911

A STUDY OF THE ADAPTABILITY OF CERTAIN FORESTRY SPECIES TO CENTRAL KANSAS PLANTING.

By

Frederick Houser.

-o-

Were it necessary for one to test each species before planting his trees in order to find out which species are particularly adapted to his locality it would require a great deal of time as well as expense before he would be able to decide. During this time had he known which species thrives best, his forest or wood lot, as the case may be would be under considerable headway. Experimenting as a side line is a good thing, but when it is the desire to obtain species for immediate purpose in this way it is not profitable. One may not know which species are adapted to his locality but he should observe species that are hardy and rapid growers in a locality whose conditions are similar to those of his own locality.

In comparing one locality with another the following conditions should be observed: Climate which includes temperature and moisture; character and quality of the soil; drainage; etc.

A great many people have the idea that it is in their native home only of a species that it will thrive but this is a mistake for there are in so many cases such barriers to forest extension that it is impossible for them to reach the different localities. The Eucalyptus for example, whose native home is in Australia, is, after being transported by man, successfully and profitably grown in parts of The United States while the

climatic conditions of these two countries vary considerably.

It is the purpose of the following lines to give an account of observations made as a test of the adaptability of Forestry species as shown by hardiness and rate of growth.

The method of obtaining the rate of growth is as follows: The trees of a species whose age is known or is determined by counting the annual rings, are measured directly by means of a graduated pole or by a rule when the trees do not exceed twenty five feet in height. The diameter is also taken when the trees exceed ten feet in height. This is accomplished by means of a pair of tree calipers graduated in inches. Trees exceeding twenty five feet in height are measured by means of the "Hypsometer". The measurements are then compared with measurements taken at a previous known date and in this manner the comparative rate of growth may be determined.

Besides the rate of growth other observations should be made such as the form of the tree which is regulated chiefly by light; susceptibility to fungus disease and ravages by insects; and the ability to withstand abnormal atmospheric conditions.

The first species with which we are to deal is the Jack Pine, (Pinus divaricata). These trees were set out on the "Old College Farm" during the year 1896 and were one year old when set The lot consists of an area of one and one tenth acres with the rows four feet apart and the trees originally set eighteen inches apart in the row but some of them have died out since then

and in some places they are thiner than they were originally. In every row at varying intervals were set Scotch pines. The stand of Jack Pines may be considered pure as the percentage of other species does not exceed twenty. The site is a gradual south-western slope, high and well drained. The soil is shallow being less than one foot in depth, and is of a coarse crumbling nature and does not retain moisture for any length of time. The subsoil is very hard and is of a clay or gumbo nature. The land is gravelly and stony and taken as a whole is very poor. The soil cover consisting of dead pine needles is from to one and one half inches in thickness.

The trees show that they should have been trimed as the lower branches are dying in case of the taller trees and in case of the smaller ones the entire tree is almost dead and the tree does not have a vigorous a pearance.

Measurements taken in 1903 and 1907 are recorded on Tables 1 and 2.

The Jack pine is a comparatively rapid grower in this section of the country but does not compare with the Scotch or Austrian Pines for beauty but for wind-breaks if thickly set, and also for light poles and fuel it has proven a success.

The Bull Pine, (P.ponderosa). Five hundred specimens were measured that had been grown one year in the seed bed on the college campus. The soil was rich and loamy and had been mixed with sand. Great care was taken during their summer's growth, plenty of moisture being supplied and the bed was kept free from weeds.

In the fall of the year the bed was covered with a layer of straw to protect it from the cold which was doubtless left too long as some of the tops began to turn brown, but their color returned after the straw was removed.

Measurements are recorded on Tables 3., 4., 5., and 6. for one year old seedlings.

Measurements of seven year old Bull Pines were taken of trees that were set in the nursery row when they were two years old. This nursery is situated between two groves of large pine trees, which protect it from the light to some extent and also from the east and west winds. The tract is rather low but well drained. During their growth each year the soil was cultivated to keep it loose and to rid it of the weeds. Measurements are recordedon Table 7.

The Bull Pine is a moderately tall tree and has long spreading branches and a rather thick foliage. These characters make it valuable both as a shade and a wind break. It is easily propigated from the seed and is easily transplanted from the seed bed.

