

are required to shade the trunk during the hottest part of the day, to prevent blistering the bark and permanent injury to the tree.

In early spring of 1891, and every winter since, the circumferences of 38 white pine trees were measured to ascertain the annual growth. The trees were of ages from 26 to 50 years; the average age was 36. Tack nails were driven into the trunks about five feet from the ground to ensure measuring at the same place each year. The measurements show that the average gain in circumference of the 38 trees was as follows:

1891	1892	1893	1894	1895	1896	1897
.68	.91	1.25	1.19	1.03	1.11	1.17
inch.	inch.	inch.	inch.	inch.	inch.	inch.

Per centage of gain, taking 1891 as 100.

100	135	184	176	152	163	172
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Probably the gain over 1891 should be reduced 20 per cent because the annual growth of white pine trees varies much with the seasons, and from an examination of many of the trees, and trees on other woodlands, it appears that the upward growth of white pine was above the average of the last twelve years in 1890, 1894, 1896 and 1897, and was below the average in 1891 and 1895.

The average growth of the 38 trees in seven years was $7\frac{1}{4}$ inches in circumference or $2\frac{1}{4}$ inches in diameter.

The largest circumference growths of single trees in the seven years were 11.25, 11.5, 11.25, 9.5 and 9.25 inches, of respective ages in 1891 of 30, 42, 30, 26 and 33 years. All these five trees are standing in places where the slope of the surface of the ground was favorable for carrying surface drainage to the roots, and are but little shaded by other trees.

The smallest circumference growths made in seven years by single trees were 3, 3, 3.75, 4.25, and 4.5 inches, of respective ages in 1891 of 35, 35, 49, 35, 35 years.

These five trees are all standing on slopes tending to carry surface water away from the roots, and are more shaded than the five trees showing the greatest growth. The rapid increase in growth after the first year may be mostly due to the removal of the oak trees, giving more air and more light and warmth from the sun, and leaving less foliage to consume the moisture of the ground.

As the work could not be done in the best way by contract, it was paid for by the hour. The cutting, drawing together the scattering wood and cording it, cost what the wood sold for, namely, \$2 to \$2.25 per cord on the lot. The cost of removing stumps in new roads and mowing the bushes every year until killed has been \$50. Cost of trimming to December, 1897, has been \$40. Sprouts have been broken off from as much as half the lot, which, with the

limbs from the oaks, and the trimmings of the pine, have been burned and the ashes scattered around, at a cost of \$100. As the different kinds of work have sometimes been carried on together, the cost of each is only approximately correct.

The average age of the 38 white pine trees in 1891 was 36 years.

The average gain in seven years in area of horizontal section five feet from the ground was 38.7 per cent.

The greatest gain in any tree in any area of section was tree No. 21, 32 years old, 109 square inches, or 55 per cent, a full top tree at the foot of a southerly slope.

The least gain in any tree in area of section was tree No. 6, 35 years old, 20 square inches, or 13 per cent, situated on a ridge on a northerly slope.

The largest per cent of growth in any tree in seven years was 85 per cent.

The smallest per cent of growth in any tree in seven years was 13 per cent.

It seems reasonable to assume that the increase in height and in length of limbs would add enough to the increase found in sectional area to make the increase in wood growth in seven years 50 per cent, or half as much as had grown in the first 36 years.

Assuming that the growth of these 38 trees was not above the average growth of all the pine trees on the lot, for every 100 cords of standing wood in 1891 there are now 150 cords, an annual gain of about 7 per cent.

Trees 10 to 25 years old appear to have made an average gain in woody growth of more than 100 per cent in seven years.

The amount of timber in trees varies as the square of the diameter of the trunk and the length of the log. For example, a tree two feet in diameter has four times as much timber as a tree one foot in diameter of the same length of cut. A tree three feet in diameter has nine times as much timber as a tree one foot in diameter of the same length; but the tree three feet in diameter, I assume, would cut twice the length of log, and therefore produce eighteen times as much timber as the tree one foot in diameter. The larger and older the tree up to its maturity, the larger is the proportion of heart wood, and also of clear stock, if the tree has been properly trimmed when young, and therein is its value as merchandise largely increased.

The old oak growth on the lot is mostly gone. The tract is transformed into a beautiful pine grove with an undergrowth of young pines giving promise of a forest of great value in years to come.

I will be pleased to show the grounds to all persons interested in the growth of white pine.

GRINNELL'S INDIAN TALES.

An Indian agent has absolute control of affairs on his reservation, subject only

to the approval of
the department of
the interior at

Washington, which two or three times a year may send out an inspector to look after him, says George Bird Grinnell in the February Atlantic. His position is one of great responsibility, for he has to administer a business representing each year from \$50,000 to \$200,000. His power on the reservation is more nearly absolute than anything that we in this country know of. He has not the authority to order out his Indians to instant execution, but in practice this is the only power that he does not possess. Over property, liberty, and the actions of every-day life he has absolute authority. No Indian can receive food, no Indian can obtain a tool, no Indian can live in his home, unless the agent is willing. He holds in the hollow of his hand the welfare of the tribe and of each one of its individuals.

The man who bears these responsibilities and is clothed with these powers over his fellow men should be of high character and good abilities, such an one as would be chosen for the manager of a considerable business. He should feel the responsibility of his position, and not be satisfied merely to get along as easily as possible and to draw his salary regularly. The good agent really stands in the relation of a parent toward his Indians, and as a father instructs, punishes and rewards his children, so the agent should firmly but kindly govern the people who are under him. They recognize this relation, and often speak of the agent as their father. In the ordinary pursuits of life a man qualified by training and temperament for such a position would receive a good salary; he ought to receive it here,—at least thrice the pittance that is now paid to Indian agents. Such a man ought to be retained in office so long as he would remain, and should not be turned out with the coming in of each new administration.

It is not many years ago when I was present at a reservation in the Indian Territory, when a

How Indians Are Cheated.

commission was negotiating with the Indians to induce them to take their lands in severalty, and to sell the surplus. The commissioners made no secret of the fact that the administration had urged them to carry through the sale, because at the next election they wished to go before the people with the statement that they had thrown open to settlement by the public a certain num-