

CLIMATIC INFLUENCE OF TREES.

The following valuable paper was written by Dr. John A. Warder, of North Bend, Hamilton Co., Ohio, and read before the Ontario Fruit Growers' Association, at their convention in the city of Hamilton, Canada, on Thursday, January 19th. Dr. Warder is a recognized authority on forestry, and as a pomologist has few equals, and no superiors, on the American continent. The paper was received with much interest.

MR. PRESIDENT, AND GENTLEMEN OF THE ONTARIO FRUIT GROWERS' ASSOCIATION:—After hearing the paper on Protection to the Orchard, read at the recent Pomological meeting in Boston, Massachusetts (September 15th, 1881), you, Mr. President, conferred upon its reader the honor of an invitation to prepare a lecture for presentation at the approaching meeting of your society at Hamilton, Ontario.

The proposition was accepted with hesitation, partly on account of impaired health, but mainly because of an apprehension that yourself and your worthy confreres, as fruit growers, would be disappointed in the character of the topic selected—The Climatic Influence of Trees. However, after traversing a portion of your beautiful and productive Province in the lovely days of October, and after beholding the wonderful progress that has been made by your citizens in clearing off the dense forests that once clothed your fertile soil, while observing and considering the changes consequent upon converting the woodlands into the farms, the forest into the prairie, the conviction became stronger that the theme must be drawn from that group of topics, which deserve so large a share of the thoughts and consideration of the American farmers and statesmen.

A perusal of such numbers of your valuable transactions as have been kindly furnished by the secretaries of the two leading societies of the Dominion, also assure the writer that such a theme as the one about to be presented may be welcomed by you, and he feels encouraged by finding that on your side, as well as on ours, forestry is becoming an important question, and that, to some of you, as well as to some of us, the spirit will not down—the question must be met; the sooner the better! Nor should the great interests involved in the word be ignored, either by agriculturists or statesmen. It is high time that our attention should be directed to a consideration of the subject in its bearings upon the agriculture of our continent, and its future maintenance and prosperity.

The transactions of the Ontario and Montreal societies already contain evidence of your interest in Forestry, as shown in the valuable papers relating to Canadian Forests by Mr. A. T. Drummond, Mr. Jas. Little, Mr. H. G. Joly, Mr. G. M. Dawson, Messrs. McAlush, G. Peacock and others, which may be read with profit, and which show that your attention has already been directed into this channel, all of which encourages me to continue. At the same time the intelligence and the familiarity with the subject thus displayed by your own members might well cause a stranger to feel some diffidence and hesitation on entering an arena with which you are supposed to be so much more familiar than a casual visitor. It is however, but a limited portion of the subject which it is proposed to discuss at this time, Mr. President, and, as you are aware, the task is undertaken only after consulting you, and after having received your approval of the discussion of wind breaks and shelter belts and sheltering groves for Ontario.

Reference has already been made to the extensive clearings that have been effected by the generation of men now occupying the interior-lacustrine region of fertile lands in Upper Canada. It seems almost incredible that in half a century or less, so vast a change should have been effected in the condition of this broad plateau, as is evident even from the car windows of the rolling train. Over wide areas the forests that once encumbered them have disappeared, leaving no traces of their former existence in the smooth and wide savannas of smiling fields covered with beautiful crops and beautiful herds. In a brief period the howling wilderness of woods and swamps which greeted and might well have repelled the sturdy settlers, has been transformed by man's persevering industry into smiling prairie. Wonderful transformation!

The very stumps of the sylvan monarchs have been rooted out, the soil has been tamed of its wildness, and brought into the highest culture over wide tracts; and with the evidence of high farming that so generally prevails, there have come also the improved animals to consume their share of the products, and to aid in maintaining, or even in enhancing, the natural fertility of the soil.

One of the most striking features of the country traversed, next to the apparent fertility of land, was the broad extent of tillage, where large fields made parts of great farms, and these were bounded on all sides by other farms of apparently equal dimensions, lying contiguous to them on every side, or with small intervening wood lots that could rarely be called forest lands, for their limited extent, and their rifled condition would hardly entitle these bits of woodland to be called forests; they are but shadows of their former selves.

Looking out of the car windows on either hand one might behold vistas opened over these fields that extended in many cases for miles without interruption of a grove or a tree, or even a stump or a bush.

