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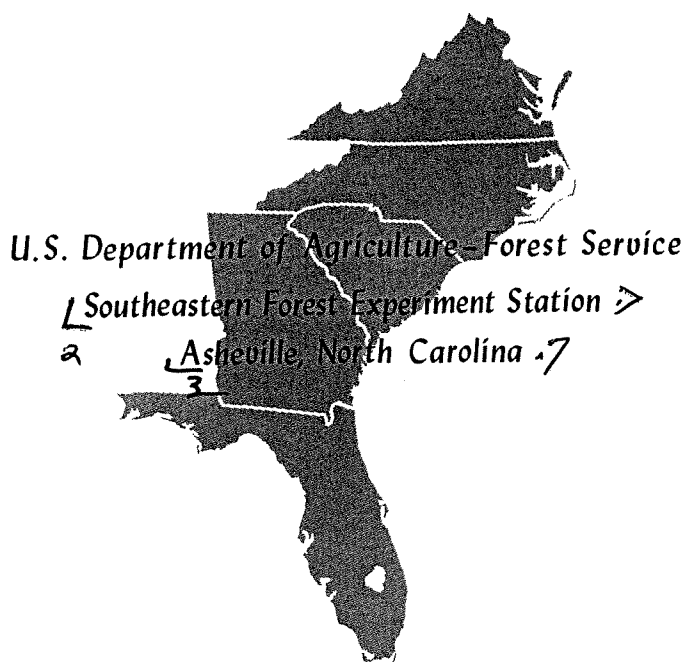

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During the course of a study on the nutrient content of foliage of loblolly pine (*Pinus taeda*), weight determinations and nutrient analyses were made on all aboveground parts of 10 trees. The data, although limited in scope, are being presented because of the scarcity of such information in the literature, and should be helpful to those interested in the nutrient cycle.

METHODS

Field

The 10 trees, each from a different plantation, were cut during March 1961 on or near the Calhoun Experimental Forest in Union County, South Carolina. They were growing on common Piedmont soils, such as Cecil, Cataula, Lloyd, and Iredell, and the original spacing varied from 6x6 to 8x8 feet. None of the stands had been thinned or pruned, but some mortality had occurred in the older plantings.

Trees selected for analysis were average with respect to diameter, height, and size of crown. No attempt was made to cover a great range of sites, ages, or sizes of trees because these plots were originally installed for another purpose. The site quality of the plots varied; over half the trees cut were 7 or 8 years old, their total height ranged from 8.0 feet to 23.3 feet, and diameter at ground level ranged from 2.8 inches to 6.9 inches.

Each tree was cut at ground level and its total height was measured. Diameter measurements were taken at ground level and at 2-foot intervals to the top of the tree. The trees were divided into the upper, middle, and lower thirds of the live crown and all material below the live crown. All material in each of these four segments was kept separate for weight determinations and nutrient analyses.

All needles and branches were removed separately and classified by age groups as one year old or less, and more than one year old. Branch sections were further classified as living or dead. The bark was removed from the main stem but not from the branches. The stemwood

referred to in the tables includes all wood from the base of the tree to the terminal shoot. The main stem below the live crown was cut into 6-foot lengths with each length sampled to increase the accuracy of weight determinations on the longer stems.

Laboratory

All material was transported to the laboratory within 2 hours after felling and the fresh weights recorded. We then determined the ovendry weight by drying samples to a constant weight at 60° C. in a forced-draft oven. If the part of the tree being dried weighed 5 pounds or less, it was placed in the oven in toto. If it weighed more than 5 pounds, the ovendry weight was determined from samples. The moisture values were then applied to the tree part for calculating total dry weight.

Several hundred grams of ovendry material from each part of each tree were ground in a Wiley mill to a size that would pass through one mm. openings. This material was stored in airtight containers until analyzed.

Total nitrogen was determined by the Kjeldahl method. Calcium, magnesium, potassium, and phosphorus were determined as follows: a 2 to 5 gram sample (ovendry 60° C.) was ashed in a muffle furnace at 400" C. for 4 hours. The ash was taken up in 10 ml. of 8 N HCl, diluted to 100 ml. volume, and then filtered. A 25 ml. portion was analyzed for Ca and Mg by the flame photometric method of Wells and Corey.[1] For K, a 10 ml. portion was diluted to 50 ml. with water and analyzed with a Beckman DU flame spectrophotometer.[2] Phosphorus was determined in a 10 ml. portion by the molybdovanadate color method." Ash was determined by ashing a 5 to 10 gram sample in a muffle furnace at 600" C . for 4 hours. Most samples were analyzed in duplicate, and any value which appeared in error was rerun.

RESULTS AND DISCUSSION

Weight of Trees

Spatial distribution of weight varies with size of the tree (table 1). For the small trees in this study, about half the weight is in the needles. The percentage of the total weight in the needles slowly declines and for the largest tree the needles constitute only 4.7 percent of the total weight. The weight of the stemwood varies directly with the size of the tree. For the small tree it makes up about a quarter of the total weight; for the larger trees it makes up over two-thirds of the weight.

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[1] Wells, C. G., and Corey, R. B. Elimination of interference by phosphorus and other elements in the flame photometric determination of calcium and magnesium in plant tissue. Soil Sci. Soc. Amer. Proc. 18: 326-330. 1954.

[2] Jackson, M. L. Soil chemical analysis. Prentice-Hall, inc., Englewood Cliffs, N. J. 1958.

Table 1. --Size, weight of tree parts, and percentage of weight in tree parts, for 10 loblolly pine trees

Tree number	Age	Diameter of base	Height	Ovendry weight[1]					Total
				Needles	Stemwood	Stembark	Branches	Total	
	Years	Inches	Feet	Grams					Pounds
1	7	2.8	6.0	711.3 (38.0%)	532.4 (28.4%)	336.1 (18.1%)	289.3 (15.5%)	1,871 .1	4.12
2	7	2.6	10.0	1,253.3 (43.3%)	706.6 (24.4%)	395.1 (13.6%)	541.1 (18.7%)	2,896.3	6.39
3	7	4.1	10.6	1,724.9 (29.8%)	2,132.3 (36.9%)	816.2 (14.2%)	1,101.3 (19.1%)	5.776.7	12.74
4	7	4.3	13.2	2,722 .O (29.5%)	3,174.0 (34.4%)	1,100.4 (11.9%)	2,240.9 (24.2%)	9,237.3	20.36
5	7	5.0	17.1	3,456.8 (26.5%)	5,390.0 (41.4%)	1,840.7 (14.1%)	2,346.0 (18.0%)	13.033.5	28.73
6	6	5.6	20.5	3,376.2 (24.2%)	6,097.9 (43.6%)	1.923.6 (13.8%)	2,569.4 (16.4%)	13.967.1	30.79
7	6	6.9	23.3	3,563.2 (14.5%)	13,093.1 (53.1%)	3,403.6 (13.8%)	4,585.9 (18.6%)	24,645.8	54.33
6	13	6.3	35.6	4,211.9 (9.7%)	25,136.2 (57.7%)	5,603.2 (12.9%)	8,583.2 (19.7%)	43.534.5	95.98
9	21	7.5	45.6	2,776.0 (5.0%)	39,103.5 (70.9%)	6,879.1 (12.5%)	6,426.6 (11.6%)	55,185.2	121.66
10	21	9.6	46.4	4,171.4 (4.7%)	61,686.1 (70.0%)	8,848.6 (10.0%)	13,475.4 (15.3%)	88,181.5	194.40

[1] The percentage value beneath each figure shows the percentage of the total weight in that particular part of the tree.

