glauca* (0-10%),[a] *Betula papyrifera* and *Betula alleghaniensis* (1-5%)[a]

Stands selected with different stem densities.

Age (years)		51	42	42	43	42	42
Trees/ha		1840	2642	4168	4797	7646	12491
Tree height (m)		11.0	9.8	9.4	9.8	9.8	8.3
Basal area (m^2/ha)		34.1	35.0	44.1	51.3	57.3	66.6
Leaf area index							
Stem volume (m^3/ha)		220	209	262	277	319	360
Dry biomass (t/ha)	Stem wood	61.6	59.2	68.4	81.3	92.3	103.2
	Stem bark	8.9	9.9	10.0	11.7	13.8	14.5
	Branches	18.9	17.2	17.2	16.8	16.5	16.5
	Fruits etc.	0.6	0.7	0.6	0.7	0.6	0.5
	Foliage	17.4	16.3	17.1	18.3	18.7	19.7
	Root estimate	35.7	35.3	41.9	44.2	47.1	51.9
CAI (m^3/ha/yr)		10.2	9.7	10.5	11.7	13.3	14.2
Net production (t/ha/yr)	Stem wood	2.93[b]	3.22[b]	3.33[b]	3.80[b]	4.39[b]	4.91[b]
	Stem bark	0.34[b]	0.32[b]	0.32[b]	0.34[b]	0.41[b]	0.41[b]
	Branches	1.40[c]	1.31[c]	1.37[c]	1.44[c]	1.67[c]	1.82[c]
	Fruits etc.	0.11	0.16	0.11	0.14	0.14	0.09
	Foliage	4.70	4.39	4.52	4.91	5.09	5.40
	Root estimate						

Sixteen to 18 *Abies*, 1 to 4 *Picea* and 4 *Betula* were sampled per stand, and totals of 89 *Abies*, 2 *Picea* and 7 *Betula* root systems were excavated. Unrecoverable fine roots were assumed to weigh 5.7 t/ha. Stand biomass values were derived for 5 plots per stand (each plot containing 24 trees) from regressions on D and D^2H. Foliage increment was taken as 26% of the crown weight of *Abies*, and 35% of *Picea*, averaged over 4 years.

a. Percentage of total basal area (*B. alleghaniensis* syn. *B. lutea*).

b. Including estimates of mortality.

c. Branch biomass divided by branch age, excluding woody litterfall.