The Red Cedar, (Juniperus virginiana), is worthy of the opinion in which it has always been held. It is hardy in this locality and is a moderately rapid grower after it has once obtained a fair start. It is sometimes difficult to transplant the Red Cedar but with proper precaution this may be accomplished withot a very grea percentage of them dying. It is a great drouth and partially shade endurer and prefers a mild climate. The Red Cedar is noted for its pretty green color when in its growing condition and on account of this it is considered one of the most beautiful conifers. Altho it

sometimes takes on a scraggly appearance as it increases with age, and often turns brown during a dry season, it is well adapted to this climate and soil.

The Older Red Cedars are situated on the colleg campus and th there are some that were set on the old college farm in 1895. The soil where these were set is stony and very poor but the trees have just as healthy appearance as those that were set on the better soil but their growth is possibly not so rapid. Measurements of Red Cedars are recorded on Tables 8,.9,. 10,. 11,. and 12.

The White Pine (P. Strobus). The White Pine has been repeatedly experimented with in this station and the results of the first few years experiments were not the most promising but during later years the estimation of this species has be come much better. It is not nearly as easily propigated as the Scotch and Austrian Pines and it requires a better quality of soil, but it is well worth any one's time to set this tree as it serves both as a beautifier of the landscape and as a windbreak.

The White pine is a slow grower in this section of the country and thrives best when set with other species that will partially shade it as it is shade enduring. The few species on the college campus are hardy and persistent growers. See Table 13 for measurements of White Pines.

The Scotch Pine (P.Sylvestris) Experiments with ths species here have been the most successful of any of the conifers. There are more old trees of this species on the college campus than of

any other. It seems to be well adapted to this soil and climate and the measurements show that it is a hardy and rapid growing species

When the lower branches are kept trimed it makes an excellent shade tree, the needles being long and numerous allow but little light to reach the ground. The fallen needles form a thick mulching which greatly aids the soil in retaining the moisture.

See Tables 14 and 15 for measurements of the Scotch Pine.

Table 1.

Jack Pines. (12yrs. old)
(measured in feet and inches)

No.	Ht. ft-in.	Diam. inches.	No.	Ht. ft-in.	Diam. Inches.
1.	15-6	3.25	26.	9-3	2.
2.	7-6	1.25	27.	10.3	2.25
3.	17-6	4.25	28.	11-9	2.5
4.	9-6	.75	29.	19.	5.
5.	17-6	3.	30.	17.	3.25
6.	15-6	2.	31.	18-6	3.25
7.	18.	3.5	32.	17.	3.25
8.	11.	1.	33.	16.	3.5
9.	17.	3.	34.	12-9	2.5
10.	17.	4.25	35.	16.	3.
11.	15.	2.5	36.	17-9	2.5
12.	16.	3.75	37.	16-3	3.
13.	18.	3.	38.	16-3	3.5
14.	15-6	3.	39.	16.	3.5
15.	19.	3.5	40.	12-3	3.
16.	13-6	1.5	41.	18.	3.25
17.	16-9	3.	42.	6-3	.5
18.	16-6	3.	43.	17.	4.25
19.	13.	1.5	44.	12.	2.5
20.	17-9	3.	45.	8.	1.25
21.	15.	2.	46.	17-3	3.75
22.	16-6	2.25	47.	16.	2.
23.	20-6	3.5	48.	12-3	2.
24.	17-6	3.	49.	16-3	2.
25.	17.	2.	50.	16-6	2.75
	392-3	66.25		365-6	70.25
	365-6	70.25			
	50)757-9	50)136.5			

Average 15-1.6Ht. 2.72 Diameter.

Table 2.

Jack Pines(8yrs. old)

No.	Ht. ft-in.	Diam. inches.
1.	10-7	2.25
2.	12-	2.
3.	12-6	2.
4.	13-6	2.5
5.	9-6	1.
6.	10-6	2.
7.	9.	1.25
8.	13.	2.25
9.	9-9	1.5
10.	11.	1.75
11.	10-3	2.625
12.	14-6	1.5
13.	10.	1.5
14.	9-6	1.625
15.	10-6	2.125
16.	12-6	2.125
17.	11-3	1.75
18.	11.	1.75
19.	13-3	2.125
20.	10-6	1.75
21.	11-9	1.875
22.	11-3	1.75
23.	9-9	1.25
24.	12-6	2.5
25.	8-6	1.5
Averages	11-2	1.8

NOTE: These are the same trees as are recorded on Table 7. but were measured in 1903 while those in Table were measured 1907.