The percentage of weight in the stembark changes slowly, and steadily decreases as the tree becomes larger. For the smallest tree it makes up 18 percent of the dry weight and for the largest tree 10 percent.

The percentage of total tree weight in the branches is variable, primarily as a result of variation in stand density and its effect on crown length and width. Wind and ice storms, as well as genetic factors, cause variation in crown characteristics. The weakest part of the data in this study is the weight of the branches. The plantations suffered from several ice storms and so the branch weight, although satisfactory for the South Carolina Piedmont, may not be a good estimate for the entire range of the species. A bias also exists in the branch weight because we experienced difficulty in collecting dead branches which broke from the stems when the trees were felled. For the trees analyzed in this study, the percentage of total weight in the branches ranges from 11.6 to 24.2 percent. There was no apparent relationship between total branch weight and size of trees.

Moisture Content

The average moisture content of the 10 trees was computed as a percentage of the dry weight (table 2). There is considerable variation between trees for the stemwood; thus, the differences between parts of stem are not significant. For stembark there is a direct correlation between moisture content and height of the bark above ground. Although there was variation between the 10 trees, the same height-moisture content relationship held for all ten.

There was no relationship between location on tree and moisture content for the needles; thus, all needles with the same year of origin were lumped together. Also, there was little relationship between age of needles and their moisture content. The moisture content of the branches closely paralleled that of the needles. However, the dead branches had appreciably less moisture than any living part of the tree. The fresh and dry weights for Tree 10, one of the several sample trees of pulpwood size, are shown in table 3.

Table 2. --Average moisture content of 10 trees as a percentage of the oven-dry weight

Tree part	Percentage
Stemwood	
Upper ⅓ crown	151.3
Mid ⅓ crown	148.8
Lower ⅓ crown	145.2
Below crown	130.9
Average	144.7
Stembark	
Upper ⅓ crown	140.1
Mid ⅓ crown	124.3
Lower ⅓ crown	103.1
Below crown	18.2
Average	113.2
Needles	
Less than one year old	108.4
Over one year old	104.5
Average	106.8
Branches	
Less than one year old	108.4
Over one year old	106.7
Dead	48.7
Average	99.3

Table 3. --Fresh and dry weight, in pounds, of parts of Tree 10'

Weight	Needles	Stemwood	Stembark	Branches	Total
Fresh	18.18	288.00	30.86	49.00	386.04
Dry	9.20	136.00	19.50	29.70	194.40

'Computed from data of this tree and not averages shown in table 2.

Nutrient Content

Of the five elements studied, nitrogen was present in the greatest percentage in all parts of the trees, followed in order by potassium, calcium, magnesium, and phosphorus (table 4). An exception occurred in the branches, where the percentage of calcium exceeded that of potassium.

Table 4. --Percentage composition, on dry weight basis, of five elements for the parts of 10 trees studied

Tree part	Tree number										Average
	1	2	3	4	5	6	7	8	9	10	
	Percent										
NITROGEN											
Needles	1.031	0.920	1.134	1.062	1.076	1.035	0.961	1.063	0.995	0.886	1.016
Stembark	.509	.499	.582	.424	.420	.423	.397	.370	.310	.278	.421
Stemwood	.202	.186	.190	.137	.157	.131	.123	.110	.067	.072	.138
Branches	.398	.402	.407	.306	.301	.280	.233	.277	.314	.320	.324
PHOSPHORUS											
Needles	.092	.093	.103	.107	.093	.094	.107	.104	.098	.099	.099
Stembark	.075	.089	.090	.065	.055	.047	.067	.052	.043	.047	.063
Stemwood	.030	.031	.027	.020	.021	.019	.019	.016	.010	.012	.020
Branches	.049	.058	.043	.040	.036	.033	.041	.046	.036	.046	.043
POTASSIUM											
Needles	.348	.357	.244	.462	.505	.372	.730	.568	.345	.378	.431
Stembark	.333	.286	.294	.391	.408	.224	.519	.300	.182	.210	.315
Stemwood	.128	.123	.092	.108	.111	.089	.148	.089	.054	.081	,102
Branches	.180	.199	.109	.191	.185	.146	.242	.236	.154	.221	.186
CALCIUM											
Needles	.240	.387	,337	.284	.258	.329	.242	.316	.235	.242	.287
Stembark	.211	.317	.291	.208	.139	.135	.131	.173	.340	.190	.214
Stemwood	.063	.079	.070	.066	.061	.063	.053	.064	.065	.055	.064
Branches	.239	.318	.326	.224	.176	.218	.169	.248	.259	.209	.239
MAGNESIUM											
Needles	.150	.099	.188	.113	.091	.090	.103	.143	.126	.129	.123
Stembark	.113	.088	.093	.090	.069	.071	.081	.086	.120	.079	.089
Stemwood	.033	.027	.030	.027	.028	.027	.025	.023	.024	.020	.026
Branches	.081	.059	.071	.061	.056	.056	.049	.066	.064	.052	.062

The needles had the greatest percentage of all five elements studied, followed by the stembark, branches, and stemwood. Again the only exception was the calcium content of the branches--it was higher than that of the bark.

The weight of the nutrients in the trees can be computed by multiplying the ovendry weight times the percentage composition values (table 5). The total weight of the five elements and the total tree weights are listed at the bottom of the table. Beneath this is the percentage contribution of all five elements to the total dry weight of the tree.

The basic data for the 10 trees (Appendix, tables 6 through 15), except for the ash content, have been summarized (tables 4 and 5). The ash content is correlated directly with the mineral content. The richest

part of the tree with respect to mineral elements, the needles, has an ash content of over 2 percent. The stemwood, the part of the tree lowest in mineral elements, has an ash content around one-half percent.

For the five elements studied, comparisons can be made between the various divisions within any one tree part. Some of these relationships are consistent with all the trees; e. g., the increase in magnesium content in the stembark with increase in height above ground. Others, such as the calcium content of the wood, do not seem to be too strongly correlated with position in the tree.