Here then, while finding so much to admire in the results of the industry of the settlers, who, in half a century or less, had effected so great a change upon the earth's surface, here a theme was suggested to the traveller for him to present to-day to his friends of Ontario: This is what he now desires to impress and emphasize—The necessity for you to protect yourselves, your cattle, and your crops from the storms of winter. He begs you to begin at once your efforts to modify and to meliorate your climate by restoring barriers against the winds you have invited by too widely opening to them doors of access to your homes. He also begs you, at the same time, while beautifying your country, to provide against the future necessities of the people by producing, in these plantations, future supplies of fuel and lumber, yes! even here, and on these fertile lands this may be done, and by the wisest economy, by planting trees, in protective groves, but especially in wind-breaks and shelter-belts on all your farms.

While occupying even a considerable portion of arable land, that would then be withdrawn from the dominion of the plough, these plantations will, nevertheless, insure to the advantage of the farmer, and of the country, by enhancing the fertility and productiveness of the remainder of the land thus sheltered, as has been demonstrated on the open prairies of Iowa wherever these shelters have been applied.

The whole of the route traversed by the Grand Trunk Railway westward from Kingston, is very happily situated in regard to lacustrine influence, which must greatly modify the climate of the region. The broad surfaces of those great inland seas, Ontario, Erie and Huron, cannot fail to exert the well known effects of large bodies of water upon the atmosphere. It is, however, the region west of Toronto that is most happily situated in this respect, and here, too, the prevailing character of the soil seems to adapt the region to high farming. Here the lacustrine surroundings are most fully developed, and here, while enjoying the advantages derived from this source, the inhabitants must beware how they expose the country to the disadvantages that may arise from a too open exposure to the water. The winds must not be allowed a too free access to the land.

To obviate the effects of the winds, it is advised to plant groves about the farm steadings to the windward sides of barns and sheds, as well as of the dwellings. These should by all means be supplemented by evergreen shelter hedges and screens about the residences and out houses. The fields and pastures should be protected by wind breaks on every farm.

The wind break demands a liberal space, and the planting of numerous trees to make it effective. In a champion country these shelters should not be more than forty rods apart, nor should they occupy less than four rods in width, though even a single or a double row of trees between two fields will furnish a great deal of shelter, more especially if they be of evergreen species.

The soil should be well prepared by thorough ploughing and harrowing, so as to produce a

good tilth; when ready to plant, parallel furrows should be drawn four feet apart, in which to plant the little trees. This close planting is particularly recommended where the use of deciduous trees has been determined upon; but more space may be allowed for the evergreens, and where these are planted in single or double rows, with the trees of one row set opposite to the interspaces of the other, six or eight feet may be allowed. If the evergreens have been planted three or four feet apart at the first, alternate trees can be removed and set elsewhere, when their limbs meet on either side; they will be saleable to your neighbours, or they may be used in the extension of your own shelters. At any rate they will have already served a good purpose by rendering the screen more effective; they have paid their way.

The planting, particularly of evergreens, should be done in the spring, and care should be taken to preserve the roots from exposure to the sun and wind; if these delicate organs be once desiccated they never recover.

Planting small trees is a very simple operation, and may be thus performed on land prepared as already directed: A spit of the mellow soil of the furrow is lifted with a spade, the little tree placed, its roots are spread out and the earth from the spade is thrown upon them; this needs to be well prepared with the foot so as to bring it in close contact with the fibrous roots and occlude the air as thoroughly as possible; sufficient mellow soil is then thrown about the tree so that it shall be buried rather deeper than it had been previously. Two men with spades and a boy with trees may constitute a team for this work, and carry two rows. A favorite plan in Iowa is to employ the same force in a single furrow that has been freshly deepened by the plough. One man follows the boy, setting the trees with his hands and tramping with his feet so as to make them stand to the line, while the second follows with a hoe or shovel and draws in the earth. A cultivator or double hand plough is then passed along each side of the row.

The plantation should be well cultivated and kept clean for a few years, longer or shorter, according to the thriftiness of the species, but until the trees shade the ground, when they will take care of themselves. Cattle must be rigidly excluded.

Various combinations of species have been recommended for these belts, but as a rule in forestry it should be borne in mind that evergreens and deciduous trees do not succeed so well when mixed as when each class is massed separately. To this there may be some apparent exceptions: the European larch and Scotch pine, or Norway spruces, are often found in the same group doing well together—so in nature we sometimes find similar admixtures. But all the evergreens would be likely to suffer if they were mingled in a plantation with the rapid growing and unbragous elms, cottonwoods, maples and other broad leaved trees. Beautiful and effective for winter as are the evergreen conifers, however, these native deciduous species cannot be ignored, nor should they be neglected nor dispensed with by the farmers who may desire as quickly and as cheaply as possible to produce an effect in the shelter belt. Let such a one begin with the poplars, willows, or with any trees or cuttings that are at hand, always excepting the so-called Lombardy poplar, which, as an ornamental (!) shade (?) tree, already shows its aspiring head in some of the western towns of the Dominion.