By comparing Tables 1 and 2 it is found that during 4 yrs. growth there is an increase in height of 3 ft. 11.6 in. and in diam 1.54 inches.

Table 3.

Bull Pine 1 yr. in seed bed.
(measured in inches)

No.	Ht.	No.	Ht.	No.	Ht.	No.	Ht.	No.	Ht.
1.	2.	26.	3.5	51.	2.25	76.	2.5	101.	3.75
2.	1.75	27.	2.5	52.	1.25	77.	2.5	102.	2.5
3.	2.25	28.	3.5	53.	2.5	78.	2.25	103.	2.5
4.	1.75	29.	3.	54.	2.25	79.	1.75	104.	2.
5.	2.5	30.	1.5	55.	1.	80.	1.5	105.	2.25
6.	2.25	31.	2.25	56.	2.5	81.	3.75	106.	2.25
7.	2.25	32.	3.25	57.	2.5	82.	2.	107.	2.5
8.	1.25	33.	2.25	58.	1.25	83.	2.5	108.	3.5
9.	2.	34.	1.25	59.	1.	84.	1.75	109.	2.5
10.	1.5	35.	1.25	60.	2.5	85.	1.25	110.	2.25
11.	2.25	36.	2.25	61.	1.75	86.	1.5	111.	2.
12.	1.75	37.	2.	62.	2.5	87.	2.25	112.	2.25
13.	.75	38.	2.25	63.	1.75	88.	2.	113.	1.25
14.	2.25	39.	2.25	64.	1.	89.	2.25	114.	2.75
15.	2.5	40.	3.75	65.	2.	90.	2.	115.	2.
16.	.75	41.	2.5	66.	3.25	91.	2.25	116.	2.5
17.	1.	42.	2.25	67.	2.25	92.	3.25	117.	2.
18.	1.25	43.	.5	68.	2.	93.	2.	118.	1.75
19.	2.	44.	2.5	69.	1.5	94.	2.5	119.	3.
20.	3.	45.	1.5	70.	3.25	95.	2.	120.	1.75
21.	2.75	46.	1.25	71.	3.	96.	1.25	121.	2.5
22.	1.75	47.	2.75	72.	2.	97.	1.25	122.	1.25
23.	1.25	48.	2.5	73.	2.75	98.	3.75	123.	1.25
24.	2.	49.	2.	74.	3.	99.	2.	124.	3.75
25.	1.25	50.	1.25	75.	2.5	100.	2.	125.	2.

25)46.25 — 25)56.75 — 25)53.50 — 25)54. — 25)58.

58.
53.50
56.75
46.25
---
125)268.5

Average for 125 trees 2.14inches.

Table 4.

Bull Pines (con) 1 yr. in seed bed.
(measured in inches)

No.	Ht.	No.	Ht.	No.	Ht.	No.	Ht.	No.	Ht.
126.	2.25	151.	4.	176.	2.	201.	2.	226.	2.5
127.	2.	152.	1.5	177.	2.75	202.	1.75	227.	4.
128.	2.	153.	1.5	178.	2.5	203.	2.25	228.	1.5
129.	1.	154.	2.25	179.	3.25	204.	4.	229.	2.75
130.	1.75	155.	2.5	180.	2.75	205.	2.5	230.	3.5
131.	1.25	156.	1.5	181.	3.25	206.	2.75	231.	1.5
132.	3.25	157.	2.	182.	2.5	207.	1.75	232.	2.
133.	2.5	158.	2.	183.	2.	208.	2.5	233.	2.75
134.	2.	159.	1.5	184.	3.	209.	2.75	234.	2.
135.	1.	160.	3.25	185.	2.5	210.	3.	235.	2.25
136.	2.25	161.	2.25	186.	2.	211.	2.25	236.	2.25
137.	2.	162.	2.75	187.	4.5	212.	3.25	237.	2.
138.	1.	163.	1.5	188.	3.	213.	2.25	238.	3.
139.	2.25	164.	3.	189.	2.5	214.	4.	239.	1.75
140.	2.	165.	1.25	190.	2.75	215.	3.25	240.	3.75
141.	1.25	166.	1.5	191.	3.	216.	2.25	241.	3.
142.	3.5	167.	2.25	192.	3.	217.	3.25	242.	2.75
143.	3.75	168.	2.	193.	3.	218.	2.	243.	2.
144.	3.25	169.	1.5	194.	2.25	219.	2.75	244.	1.25
145.	1.25	170.	3.25	195.	2.	220.	3.	245.	1.
146.	1.5	171.	2.5	196.	4.	221.	3.	246.	3.5
147.	2.5	172.	2.75	197.	2.5	222.	1.5	247.	2.5
148.	1.5	173.	2.75	198.	2.	223.	3.	248.	2.5
149.	3.	174.	1.25	199.	2.25	224.	3.5	249.	2.5
150.	2.75	175.	1.5	200.	1.5	225.	2.5	250.	3.25
	55.25		54.		71.75		67.		61.25