Table 5. --Weight of five elements in parts of 10 loblolly pine trees

NITROGEN

Tree part	Tree number									
	1	2	3	4	5	6	7	8	9	10
	Grams									
Needles	7.35	12.13	20.35	29.11	38.17	37.51	31.05	44.88	21.43	37.93
Stembark	1.48	1.68	4.22	3.93	6.59	7.02	10.51	14.08	14.07	16.18
Stemwood	1.00	1.26	3.43	3.65	6.94	6.56	12.61	18.57	18.62	29.09
Branches	1.10	1.73	4.24	6.28	6.55	7.22	9.12	17.77	15.02	32.31
Total	10.93	16.80	32.24	43.51	58.25	58.31	69.29	95.30	75.14	115.57

PHOSPHORUS

Needles	.65	1.16	1.80	2.86	3.28	3.22	3.72	4.39	2.68	3.88
Stembark	.20	.25	.56	.54	.75	.71	1.44	1.80	1.65	2.51
Stemwood	.16	.18	.46	.56	.92	1.01	1.85	2.11	2.83	5.13
Branches	.13	.27	.44	.74	.77	.75	1.49	2.21	1.41	3.76
Total	1.14	1.86	3.26	4.70	5.72	5.69	8.50	11.11	8.63	15.34

POTASSIUM

Needles	2.42	4.23	4.04	12.14	11.12	12.39	22.14	24.09	9.87	15.88
Stembark	.95	.96	1.85	2.76	5.03	3.45	8.57	7.64	7.63	11.19
Stemwood	.70	.76	1.69	3.00	4.76	4.79	12.82	14.32	17.01	35.44
Branches	.51	.98	1.17	3.53	4.01	3.34	8.39	10.85	6.17	18.85
Total	4.58	6.93	8.75	21.43	30.92	23.97	51.92	56.90	40.66	81.16

CALCIUM

Needles	1.79	4.93	5.60	1.27	8.60	8.39	8.69	12.44	6.64	9.98
Stembark	.67	1.30	2.42	1.98	2.43	2.43	4.12	8.92	18.18	11.91
Stemwood	.34	.56	1.48	2.14	3.52	3.92	7.55	17.44	27.21	37.01
Branches	.70	1.80	3.27	4.94	3.95	5.38	8.31	22.41	17.22	30.43
Total	3.50	8.59	12.71	16.33	18.50	20.12	28.67	61.21	69.25	89.33

MAGNESIUM

Needles	1.10	1.38	3.22	3.29	3.21	2.99	4.06	5.53	3.33	5.45
Stembark	.34	.28	.69	.77	1.02	1.12	2.02	2.95	4.68	4.10
Stemwood	.16	.17	.57	.75	1.39	1.55	2.68	4.80	8.29	12.24
Branches	.22	.30	.69	1.16	1.27	1.29	2.06	3.71	2.94	5.53
Total	1.82	2.13	5.17	5.91	6.89	6.95	10.82	16.99	19.24	21.32

Nutrient wt.[1]	21.97	36.31	62.19	92 .oo	120.28	115.04	169.20	241.51	212.94	328.72
Tree wt.[2]	1,871.1	2,896.3	5,776.7	9,237.3	13,033.5	13,967.1	24,645.8	43,534.5	55,185.2	88,181.5
Percentage[3]	1.17	1.25	1.08	1.00	0.92	0.82	0.69	0.55	0.39	0.37

[1] Sum of elements for tree in grams.
[2] Total ovendry weight of tree in grams (from table 1).
[3] Percentage of total tree weight in elements measured.

The total weight of the elements in the tree increases as the tree becomes larger. However, the weight of these nutrients, as a percentage of the total tree weight, decreases as the trees become larger. For the smallest tree, the five elements make up 1.17 percent of the total weight; for the largest tree, they make up 0.37 percent. This is a reflection of the greater proportion of the weight of the larger tree in stemwood--material comparatively low in nutrient content.

The distribution of the five elements on a weight basis (table 16) is related to size of the tree. There is a definite change in the location of the elements as the tree becomes larger. Age is not a useful criterion in these data because of the wide range of sizes within age groups. For the smallest trees, over half of the elements are in the needles. As the tree becomes larger the proportion in the needles decreases, just as the weight of the needles decreases with respect to the total tree weight. The bark contains from 15 to 20 percent of the elements, regardless of tree size. The stemwood in the small trees contains 10 to 15 percent of the elements, As the trees grow larger the wood makes up a greater part of the total tree weight and this percentage increases to from 25 to 45 percent. The proportion of elements in the branches is low in small trees and slowly increases as the trees get larger. The quantity of elements in branches of larger trees varies because of the variability of the number and sizes of branches retained on a larger tree.

There is a relationship between d. b. h. and the total content of nitrogen, phosphorus, potassium, calcium, and magnesium (fig. 1). The lack of smoothness in the curves reflects the variability among trees. Variability appeared to be greatest for potassium, as previously indicated by foliar analysis by Wells and Metz.[3] The data indicated an almost constant rate of accumulation of nitrogen, potassium, and phosphorus as the diameter increased. Calcium and magnesium accumulated at a greater rate in the larger trees. Because of the decrease in rate of diameter growth as the trees become larger, the annual rate of accumulation of the elements in the trees decreased as the trees became larger,

Management of forest land usually means that wood, and the nutrients tied up in this material, will be periodically removed from the site. Data in this paper can be useful for estimating the nutrients removed from the site. An example of such use, for a hypothetical cord of loblolly pine pulpwood, follows.

Assuming that an average cord of loblolly pine has a fresh weight of 5,000 pounds and a dry weight of 2,500 pounds, the dry material would consist of about 2,250 pounds of wood and 250 pounds of bark. Using the nutrient content of the "below crown" portion of Tree 10 (table 15), this removal would amount to 0.25 pound of phosphorus, 1.52 pounds of potassium, 1.69 pounds of calcium, 0.56 pound of magnesium, and 1.44 pounds of nitrogen. These amounts include nutrients in both the wood and the bark (table 17).

[3] Wells, C. G., and Metz, L. J. Variation in nutrient content of loblolly pine needles with season, age, soil and position on the crown. Soil Sci. Soc. Amer. Proc. 27: 90-93. 1963.