Indeed both classes of trees may be happily combined without mingling them promiscuously. They may be planted in the same belt but in separate rows, putting the sturdy native deciduous kinds in a few rows on the outside, using the cotton woods and white willow, etc., which grow freely from cuttings and which rapidly produce an effective screen. Next to these may come the elms, the oaks, maples or white ash, and other kinds. These thickly set will soon rise and form a protection to the evergreens.

Mr. H. G. Joly, in the 6th report of the Montreal society (for 1880), speaks in high terms of his cotton woods, which in twenty-three years had attained the height of sixty feet, with a diameter of twenty-five inches. This is a remarkable growth, truly, and though the timber

be not of superior value, the desired shelter is quickly produced; and, as he wisely suggests, it will aid in protecting other trees. One form of the cottonwood is a great favorite in Scotland, where it is called the black Italian poplar, and perhaps the same kind is planted extensively in parts of France, where it is known as the *peuplier du Canada*.

The European white willow (*salix alba*) is another tree of similar characters, easily multiplied by cuttings, of rapid growth, and largely employed in prairie regions for wind breaks and shelters. When matured these soft woods will be found to have great value for many purposes, though inferior to hardwoods and resinous trees either for lumber or for fuel. The charcoal used in the manufacture of gunpowder is almost exclusively prepared from the white willow.

But your own native trees claim your consideration, and, as appears from your transactions, they have received deserved attention in your discussions. The noble American oak—"Canadian"—(*quercus alba*) merits the care of all planters, especially in the groves. Though it be rather slow in its early growth, it may be supported by more rapidly growing species that must be gradually removed as the oaks need the space they have occupied. Oaks or their acorns may be planted among the poplars and willows of the outside rows, and they will be ready to spring into a vigorous growth when these pioneers are removed.

The sugar maples will make lovely groves, that will yield their sweet tribute, as well as lend their beauty to the landscape, while living, and furnish valuable timber for fuel when cut down. The invaluable white ash should be much more largely planted in groves and by the roadsides, as it makes a beautiful and most useful tree. The American elm, too, has its uses as timber, and is especially adapted for avenues, where room is given for the development of its wide-spreading and wind-resisting branches. The wild cherry, the black, not the red (*prunus serotina*), is commended for its elegance, its thriftiness and rapid growth, as well as for the great beauty and usefulness of its lumber, which is quickly produced.

In your discussions on the subject of shelter, as reported in one of your volumes, a native tree is named which is well to have recognized for its beauty, as well as for the merits you very properly attribute to it as a bee pasture. The American linden or basswood (*Tilia Americana*), may very well be made a leading component of the home grove; its rapid growth will soon make it effective, and its sweets will certainly be welcomed by the bees. The timber of the linden, too, has its uses, though very soft and inferior to many other species, and its inner bark has a commercial value as the material of bast matting, while the wood is used for paper pulp.

There are many other trees with which you can experiment in your planting, but they need not now be mentioned.

In the selection of evergreens for these shelter groves and belts, the hardy natives of your own country should first claim your attention. Nothing can better serve your purpose than the common white pine (*pinus strobus*), and the red pine (*P. resinosa*). Both are rapid growers when fairly started, and both are well adapted to your soil and climate. For shelter grove or wind break they cannot be surpassed. Next to these and in the same genus come the foreign kinds known as the Scotch (*P. sylvestris*), and the Austria (*P. Austriaca*), which are rugged and thrifty, of great value, both growing and when felled, but not equal to our natives above named, either for their future lumber or in the rapidity of their growth. Neither of these can compare with our natives as ornamental trees, though they are often planted with that end in view. They belong to the forest rather than to the lawn, for which we have lovelier species.

Of spruces you have the natives, the beautiful white spruce, (*Picea alba*), and the black, which has often a blue tint, (*P. nigra*) and its variety often called red spruce, trees of medium size and beautiful, but excelled in size and utility, whether standing or felled, by the foreign exotic Norway spruce (*P. excelsa*), which yourselves have decided, and very correctly, to be the very best of all evergreen trees for the shelter belt, on account of its hardness, its