61.25
71.75
54.
55.25

125)309.25

Average for 125 trees 2.47 inches.

Table 5.

Bull Pines (con) 1 yr. in seed bed.
(measured in inches)

No.	Ht.	No.	Ht.	No.	Ht.	No.	Ht.	No.	Ht.
251.	2.	276.	2.75	301.	2.25	326.	2.	351.	3.
252.	1.25	277.	2.25	302.	1.	327.	3.	352.	3.5
253.	2.5	278.	3.	303.	1.5	328.	3.	353.	2.5
254.	2.75	279.	3.	304.	2.	329.	1.75	354.	2.5
255.	2.	280.	1.	305.	3.5	330.	1.75	355.	2.5
256.	2.5	281.	3.5	306.	2.75	331.	2.	356.	2.5
257.	2.25	282.	2.	307.	1.75	332.	2.	357.	3.
258.	2.	283.	2.25	308.	1.25	333.	2.	358.	4.
259.	1.5	284.	2.5	309.	3.25	334.	2.5	359.	3.
260.	3.	285.	2.5	310.	1.5	335.	2.75	360.	2.
261.	2.	286.	2.25	311.	2.	336.	2.	361.	2.5
262.	3.	287.	2.5	312.	1.25	337.	1.75	362.	1.5
263.	2.25	288.	1.5	313.	1.25	338.	2.25	363.	2.5
264.	2.	289.	1.5	314.	3.	339.	2.25	364.	3.
265.	2.	290.	2.75	315.	2.75	340.	2.	365.	3.
266.	1.5	291.	1.	316.	2.25	341.	2.5	366.	2.
267.	2.75	292.	2.5	317.	2.25	342.	2.25	367.	2.
268.	2.5	293.	3.5	318.	2.5	343.	1.5	368.	3.5
269.	2.75	294.	2.5	319.	3.	344.	2.75	369.	4.
270.	2.5	295.	2.	320.	1.25	345.	2.	370.	3.
271.	2.75	296.	2.	321.	1.5	346.	1.5	371.	3.
272.	2.5	297.	2.	322.	.75	347.	1.75	372.	3.
273.	1.75	298.	2.25	323.	2.	348.	1.75	373.	2.5
274.	2.5	299.	2.5	324.	2.25	349.	2.25	374.	3.
275.	1.5	300.	2.75	325.	3.	350.	1.	375.	3.
	55.25		57.5		51.5		52.25		70.

70.
51.5
57.5
55.25

125)285.

Agerage for 125 trees 2.29 Inches.

Table 6.

Bull Pine(Con) 1 yr. in seed bed.