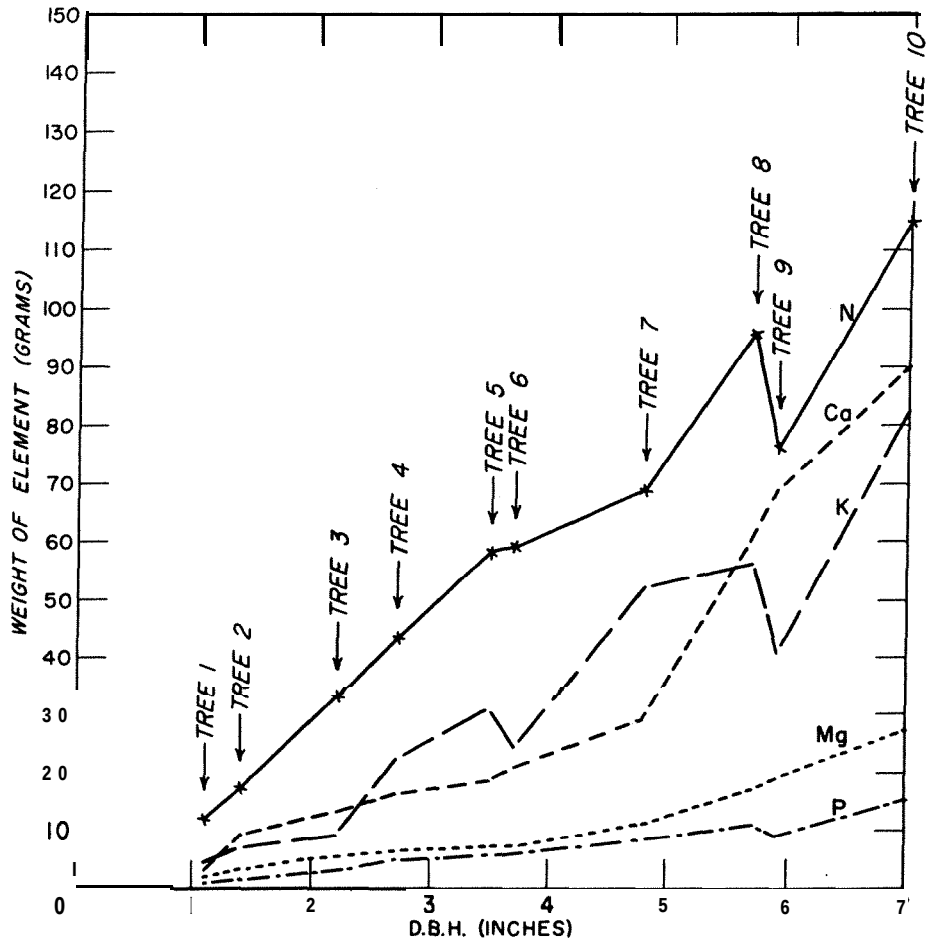

Figure 1. --Relationship between d. b. h. and weight of N, P, K, Ca, and Mg in 10 loblolly pine trees.

If a tree such as 10, which is pulpwood size, is cut to a 4-inch top, then 89 percent of the stem would be removed from the site. However, from the nutrient standpoint this wood contains only 45 percent of the phosphorus in the standing tree, 51 percent of the potassium, 49 percent of the calcium, 53 percent of the magnesium, and 35 percent of the nitrogen.

There is a continual flow of nutrients in the forest from the soil to the tree and then back to the soil. Except for nitrogen and such things as sulfur, added from rainfall, all of these nutrients must come from the soil. Deep- rooted vegetation, such as trees, acts as a redistributing agent and brings to the surface mineral elements from deep in the soil profile, When wood is removed from a site the mineral elements in this material are lost to the site. The effects of this loss on site quality are not known at the present- time.

APPENDIX

Table 6. --Basic data for Tree 1

Tree part	Location* of part	Total weight dry matter	Ash	P		K		Ca		Mg		N	
		Grams	Percent	Percent	Grams	Percent	Grams	Percent	Grams	Percent	Grams	Percent	Grams
Needles													
	T-60	90.6	2.340	0.093	0.08	0.370	0.34	0.209	0.19	0.146	0.13	1.024	0.93
	U-60	212.9	2.205	.091	.19	.360	.77	.190	.40	.125	.27	1.028	2.19
	M-60	145.2	2.350	.092	.13	.360	.52	.238	.35	.144	.21	1.028	1.49
	L-60	262.6	2.525	.094	.25	.300	.79	.324	.85	.186	.49	1.044	2.74
	Total	711.3			.65		2.42		1.79		1.10		7.35
Stemwood													
	U	68.4	.545	.037	.03	.138	.09	.060	.04	.040	.03	.250	.17
	M	152.2	.465	.024	.04	.098	.15	.064	.10	.029	.04	.177	.27
	L	311.8	.565	.030	.09	.148	.46	.064	.20	.029	.09	.179	.56
	Total	532.4			.16		.70		.34		.16		1.00
Stembark													
	U	37.5	1.925	.106	.04	.452	.17	.244	.09	.132	.05	.669	.25
	M	19.8	1.415	.068	.05	.304	.24	.197	.16	.115	.09	.472	.38
	L	220.8	1.350	.052	.11	.244	.54	.192	.42	.091	.20	.385	.85
	Total	338.1			.20		.95		.67		.34		1.48
Branches													
	U-60	81.4	1.170	.063	.05	.244	.20	.196	.16	.102	.08	.456	.37
	M-60	24.2	1.240	.056	.01	.198	.05	.252	.06	.093	.02	.448	.11
	L-60	33.5	1.335	.055	.02	.186	.06	.258	.09	.093	.03	.442	.15
	M-53	24.5	1.080	.036	.01	.136	.03	.227	.06	.053	.01	.328	.08
	L-53	125.7	1.145	.036	.04	.138	.17	.260	.33	.062	.08	.314	.39
	Total	289.3			.13		.51		.70		.22		1.10
Tree total		1,871.1			1.14		4.58		3.50		1.82		10.93

* T = Terminal
U = Upper $\frac{1}{3}$ of crown
M = Middle $\frac{1}{3}$ of crown
L = Lower $\frac{1}{3}$ of crown
60 = (1960 growing season) one year old
59 = (1959 growing season) more than one year old

Table 7. --Basic data for Tree 2

Tree part	Location+ of part	Total weight dry matter	Ash	P		K		Ca		Mg		N	
		Grams	Percent	Percent	Grams	Percent	Grams	Percent	Grams	Percent	Grams	Percent	Grams
Needles													
	T -60	58.9	2.405	0.100	0.06	0.520	0.31	0.214	0.13	0.081	0.05	0.988	0.58
	U-60	216.0	2.060	.089	.19	.440	.95	.194	.42	.074	.16	.922	1.99
	M-60	444.1	2.315	.090	.40	.300	1.33	.350	1.55	.118	.52	1.042	4.63
	L-60	234.1	2.430	.092	.22	.330	.77	.396	.93	.121	.28	1.070	2.50
	T-59	10.4	--	.089	.01	.320	.03	.346	.04	.060	.01	.800	.08
	M-59	99.8	2.810	.090	.09	.310	.31	.482	.48	.093	.09	.800	.80
	L-59	190.0	3.320	.100	.19	.280	.53	.724	1.38	.144	.27	.816	1.55
	Total	1,253.3			1.16		4.23		4.93		1.38		12.13
Stemwood													
	U	66.8	.675	.038	.03	.144	.10	.078	.05	.030	.02	.226	.15
	M	175.9	.435	.036	.06	.136	.24	.080	.14	.029	.05	.152	.27
	L	464.1	.455	.020	.09	.090	.42	.080	.37	.022	.10	.180	.84
	Total	706.8			.18		.76		.56		.17		1.26
Stembark													
	U	37.8	2.085	.138	.05	.330	.12	.292	.11	.128	.05	.642	.24
	M	84.8	1.419	.076	.06	.318	.27	.322	.27	.075	.06	.475	.40
	L	272.5	1.575	.052	.14	.210	.57	.338	.92	.061	.17	.380	1.04
	Total	395.1			.25		.96		1.30		.28		1.68
Branches													
	U-60	86.4	1.235	.072	.06	.284	.25	.246	.21	.067	.06	.414	.36
	M-60	99.6	1.295	.069	.07	.234	.23	.286	.28	.069	.07	.450	.45
	L-60	31.8	1.505	.070	.02	.214	.07	.322	.10	.067	.02	.488	.16
	M-59	134.2	1.170	.040	.05	.132	.18	.340	.46	.045	.06	.334	.15
	L-59	189.1	1.265	.039	.07	.132	.25	.396	.75	.045	.09	.322	.61
	Total	541 .1			.27		.98		1.80		.30		1.73
Tree total		2,896.3			1.86		6.93		8.59		2.13		16.80

