

THE EFFECT OF PASTURING ON THE GROWTH OF TREES.

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It seems to have become habitual with us in our ordinary way of thinking to regard the trees and the forests as fixed parts of a landscape, like the hills and the valleys and the streams. The hoary, majestic oak and its kindred of the "forest primeval" appear to live irrespective of time and to have an existence unaffected by variable surrounding conditions. Yet, how delusive are these appearances when carefully investigated. The sturdy giant of the forest is dependent on the sunbeam and the raindrop, and exists only at the mercy of the insect on its foliage or of the animal browsing beneath its shade.

From even very casual observation it must be evident that trees are injured and their growth retarded by animals pasturing about them. It is the purpose of this article to give briefly the results of detailed observations, extending over a period of years, concerning the animal in its relation to the tree. On open ranges the damage to trees by stock is of a more or less trifling nature, except when very large herds or flocks pass frequently over the same ground. On enclosed areas of bush, such as might be found in a farmer's wood lot, the damage to the trees reaches its maximum.

The injury done to trees in a pastured wood lot is in direct proportion to the number of animals and the scarcity of forage. Hogs are often turned loose in a wood lot in the fall to fatten on nuts and acorns, and as long as this food lasts little damage is done, except the loss of seeds and nuts which produce next year's seedlings. As soon, however, as the supply of nuts ceases, down goes the snout of the hog to find food under the surface mould. In this rooting for worms and grubs many small roots and fibres are torn up and girdled for their bark, while young seedlings are often rooted out of the soil entirely. If hogs are left in a bush, as sometimes happens, till it is not a question of fattening, but of bare subsistence, large trees are torn and girdled and the growth of scores of years sometimes destroyed in a few hours. A case of this extreme kind happened near Niagara Falls some years ago. A butcher, whose slaughter-house on the outskirts of the town had become offensive to the citizens of expanding suburbs, was forced to remove his abattoir a couple of miles into the country. The spot he secured was part of a magnificent old chestnut wood. About an acre was fenced off and a drove of twenty-five or thirty hogs turned in to fatten on nuts, and the offal from the slaughter-house. Soon all the grass disappeared from the enclosure, next the mixed herbage and seedlings, till nothing green could be seen as high as the pigs could reach. All the refuse of occasional killing was not sufficient for the hogs, large saplings and poles were attacked, and all the fresh bark within reach stripped off. Great holes were burrowed round the trees and the bark gnawed off a foot or two under the ground. Every square yard of the whole surface was turned over and all the small roots within range eaten off. Not a single tree escaped injury, except a few old veterans protected by two or three inches of hard, rough bark. When late in the fall the gaunt razor-backs were turned into juicy bacon for the citizens of the town, the beautiful woods of a few weeks before had become almost a howling wilderness. A decade of growth has passed over the woods since then, but has failed to obliterate the destructive effect of one fall's pasturing by hogs.

Another peculiar case of the injurious action of hogs on trees happened this summer. A farmer had enclosed his apple

orchard and turned in the hogs to eat up the fallen apples. During the summer the orchard was pruned, and though the pigs were well fed twice a day, they girdled all the fresh bark from the brush. A week or so after the pruning the brush was hauled off and it was found that the bark was torn from the trunks of many trees, while several were completely girdled.

Horse have also been known to injure trees by girdling their trunks and limbs. While speaking on forestry before the Middlesex County Farmers' Institute, a gentleman told me of his having a row of maple trees girdled by colts. The trees were just outside the fence of the field in which the colts were pasturing. As the pasture became poor, the colts had grazed along the fence-corners and had reached over and destroyed the whole row of shade trees. Horses and cattle, however, generally confine themselves to eating off the leaves and green twigs within reach. In every pastured wood-lot the high grazing mark is very apparent. Contrary to what might be expected, sheep are the most harmful to trees, of all browsing animals. Besides closely cropping off young seedlings and sometimes girdling the fresh bark from growing trees, sheep by their restless activity so trample the soil about trees as to make the growth of the latter almost an impossibility.

In spite of an occasional excessive damage to trees by browsing of animals, by far the greater injury results indirectly from the trampling of the soil and the consequent destruction of the natural mulch about the trees. On the vegetable mould of the forest floor depend largely the health and vigor of the trees. This mould, which is composed largely of decaying leaves and twigs, is of a very porous nature and forms a natural reservoir for water. Under the shade of the treetops the moisture of the vegetable mould is given up slowly throughout the season, and the air about the trees is kept in that humid condition so favorable for plant growth. The downward movement of water through the forest mould is also slow, and as the water-table gradually lowers, the roots of the trees push down through the softened subsoil. For this reason forest trees are seldom blown down by high winds. Moreover by virtue of the slow movement of water in the forest mould, the springs of the woodland have a continuous, even flow throughout the year.

One of the most noticeable features of pastured woodlots is the absence of the natural forest mould. The sharp feet of stock cut up the soft turf and pack it, so that its water-holding capacity is practically destroyed. For this reason creeks become in spring rushing torrents roaring down hillsides and tearing away the fertile soil, and become dried up rocky gullies almost before summer comes. Rain falling upon pastured forests finds in the soil no natural reservoir, but passes quickly through the soil to swell for a few hours the creeks, and is lost to the trees. When summer comes the soil of a pastured woods is hard and cracked like a bare fallow. The rain which fell upon it has passed through it so quickly that the roots of the trees have been unable to follow down after the too rapidly receding water-table. Deep root growth under such conditions is checked and the trees are very frequently blown down by strong winds. It is not a uncommon thing on closely pastured woodlots to see sturdy oaks and maples, or even the tough-rooted elm, overthrown by the wind.

Besides being a reservoir for moisture the forest mould is a natural seed bed and nursery for nuts and seeds, which fall upon it from the trees above. It must be known that seedlings of forest trees are the most delicate of all plants and require during their early years almost ideal conditions of vegetation. In the deep rich mould under the protecting shade of the