(measured in inches)

No.	Ht.	No.	Ht.	No.	Ht.	No.	Ht.	No.	Ht.
376.	2.	401.	2.5	426.	3.	451.	2.	476.	2.
377.	2.	402.	2.	427.	2.5	452.	2.	477.	2.5
378.	1.5	403.	3.5	428.	2.5	453.	3.	478.	4.
379.	2.	404.	2.5	429.	2.	454.	2.5	479.	3.
380.	2.	405.	2.	430.	2.	455.	2.	480.	2.
381.	2.	406.	2.	431.	2.	456.	2.	481.	3.
382.	2.5	407.	3.	432.	2.	457.	1.5	482.	3.
383.	2.	408.	2.5	433.	3.	458.	2.	483.	2.5
384.	2.5	409.	3.5	434.	2.5	459.	2.5	484.	1.5
385.	3.	410.	2.5	435.	2.	460.	2.5	485.	2.
386.	2.	411.	2.5	436.	2.	461.	1.5	486.	2.
387.	2.5	412.	2.	437.	1.5	462.	2.5	487.	2.5
388.	3.	413.	2.	438.	3.	463.	2.5	488.	2.
389.	2.5	414.	3.	439.	2.5	464.	3.	489.	3.
390.	4.	415.	2.5	440.	2.5	465.	2.5	490.	2.5
391.	4.5	416.	2.5	441.	3.	466.	2.	491.	2.5
392.	2.5	417.	2.	442.	2.5	467.	2.5	492.	1.5
393.	2.5	418.	3.	443.	2.	468.	3.	493.	1.5
394.	3.	419.	2.	444.	2.5	469.	2.5	494.	2.
395.	3.	420.	2.5	445.	3.	470.	3.	495.	3.
396.	3.	421.	2.	446.	2.5	471.	2.5	496.	2.
397.	4.	422.	2.	447.	3.	472.	3.5	497.	2.5
398.	3.	423.	2.5	448.	3.	473.	3.5	498.	2.
399.	2.5	424.	3.5	449.	1.5	474.	2.	499.	3.5
400.	3.	425.	3.	450.	2.5	475.	2.	500.	2.5
	73.		70.		58.		58.5		61.
							61.		
							58.		
							70.		
							73.		
							125)320.5		

Average for 125 trees 2.66 inches.

Average for 500. trees is 2.39 inches.

Table 7.

Bull Pines (7 yrs old)

No.	Height ft.-in	No.	Height ft.-in.
1.	3-10	26.	2.5
2.	4-11	27.	2.8
3.	3-6	28.	3.9
4.	5-	29.	2.3
5.	3-6	30.	2.8
6.	3-7	31.	4-10
7.	2-2	32.	4-4
8.	1-6	33.	3-7
9.	2-8	34.	3-5
10.	3-3	35.	3-10
11.	4.	36.	4-3
12.	5-2	37.	5-11
13.	3-2	38.	5.
14.	4-7	39.	5-6
15.	2-6	40.	5-7
16.	2-	41.	3-11
17.	3-4	42.	5-2
18.	2-2	43.	5-1
19.	3-11	44.	5-4
20.	5-	45.	2-7
21.	5-3	46.	4-1
22.	3-6	47.	4-7
23.	4.	48.	3-11
24.	3-10	49.	3-7
25.	7-8	50.	4-10
	94-		102-3
			94.
			50)196-3
		Average	3-11.1 inches.

Table 8.

RED CEDAR 2 yrs. in seed bed.

(measured in inches)

No.	Ht.	No.	Ht.	No.	Ht.	No.	Ht.	No.	Ht.
1.	20.5	26.	8.5	51.	13.	76.	14.5	101.	9.
2.	14.	27.	9.	52.	11.	77.	16.5	102.	9.
3.	17.	28.	8.	53.	7.5	78.	16.	103.	14.
4.	14.	29.	7.5	54.	9.	79.	17.	104.	13.
5.	14.	30.	7.5	55.	8.	80.	11.	105.	13.5
6.	13.	31.	12.5	56.	8.	81.	10.5	106.	11.
7.	15.	32.	11.	57.	17.	82.	19.	107.	8.
8.	17.	33.	16.5	58.	14.	83.	10.5	108.	13.
9.	6.	34.	13.	59.	15.5	84.	14.	109.	7.
10.	7.	35.	12.5	60.	13.	85.	14.5	110.	18.
11.	9.	36.	11.	61.	11.	86.	16.	111.	13.
12.	17.	37.	18.	62.	12.5	87.	15.	112.	11.
13.	15.	38.	18.	63.	6.5	88.	13.5	113.	9.5
14.	17.	39.	15.5	64.	10.	89.	11.	114.	7.
15.	17.	40.	8.	65.	16.	90.	15.	115.	14.
16.	7.	41.	16.	66.	8.	91.	10.	116.	10.
17.	9.	42.	15.	67.	6.	92.	13.	117.	13.5
18.	8.	43.	10.	68.	15.	93.	10.	118.	10.
19.	17.5	44.	10.	69.	9.	94.	18.	119.	10.5
20.	19.	45.	7.	70.	15.5	95.	6.	120.	8.5
21.	9.5	46.	6.5	71.	14.	96.	15.	121.	15.
22.	12.	47.	7.	72.	13.	97.	12.	122.	15.5
23.	7.	48.	18.	73.	12.	98.	14.	123.	9.
24.	9.	49.	7.	74.	8.5	99.	14.5	124.	14.
25.	13.	50.	6.	75.	9.	100.	17.	125.	10.5
	25)323.5		25)279.		25)282.		25)353.5		25)286.5
Average	12.9		11.16		11.28		14.14		11.46