* T = Terminal
U = Upper $\frac{1}{3}$ of crown
M = Middle $\frac{1}{3}$ of crown
L = Lower $\frac{1}{3}$ of crown
60 = (1960 growing season) one year old
59 = (1959 growing season) more than one year old

Table 8. --Basic data for Tree 3

Tree part	Location* of part	Total weight dry matter	Ash	P		K		Ca		Mg		N	
		Grams	Percent	Percent	Grams	Percent	Grams	Percent	Grams	Percent	Grams	Percent	Grams
Needles													
	T-60	55.5	2.075	0.108	0.06	0.300	0.17	0.144	0.08	0.107	0.06	0.978	0.54
	U-60	441.1	2.160	.102	.45	.230	1.01	.190	.84	.128	.56	1.044	4.60
	M-60	750.7	2.620	.108	.81	.240	1.80	.328	2.46	.193	1.45	1.242	9.32
	L-60	439.6	3.090	,100	.44	.220	.97	.456	2.00	.236	1.04	1.240	5.45
	L-59	38.0	3.400	,098	.04	.230	.09	.568	.22	.278	.11	1.166	.44
	Total	1,724.9			1.80		4.04		5.60		3.22		20.35
Stemwood													
	U	84.9	.560	.041	.03	.124	.11	.066	.06	.035	.03	,268	.23
	M	378.1	.635	.028	.11	.100	.38	.078	.29	.033	.12	.203	.77
	L	931.7	.450	.019	.18	.072	.67	.069	.64	.026	.24	.148	1.38
	BC	737.6	.520	.019	.14	.072	.53	.066	.49	.025	.18	.142	1.05
	Total	2,132.3			.46		1.69		1.48		.57		3.43
Stembark													
	U	50.9	1.705	.156	.08	.488	.25	.250	.13	.117	.06	.799	.41
	M	153.9	1.315	.098	.15	.336	.52	.320	.49	.098	.15	.579	.89
	L	329.9	1.315	.056	.18	.176	.58	.262	.86	.077	.25	.485	1.60
	BC	283.5	1.360	,052	.15	.178	.50	.332	.94	.081	.23	.465	1.32
	Total	818.2			.56		1.85		2.42		.69		4.22
Branches													
	U-60	195.4	1.040	.069	.13	.174	.34	.204	.40	.074	.14	.480	.94
	M-60	140.2	1.230	.060	.08	.146	.20	.308	.43	,093	.13	.462	.65
	L-60	54.2	1.455	.052	.03	.146	.08	.342	.19	.094	.05	.482	.26
	M-59	234.3	1.010	.039	.09	.106	.25	.294	.69	.062	.15	.538	1.26
	L-59	442 ,9	1.080	.023	.10	.066	.29	.314	1.39	.045	.20	.236	1.05
	Dead	34.3	1.490	.015	.01	.016	.01	.496	.17	.058	.02	.246	.08
	Total	1,101.3			.44		1.17		3.27		.69		4.24
Tree total		5,776.7			3.26		8.75		12.77		5.17		32.24

* T = Terminal
U = Upper $\frac{1}{3}$ of crown
M = Middle $\frac{1}{3}$ of crown
L = Lower $\frac{1}{3}$ of crown
BC = Below crown
60 = (1960 growing season) one year old
59 = (1959 growing season) more than one year old

Table 9. --Basic data for Tree 4

Tree part	Location* of part	Total weight dry matter	Ash	P		K		Ca		Mg		N	
		Grams	Percent	Percent	Grams	Percent	Grams	Percent	Grams	Percent	Grams	Percent	Grams
Needles													
	T-60	113.4	2.180	0.110	0.12	0.560	0.64	0.172	0.20	0.094	0.11	1.138	1.29
	U-60	303.9	2.295	.114	.35	.540	1.64	.178	.54	.112	.34	1.186	3.60
	M-60	1,292.9	2.095	.102	1.32	.440	5.69	.228	2.95	.118	1.53	1.124	14.53
	L-60	519.8	2.405	.104	.54	.420	2.18	.296	1.54	.157	.82	1.132	5.88
	M-59	248.5	2.590	.104	.26	.400	.99	.382	.95	.088	.22	.918	2.28
	L-59	243.5	2.750	.110	.27	.410	1.00	.448	1.09	.110	.27	.874	2.13
	Total	2,722.0			2.86		12.14		7.27		3.29		29.71
Stemwood													
	U	139.5	.620	.031	.04	.154	.21	.058	.08	.038	.05	.217	.30
	M	601.3	.565	.016	.10	.096	.58	.072	.43	.024	.14	.112	.67
	L	1,291.4	.450	.016	.21	.088	1.14	.071	.92	.021	.27	.110	1.42
	BC	1,141.8	.455	.018	.21	.094	1.07	.062	.71	.025	.29	.110	1.26
	Total	3,174.0			.56		3.00		2.14		.75		3.65
Stembark													
	U	56.7	2.810	.116	.07	.820	.46	.310	.18	.150	.09	.618	.35
	M	184.6	1.385	,063	.12	,364	.67	.174	.32	.090	.17	.424	.78
	L	407.6	1.140	.042	.17	.196	.80	.168	.68	.059	.24	.336	1.37
	BC	451.5	1.110	,040	.18	.184	.83	.178	.80	.059	.27	.317	1.43
	Total	1,100.4			.54		2.76		1.98		.77		3.93
Branches													
	U-60	139.8	1.430	,066	.09	.344	.48	.174	.24	.084	.12	.402	.56
	M-60	292.6	1.190	.052	.15	.260	.76	.202	.59	.072	.21	.388	1.14
	L-60	90.2	1.320	.050	.04	.256	.23	.224	.20	.072	.06	.338	.30
	u-59	20.6	1.050	.040	.01	.172	.04	.232	.05	.068	.01	.304	.06
	M-59	842.0	.945	.028	.24	.130	1.09	.181	1.52	.045	.38	.258	2.17
	L-59	659.4	1.075	.027	.18	.128	.84	.272	1.79	.045	.30	.252	1.66
	Dead	196.3	.940	.015	.03	.048	.09	.280	.55	.042	.08	.198	.39
	Total	2,240.9			.74		3.53		4.94		1.16		6.28
Tree total		9,237.3			4.70		21.43		16.33		5.97		43.57

* T = Terminal
U = Upper $\frac{1}{3}$ of crown
M = Middle $\frac{1}{3}$ of crown
L = Lower $\frac{1}{3}$ of crown
BC = Below crown
60 = (1960 growing season) one year old
59 = (1959 growing season) more than one year old

Table 10. --Basic data for Tree 5

Tree part	Location* of part	Total weight dry matter	Ash	P		K		Ca		Mg		N	
		Grams	Percent	Percent	Grams	Percent	Grams	Percent	Grams	Percent	Grams	Percent	Grams
Needles													
	T-60	64.0	2.355	0.094	0.06	0.640	0.41	0.118	0.08	0.060	0.04	1.022	0.65
	U-60	754.5	2.035	.099	.75	.620	4.68	,128	.97	.085	.64	1.028	7.76
	M-60	1,436.7	2.020	.098	1.41	.480	6.90	.168	2.41	.078	1.12	1.186	17.04
	L-60	298.8	2.345	.098	.29	.410	1.23	.320	.96	.120	.36	1.228	3.67
	M-59	271.6	2.455	.085	.23	.460	1.25	.268	.73	.064	.17	.982	2.67
	L-59	631.2	3.075	.085	.54	.420	2.65	.546	3.45	.140	.88	1.010	6.38
	Total	3,456.8			3.28		17.12		8.60		3.21		38.17
Stemwood													
	U	196.9	.600	.034	.07	.180	.35	.054	.11	.035	.07	.239	.47
	M	966.1	.490	.020	.19	.102	.99	.055	.53	.030	.29	.151	1.46
	L	2,119.8	.465	.017	.36	.086	1.82	.065	1.38	.026	.55	.124	2.63
	BC	2,107.2	.420	.014	.30	.076	1.60	.071	1.50	.023	.48	,113	2.38
	Total	5,390.0			.92		4.76		3.52		1.39		6.94
Stembark													
	U	94.8	2.105	.096	.09	.820	.78	.172	.16	.108	.10	.591	.56
	M	361.3	1.230	.060	.22	.420	1.52	.115	.42	.073	.26	.457	1.65
	L	710.2	.910	.035	.25	.210	1.49	.102	.72	.050	.36	.332	2.36
	BC	674.4	.880	.029	.19	.184	1.24	.168	1.13	.045	.30	.300	2.02
	Total	1,840.7			.75		5.03		2.43		1.02		6.59
Branches													
	U-60	372.4	1.110	.062	.23	.356	1.33	,130	.48	.080	.30	.382	1.42
	M-60	289.3	.985	.048	.14	.246	.71	.156	.45	.064	.19	.374	1.08
	L-60	36.8	1.115	.044	.02	.220	.08	,204	.08	.062	.02	.372	.14
	M-59	682.0	.730	.027	.18	.138	.94	.152	1.04	.051	.35	.252	1.72
	L-59	765.0	.840	.023	.18	.114	.87	.190	1.45	.043	.33	.236	1.81
	Dead	200.5	.780	.010	.02	.038	.08	.224	.45	.039	.08	.188	.38
	Total	2,346.0			.77		4.01		3.95		1.27		6.55
Tree total		13,033.5			5.72		30.92		18.50		6.89		58.25

* T = Terminal
U = Upper $\frac{1}{3}$ of crown
M = Middle $\frac{1}{3}$ of crown
L = Lower $\frac{1}{3}$ of crown
BC = Below crown
60 = (1960 growing season) one year old
59 = (1959 growing season) more than one year old

Table 11. --Basic data for Tree 6

Tree part	Location* of part	Total weight dry matter	Ash	P		K		Ca		Mg		N	
		Grams	Percent	Percent	Grams	Percent	Grams	Percent	Grams	Percent	Grams	Percent	Grams
Needles													
	T-60	156.2	2.175	0.108	0.17	0.430	0.67	0.140	0.22	0.065	0.10	1.030	1.61
	U-60	837.2	1.835	.106	.89	.380	3.18	.146	1.22	.068	.57	.866	7.25
	M-60	1,922.2	2.005	.092	1.77	.360	6.92	.242	4.65	.095	1.83	1.246	23.95
	L-60	154.3	2.365	.094	.14	.340	.52	.376	.58	.108	.17	1.182	1.82
	M-59	100.3	2.580	.082	.08	.360	.36	.466	.47	.095	.10	.950	.95
	L-59	206.0	2.880	.082	.17	.360	.74	.606	1.25	.108	.22	.936	1.93
	Total	3,376.2			3.22		12.39		8.39		2.99		37.51
Stemwood													
	U	233.0	.555	.028	.07	.120	.28	.057	.13	.030	.07	.200	.47
	M	1,200.3	.495	.019	.23	.090	1.08	.065	.78	.029	.35	.129	1.55
	L	2,664.7	.415	.016	.43	.076	2.03	.065	1.73	.025	.67	.100	2.66
	BC	1,999.9	.460	.014	.28	.070	1.40	.064	1.28	.023	.46	.094	1.88
	Total	6,097.9			1.01		4.79		3.92		1.55		6.56
Stembark													
	U	93.4	1.510	.085	.08	.390	.36	.144	.13	.120	.11	.580	.54
	M	367.6	1.265	.033	.12	.168	.62	.156	.57	.050	.18	.456	1.68
	L	808.6	.975	.035	.28	.165	1.33	.108	.87	.059	.48	.326	2.64
	BC	654.0	1.150	.035	.23	.175	1.14	.132	.86	.054	.35	.330	2.16
	Total	1,923.6			.71		3.45		2.43		1.12		7.02
Branches													
	U-60	264.6	1.110	.048	.13	.224	.59	.151	.40	.074	.20	.358	.95
	M-60	403.4	1.105	.048	.19	.220	.89	.200	.81	.064	.26	.524	2.11
	L-60	30.8	1.450	.046	.01	.202	.06	.277	.09	.068	.02	.182	.06
	M-59	898.8	.885	.026	.23	.110	.99	.187	1.68	.046	.41	.230	2.07
	L-59	778.1	1.065	.022	.17	.100	.78	.248	1.93	.043	.33	.218	1.70
	Dead	193.7	1.005	.010	.02	.018	.03	.243	.47	.038	.07	.170	.33
	Total	2,569.4			.75		3.34		5.38		1.29		7.22
Tree total		13,967.1			5.69		23.97		20.12		6.95		58.31

* T = Terminal
U = Upper $\frac{1}{3}$ of crown
M = Middle $\frac{1}{3}$ of crown
L = Lower $\frac{1}{3}$ of crown
BC = Below crown
60 = (1960 growing season) one year old
59 = (1959 growing season) more than one year old