12.9
11.16
11.28
14.14
11.46
5)60.94
12.188 Average for page.

G.

Table 10.

RED CEDAR (Con.) 2 yrs. in seed bed.

(measured in inches)

No.	Ht.	No.	Ht.	No.	Ht.	No.	Ht.	No.	Ht.
126.	9.	151.	15.	176.	11.5	201.	13.5	226.	10.
127.	7.	152.	7.	177.	8.	202.	15.	227.	17.
128.	12.	153.	9.	178.	13.	203.	15.	228.	18.
129.	7.5	154.	9.	179.	12.5	204.	11.	229.	10.
130.	11.	155.	10.	180.	9.5	205.	15.	230.	10.
131.	12.5	156.	14.5	181.	13.	206.	10.	231.	12.
132.	13.5	157.	14.5	182.	17.	207.	15.	232.	15.
133.	13.5	158.	15.	183.	13.	208.	12.5	233.	11.
134.	11.	159.	12.5	184.	13.5	209.	19.	234.	8.5
135.	14.	160.	11.	185.	12.	210.	15.	235.	9.5
136.	8.	161.	14.	186.	16.5	211.	15.	236.	8.5
137.	10.	162.	12.5	187.	15.	212.	8.	237.	11.
138.	16.	163.	8.	188.	11.5	213.	11.5	238.	15.
139.	7.	164.	9.	189.	8.	214.	14.	239.	9.
140.	14.5	165.	8.	190.	14.	215.	11.5	240.	10.
141.	13.5	166.	14.	191.	10.	216.	15.	241.	17.
142.	13.	167.	11.	192.	11.	217.	12.	242.	10.5
143.	8.	168.	7.5	193.	16.	218.	8.5	243.	16.
144.	11.	169.	12.5	194.	15.5	219.	11.5	244.	17.
145.	10.	170.	12.	195.	16.	220.	12.	245.	13.
146.	13.	171.	8.5	196.	16.	221.	11.5	246.	8.5
147.	6.5	172.	16.	197.	16.	222.	11.	247.	13.
148.	13.5	173.	8.	198.	16.	223.	12.5	248.	11.
149.	11.	174.	18.	199.	10.5	224.	15.5	249.	15.5
150.	11.5	175.	18.	200.	15.5	225.	14.5	250.	17.
	25)277.5		25)274.		25)330.		25)325.		25)313.
Average	11.1		10.96		13.2		13.		12.52

11.1
10.96
13.2
13.
12.52
5) 60.78
12.15 Average for page.

Table 9.

RED CEDAR. (Con.) 2 yrs. in seed bed.

(measured in inches)

No.	Ht.	No.	Ht.	No.	Ht.	No.	Ht.	No.	Ht.
251.	9.	276.	15.5	301.	17.5	326.	9.	351.	13.5
252.	12.	277.	12.	302.	8.5	327.	7.5	352.	8.
253.	11.	278.	10.5	303.	17.5	328.	13.5	353.	6.
254.	11.	279.	10.5	304.	14.5	329.	13.	354.	6.5
255.	16.	280.	7.5	305.	5.	330.	13.	355.	5.
256.	11.	281.	10.	306.	8.5	331.	12.5	356.	16.
257.	9.	282.	15.	307.	4.5	332.	9.	357.	12.5
258.	17.	283.	7.5	308.	8.5	333.	7.5	358.	18.
259.	11.	284.	9.5	309.	15.5	334.	9.	359.	9.
260.	8.	285.	9.	310.	14.	335.	8.	360.	17.5
261.	17.5	286.	10.	311.	12.5	336.	7.5	361.	14.
262.	14.	287.	8.	312.	17.5	337.	14.	362.	5.
263.	13.	288.	16.5	313.	7.	338.	5.5	363.	5.
264.	13.5	289.	12.5	314.	4.5	339.	13.	364.	8.5
265.	14.	290.	16.	315.	3.5	340.	9.	365.	12.
266.	18.	291.	14.5	316.	12.5	341.	7.	366.	13.5
267.	15.	292.	16.5	317.	6.5	342.	8.	367.	14.
268.	9.	293.	12.	318.	12.	343.	14.5	368.	7.
269.	15.	294.	12.	319.	5.5	344.	10.	369.	7.5
270.	10.	295.	12.	320.	11.5	345.	15.5	370.	16.
271.	9.	296.	13.	321.	13.	346.	16.5	371.	16.
272.	18.	297.	9.	322.	7.	347.	17.	372.	8.5
273.	12.5	298.	12.5	323.	6.5	348.	17.5	373.	8.
274.	11.5	299.	14.	324.	9.5	349.	7.	374.	16.
275.	16.	300.	8.	325.	13.	350.	16.5	375.	7.
	25)301.5		25)295.		25)255.5		25)280.5		25)270.
Average.	12.6		11.8		10.22		11.14		10.8

12.6
11.8
10.22
11.14
10.8
5)56.56

11.312 Average for page.

Table 11.

RED CEDAR (Con.) 2 yrs. in seed bed.

(measured in inches)

No.	Ht.	No.	Ht.	No.	Ht.	No.	Ht.	No.	Ht.
376.	5.5	401.	7.	426.	15.	451.	5.5	476.	7.
377.	9.5	402.	15.	427.	14.5	452.	7.5	477.	10.
378.	14.	403.	14.	428.	10.	453.	11.5	478.	11.
379.	12.	404.	11.	429.	10.5	454.	7.5	479.	11.
380.	10.	405.	13.5	430.	16.	455.	13.5	480.	15.5
381.	8.5	406.	6.5	431.	6.	456.	9.	481.	11.
382.	9.5	407.	13.	432.	5.	457.	14.	482.	8.
383.	14.5	408.	17.	433.	5.	458.	12.	483.	8.
384.	9.	409.	15.	434.	7.	459.	8.	484.	5.
385.	6.5	410.	5.	435.	10.5	460.	15.	485.	5.
386.	7.	411.	9.	436.	9.	461.	14.	486.	7.
387.	8.	412.	9.	437.	7.	462.	17.	487.	16.5
388.	12.	423.	17.	438.	11.	463.	23.	488.	14.
389.	13.	424.	5.5	439.	7.	464.	9.	489.	10.
390.	11.5	425.	16.5	440.	6.	465.	7.	490.	5.
391.	5.	426.	7.	441.	13.	466.	8.	491.	9.
392.	7.	427.	6.5	442.	9.	467.	6.	492.	13.
393.	11.	428.	9.5	443.	6.	468.	9.	493.	11.5
394.	16.	429.	14.5	444.	10.	469.	13.	494.	18.
395.	11.	420.	15.5	445.	10.	470.	12.	495.	10.
396.	16.	431.	9.	446.	8.	471.	5.	496.	11.
397.	8.	432.	6.	447.	6.5	472.	15.	497.	11.5
398.	9.	433	17.	448.	7.	473.	10.	498.	6.
399.	9.	434.	18.	449.	7.	474.	10.	499.	9.
400.	7.	425.	11.	450.	8.	475.	7.	500.	7.
	25)253.5		25)298.		25)214.		25)269.5		25)262.
Average	10.14		11.92		8.56		10.78		10.48

10.14
11.92
8.56
10.78
10.48
5)51.88
10.376 Average for page.

Average for 500 trees is 11.5 inches.

Table 12.

Red Cedars on College Campus.

Set 1884.