Table 12. --Basic data for Tree 7

Tree part	Location* of part	Total weight dry matter	Ash	P		K		Ca		Mg		N	
		Grams	Percent	Percent	Grams	Percent	Grams	Percent	Grams	Percent	Grams	Percent	Grams
Needles													
	T-60	84.0	3.920	0.150	0.13	1.380	1.16	0.160	0.13	0.073	0.06	0.936	0.79
	U-60	490.8	2.745	.129	.63	1.010	4.96	.124	.61	.068	.33	1.066	5.23
	M-60	1,636.6	2.240	.108	1.77	.610	9.98	.204	3.34	.117	1.91	1.126	18.43
	L-60	605.4	2.400	.100	.61	.480	2.91	.296	1.79	.136	.83	1.126	6.82
	M-59	145.8	2.320	.078	.11	.500	.73	.264	.38	.090	.13	.726	1.06
	L-59	600.6	2.565	.078	.47	.400	2.40	.406	2.44	.133	.80	.786	4.72
	Total	3,563.2			3.72		22.14		8.69		4.06		37.05
Stemwood													
	U	236.4	.815	.031	.07	.272	.64	.047	.11	.035	.08	.193	.46
	M	1,362.6	.525	.016	.22	.132	1.80	.047	.64	.023	.31	.113	1.54
	L	3,299.5	.440	.015	.49	.106	3.50	.057	1.88	.022	.73	.093	3.07
	BC	8,194.6	.515	.013	1.07	.084	6.88	.060	4.92	.019	1.56	.092	7.54
	Total	13,093.1			1.85		12.82		7.55		2.68		12.61
Stembark													
	U	85.2	--	.129	.11	1.190	1.01	.186	.16	.134	.11	.595	.51
	M	347.5	1.460	.062	.22	.475	1.65	.114	.40	.077	.27	.405	1.41
	L	896.3	1,225	.040	.36	.220	1.97	.092	.82	.058	.52	.306	2.74
	BC	2,074.6	1.185	.036	.75	.190	3.94	.132	2.74	.054	1.12	.282	5.85
	Total	3,403.6			1.44		a.57		4.12		2.02		10.51
Branches													
	U-60	317.7	1.545	.070	.22	.490	1.56	.120	.38	.069	.22	.346	1.10
	M-60	512.6	--	.042	.22	.283	1.45	.109	.56	.043	.22	.190	.97
	L-60	157.2	1.150	.052	.08	.280	.44	.187	.29	.055	.09	.342	.54
	M-59	1,021.0	--	.038	.39	.219	2.24	.199	2.03	.051	.52	.124	1.27
	L-59	1,549.8	.935	.030	.46	.164	2.54	.179	2.77	.040	.62	.228	3.53
	Dead	1,027.6	.665	.012	.12	.016	.16	.222	2.28	.038	.39	.166	1.71
	Total	4,585.9			1.49		8.39		8.31		2.06		9.12
Tree total		24,645.8			8.50		51.92		28.67		10.82		69.29

* **T** = Terminal
U = Upper $\frac{1}{3}$ of crown
M = Middle $\frac{1}{3}$ of crown
L = Lower $\frac{1}{3}$ of crown
BC = Below crow-n
60 = (1960 growing season) one year old
59 = (1959 growing season) more than one year old

Table 13. --Basic data for Tree 8

Tree part	Location* of part	Total weight dry matter	Ash	P		K		Ca		Mg		N	
		Grams	Percent	Percent	Grams	Percent	Grams	Percent	Grams	Percent	Grams	Percent	Grams
Needles													
	T-60	180.7	3.045	0.110	0.20	0.480	0.87	0.296	0.53	0.150	0.27	1.156	2.09
	U-60	387.8	2.995	.112	.43	.560	2.17	.246	.95	.126	.49	1.180	4.58
	M-60	2,275.5	2.755	.108	2.46	.580	13.20	.254	5.78	.121	2.75	1.102	25.08
	L-60	320.1	2.660	.104	.33	.650	2.08	.264	.84	.152	.49	1.066	3.41
	M-59	733.9	3.240	.090	.66	.520	3.82	.412	3.02	.133	.98	.912	6.69
	L-59	313.9	3.320	.100	.31	.620	1.95	.422	1.32	.174	.55	.964	3.03
	Total	4,211.9			4.39		24.09		12.44		5.53		44.88
Stemwood													
	U	296.6	.690	.024	.07	.134	.40	.055	.16	.028	.08	.172	.51
	M	1,499.9	.635	.016	.24	.098	1.47	.061	.91	.024	.36	.118	1.77
	L	3,263.3	.400	.012	.39	.074	2.41	.071	2.32	.023	.75	.081	2.64
	EC	20,076.4	.395	.010	2.01	.050	10.04	.070	14.05	.018	3.61	.068	13.65
	Total	25,136.2			2.71		14.32		17.44		4.80		18.57
Stembark													
	U	110.1	2.140	.082	.09	.540	.59	.232	.26	.123	.14	.536	.59
	M	381.8	1.510	.055	.21	.310	1.18	.160	.61	.098	.37	.408	1.56
	L	634.8	1.335	.045	.29	.255	1.62	.140	.89	.082	.52	.314	1.99
	BC	4,476.5	1.105	.027	1.21	.095	4.25	.160	7.16	.043	1.92	.222	9.94
	Total	5,603.2			1.80		7.64		8.92		2.95		14.08
Branches													
	U-60	173.4	1.705	.082	.14	.424	.74	.248	.43	.126	.22	.434	.75
	M-60	663.0	1.245	.060	.40	.312	2.07	.228	1.51	.078	.52	.328	2.17
	L-60	71.4	1.345	.063	.04	.316	.23	.218	.16	.072	.05	.328	.23
	M-59	2,117.7	1.030	.030	.64	.164	3.47	.240	5.08	.054	1.14	.202	4.28
	L-59	2,037.0	1.170	.026	.53	.182	3.71	.284	5.79	.039	.79	.181	3.69
	Dead	3,520.7	.865	.013	.46	.018	.63	.268	9.44	.028	.99	.189	6.65
	Total	8,583.2			2.21		10.85		22.41		3.71		17.77
Tree total		43,534s			11.11		56.90		61.21		16.99		95.30

* T = Terminal
U = Upper $\frac{1}{3}$ of crown
M = Middle $\frac{1}{3}$ of crown
L = Lower $\frac{1}{3}$ of crown
BC = Below crown
60 = (1960 growing season) one year old
59 = (1959 growing season) more than one year old

Table 14. --Basic data for Tree 9

Tree part	Location* of part	Total weight dry matter	Ash	P		K		Ca		Mg		N	
		Grams	Percent	Percent	Grams	Percent	Grams	Percent	Grams	Percent	Grams	Percent	Grams
Needles													
	T-60	61.5	3.050	0.100	0.06	0.320	0.20	0.236	0.15	0.139	0.09	1.018	0.63
	U-60	476.9	2.970	.098	.47	.340	1.62	.234	1.12	.124	.59	.966	4.61
	M-60	1,612.0	2.740	.094	1.52	.360	5.80	.246	3.97	.115	1.85	.984	15.86
	L-60	625.6	2.755	.100	.63	.360	2.25	.224	1.40	.128	.80	1.012	6.33
	Total	2,776.0			2.68		9.87		6.64		3.33		27.43
Stemwood													
	U	235.8	.485	.015	.04	.068	.16	.058	.14	.028	.07	.102	.24
	M	1,418.2	.410	.010	.14	.054	.77	.064	.91	.023	.33	.069	.98
	L	2.927.1	.445	.008	.23	.054	1.58	.068	1.99	,022	.64	.052	1.52
	BC	34,522.4	.355	.007	2.42	.042	14.50	.070	24.17	.021	7.25	.046	15.88
	Total	39,103.5			2.83		17.01		27.21		8.29		18.62
Stembark													
	U	89.7	--	.068	.06	.265	.24	.414	.37	.180	.16	.452	.41
	M	320.5	2.046	.049	.16	.230	.74	.370	1.19	.155	.50	.352	1.13
	L	512.7	1.521	.035	.18	.135	.69	,326	1.67	.087	.45	.247	1.27
	BC	5,956.2	1.252	.021	1.25	.100	5.96	.251	14.95	.060	3.57	.189	11.26
	Total	6,879.1			1.65		7.63		18.18		4.68		14.07
Branches													
	U-60	108.0	1.475	.062	.07	.262	.28	.290	.31	.098	.11	.407	.44
	M-60	187.2	1.415	.056	.10	.246	.46	.258	.48	.076	.14	.390	.73
	L-60	55.9	1.475	.035	.02	.158	.09	.226	.13	.070	.04	.453	.25
	u-59	142.9	1.080	.035	.05	.156	.22	.235	.34	.072	.10	.280	.40
	M-59	1,973.5	1.075	.022	.43	.120	2.37	.297	5.86	.052	1.03	.198	3.91
	L-59	1,988.3	1.225	.030	.60	.124	2.47	.310	6.16	.053	1.05	.269	5.35
	Dead	1,970.8	.890	.010	.20	.014	.28	.200	3.94	.024	.47	.200	3.94
	Total	6,426.6			1.47		6.17		17.22		2.94		15.02
Tree total		55,185.2			8.63		40.68		69.25		19.2'4		75.14

* T = Terminal
U = Upper $\frac{1}{3}$ of crown
M = Middle $\frac{1}{3}$ of crown
L = Lower $\frac{1}{3}$ of crown
BC = Below crown
60 = (1960 growing season) one year old
59 = (1959 growing season) more than one year old

Table 15. --Basic data for Tree 10

Tree part	Location* of part	Total weight dry matter	Ash	P		K		Ca		Mg		N	
		Grams	Percent	Percent	Grams	Percent	Grams	Percent	Grams	Percent	Grams	Percent	Grams
Needles													
	T -60	47.8	2.670	0.109	0.05	0.340	0.16	0.262	0.12	0.128	0.06	0.868	0.41
	U-60	571.5	2.525	.100	.57	.400	2.29	.222	1.27	.121	.69	.794	4.54
	M-60	2,587.8	2,595	.090	2.33	.370	9.57	.242	6.26	.131	3.39	.914	23.65
	L-60	964.3	2.560	.096	.93	.400	3.86	.242	2.33	.136	1.31	.968	9.33
	Total	4,171.4			3.88		15.88		9.98		5.45		37.93
Stemwood													
	U	259.6	.455	.019	.05	.114	.30	.055	.14	.022	.06	.117	.30
	M	1'943.0	.370	.012	.23	.084	1.63	.052	1.01	.019	.37	.068	1.32
	L	4,698.3	.310	.010	.47	.072	3.38	.052	2.44	.018	.85	.060	2.82
	BC	54,785.2	.404	.008	4.38	.055	30.13	.061	33.42	,020	10.96	.045	24.65
	Total	61,686.1			5.13		35.44		37.01		12.24		29.09
Stembark													
	U	95.5	2.135	.075	.07	.295	.28	.278	.27	.124	.12	.430	.41
	M	336.7	1.685	.046	.15	.230	.77	.190	.64	.082	.28	.288	.97
	L	632.9	1.160	.040	.25	.200	1.27	.164	1.04	.068	.43	.223	1.41
	BC	7,783.5	.906	.027	2.10	.114	8.87	.128	9.96	.042	3.27	.172	13.39
	Total	8,848.6			2.57		11.19		11.91		4.10		16.18
Branches													
	U-60	169.8	1.580	.068	.11	.320	.54	.215	.37	,072	.12	.422	.72
	M-60	454.8	1.550	.068	.31	.308	1.40	.204	.93	.064	.29	.441	2.01
	L-60	147.2	1.345	.072	.11	.324	.48	.192	.28	.061	.09	.443	.65
	u-59	242.3	1.020	.037	.09	.210	.51	.178	.43	.046	.11	.246	.60
	M-59	3,348.4	1.155	.038	1.27	.208	6.96	.202	6.76	.045	1.51	.270	9.04
	L-59	5,189.2	1.050	.027	1.40	.146	7.58	.239	12.40	.040	2.08	.227	11.78
	Dead	3,923.7	--	.012	.47	.030	1.18	.236	9.26	.034	1.33	.193	1.51
	Total	13,475.4			3.78		18.65		30.43		5.53		32.37
Tree total		88,181.5			15.34		81.16		89.33		27.32		115.57

* T = Terminal
U = Upper $\frac{1}{3}$ of crown
M = Middle $\frac{1}{3}$ of crown
L = Lower $\frac{1}{3}$ of crown
BC = Below crown
60 = (1960 growing season) one year old
59 = (1959 growing season) more than one year old

Table 16. --Percentage of weight of individual elements in tree parts

NITROGEN

Tree part	Tree number									
	1	2	3	4	5	6	7	8	9	10
	Percent									
Needles	67	72	63	68	66	65	54	47	36	33
Stembark	14	10	13	9	11	12	15	15	19	14
Stemwood	9	8	11	8	12	11	18	19	25	25
Branches	10	10	13	15	11	12	13	19	20	28
PHOSPHORUS										
Needles	57	62	55	61	57	57	44	40	31	25
Stembark	18	13	17	12	13	12	17	16	19	17
Stemwood	14	10	14	11	16	18	22	24	33	33
Branches	11	15	14	16	14	13	17	20	17	25
POTASSIUM										
Needles	53	61	46	57	56	52	43	42	24	19
Stembark	21	14	21	13	16	14	16	14	19	14
Stemwood	15	11	19	14	15	20	25	25	42	44
Branches	11	14	14	16	13	14	16	19	15	23
CALCIUM										
Needles	51	57	44	45	47	42	30	20	10	11
Stembark	19	15	19	12	13	12	15	15	26	13
Stemwood	10	7	12	13	19	19	26	28	39	42
Branches	20	21	25	30	21	27	29	37	25	34
MAGNESIUM										
Needles	60	65	63	55	47	43	38	33	17	20
Stembark	19	13	13	13	15	16	18	17	24	15
Stemwood	9	8	11	13	20	22	25	28	43	45
Branches	12	14	13	19	18	19	19	22	16	20

Table 17. --Weight of five elements removed in an average cord of loblolly pine

	P	K	Ca	Mg	N
	Pounds				
Bark	0.068	0.285	0.320	0.105	0.430
Wood	0.180	1.238	1.372	0.450	1.012
Total	0.248	1.523	1.692	0.555	1.442