Measured 1897			1903		1907.	
No.	Height. ft.-in.	Diameter breast high inches	Height ft-in.	Diameter breast high inches.	Height ft-in.	Diameter breast high inches.
1.	20.	3.365	27.	8.5	30.	11.5
2.	20-6	4.5	28.	7.5	32.6	11.
3.	19.	4.365	28-6	7.5	33.	11.
4.	19-6	3.75	23-6	7.	28.	9.5
5.	16-6	3.5	29.	6.25	32-6	10.
6.	21-6	4.25	30.	7.	27-6	9.5
7.	17.	3.5	25.	6.25	27-6	10.
8.	19-6	5.875	28.	8.25	31.	11.
9.	16.	3.	23-6	4.	26.	6.
10.	20-6	3.	25-6	6.	31.	8.
11.	21.	3.75	27-6	6.25	30.	8.5
12.	20.	4.	27.	7.	29-6	9.5

Table 13.

The White Pine. set 1888

measured	1897.		1902.		1907.	
No.	Height ft.-in	Diameter breast high inches.	Height. ft.-in.	Diameter breast high inches.	Height ft.-in.	Diameter breast high inches
1.	18-6	3.125	25.	7.75	29.	9.75
2.	15-6	3.125	26.	7.5	29-6	9.
3.	17.	3.125	26.	7.75	27.5	8.75
4.	17.	2.75	25.6	6.75	32.8	10.
5.	18.	3.25	25.8	6.5	28-10	9.5
6.	14-6	2.25	25.6	5.75	29-6	9.
7.	21.	5.	32.6	8.		
8.	12.	1.5	30.8	7.5	32.	6.5
9.	18.	3.75	31.4	7.		
10.	20.	3.625	32.4	7.5		
11.	12.	1.25	23.8	5.	31.	12.
12.	22-1.5	4.5	31.6	8.		
13.	11.6	1.625	26.	6.25	28.	12.
14.	16.	2.625	28.6	6.25	30-6	10.5
15.	22.	4.375	33.6	7.75	35-8	10.
16.	16.	2.625	30.6	6.5	34.	11.

Table 14.

Scotch Pines

	25 yrs. old.		30. yrs. old.	
No.	Height ft.-in.	Diameter breast high inches.	Height. ft-in.	Diameter breast high inches.
1.	19.	7.5	21.	8.
2.	32.	10.75	37-6	13.25
3.	35.	11.5	40.	14.25
4.	30.	9.75	36.	11.5
5.	32.	12.	36-6	13.5
6.	32.	9.5	37-6	10.5
7.	30.	9.	35-6	10.25
8.	29-6	10.	25-6	10.75
9.	29.	8.	35-3	9.
10.	29.	11.	35.	12.
Average	28-10	9.7	33-11.7	11.7

This Table shows an average increase in height of 5 ft. 1.7 inches and an increase in diameter of 2 inches during 2 yrs. growth.

Table 15.

Scotch Pines.

5 Years old.				7 Years old.			
No.	Height ft-in.	No.	Height ft-in.	No.	Height ft-in.	No.	Height. ft-in.
1.	2-6	26.	3.2	1.	9-6		
2.	2-6	27.	4-10	2.	5.		
3.	4-3	28.	3.	3.	7-8		
4.	4-9	29.	2-10	4.	5-8		
5.	3.	30.	2-4	5.	7-5		
6.	2-9	31.	3-2	6.	8-1		
7.	3-10	32.	3-3	7.	5-6		
8.	3.	33.	4-3	8.	6-6		
9.	3.	34.	3-8	9.	6-10		
10.	2-3	35.	4-6	10.	5-8		
11.	4.	36.	3-3	11.	6-8		
12.	2-10	37.	2-10	12.	7-6		
13.	3-4	38.	2-10	13.	7-8		
14.	3-4	39.	3-	14.	5-6		
15.	2-10	40.	2-6	15.	8-		
16.	2-6	41.	3-4	16.	5-8		
17.	3-6	42.	3-6	17.	6-5		
18.	3-	43.	2-6	18.	5-6		
19.	2-8	44.	3-8	19.	6-6		
20.	3-	45.	3-6	20.			
21.	2-10	46.	3-6	21.			
22.	4-5	47.	3-	22.			
23.	2-8	48.	3-6	23.			
24.	2-8	49.	4-3	24.			
25.	2-10	50.	3.	25.			

Note: There were only nineteen 7 yr. old Scotch pines on the college campus.