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Some Forestry Problems of the Prairies of the Middle West

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SOME FORESTRY PROBLEMS OF THE PRAIRIES OF THE MIDDLE WEST.

BY HUGH P. BAKER.

A residence of several years in one of the central prairie states and two seasons spent in studying natural conditions through a belt of prairie country from the Mississippi to the foothills of the Rockies makes me feel that the problems of prairie forestry are not only intensely interesting, but that their early solution will be of vast importance to the future agricultural and commercial development of the entire middle West.

THE REGION CONSIDERED.

To more clearly define the region, the forestry problems of which will be considered in this paper, a broad belt of country has been selected lying between the lines of mean annual rainfall of 15 inches on the west and 30 inches on the east and including all or large parts of the states of Minnesota, North and South Dakota, Iowa, Nebraska and Kansas. There is no part of the region, where there is sufficient soil, that forest trees cannot be grown successfully, but until there is a much greater forest covering than at present it will not be as simple a matter to make trees grow as it is farther east or west, where conditions of rainfall and wind currents are more favorable. There is really considerable similarity in the soils of the entire region and there are no soils except the acid soils of peat swamps that are not fitted for the successful commercial production of forest trees.

The entire region except northeastern Minnesota and the Black Hills country is essentially treeless, though there are numerous indications that this was not always so. There have been some desultory and incomplete studies of early surface conditions in the region, but not enough data has yet accumulated to justify definite statements as to any forest cover that may have existed in late geological times or as to the causes for present treelessness. Systematic investigations of peat bogs which exist here and there throughout the region might throw much light on the subject. We are, however, safe in believing that the treeless condition is not due to any one cause, but to a combination of causes or factors, such as annual or periodical fires, wind, lack of precipitation and fineness of soil.

OPPORTUNITIES FOR THE PRACTICE OF FORESTRY.

This region offers large opportunity for the practice of forestry with consequent solution of the problems of prairie forestry for two reasons. First, the large amount of non-agricultural land existing in the states included in the region. Ordinarily one thinks of this whole section of country as a rich prairie covered with grain and stock farms, and it is an exceedingly rich section. The total area of the six states under consideration is 447,425 square miles. The

census of 1900 shows that of this area 237,025 square miles or 174,736,000 acres is unimproved and non-agricultural land. It is probable that since 1900 considerable areas have been brought under cultivation, but for some years to come there will be an area larger than the present area of our National Forests which may be devoted to the growing of forest trees without using an acre of cultivated or improved land. Throughout the northern portion of this section the dairy and fruit industries are developing rapidly and more and more unimproved land will be used for grazing and fruit growing. But should we take only half the amount of non-agricultural land as given by the census of 1900 there would yet be an area of 87,368,000 acres, which is nearly equal in size to Minnesota and Iowa combined. This vast amount of essentially forest land, easily accessible to the great markets of the middle West, and largely without the topographic and climatic difficulties of the forest lands of the Rockies and westward, certainly demands careful consideration in the development of a future and perhaps permanent forest policy for this country, towards which we are now feeling our way.

Second, the nearness of good markets. This factor often controls the success or failure of large commercial undertakings, especially where initial expenditures are great. Under existing climatic and soil conditions we are learning that it is necessary to use seedlings and well-developed seedlings in starting successful commercial plantings on our prairie lands. The initial expenditure in carrying on forestry work which involves planting will therefore be great, but the accessibility of the land and nearness of market will make it possible to harvest easily and often and to dispose of all of every tree.

What Lands May Be Devoted to Forestry.

The fence post question and in many instances the fuel question are just as vital to the prairie farmer as the tie and coal questions are to our railroads. With the introduction of methods of treating timber at small expense, it will rapidly become more profitable to grow as a forest crop the soft wooded species which may be grown on an exceedingly short rotation. The value of agricultural land generally in the region is too great to justify its use for the commercial production of timber over large areas. It is not a business proposition to devote land in any quantity to tree growing which will range in price from $10 to $100 per acre when there are millions of acres of sand hills and sand barrens which will grow good crops of trees and which may be purchased readily at from 50 cents to $5.00 per acre. Though it will not pay to devote large areas of valuable prairie land to tree growing, it will pay on farms of 100 acres or more to plant from 1 to 10 acres of good rich land to quick growing species producing wood durable enough for fence posts or which may be easily and cheaply treated with some preservative. Measurements taken on many groves in this region seem to prove that where good land is planted to the right species and given proper culture, that returns comparable with those from grain crops are obtained. With the present constant increase in prices of all sorts of wood material used on the farms of this section, farm owners are beginning to see that it is a business proposition to grow needed wood supplies right on the farm.

Planting Problems of the Prairies.

If we relegate the growing of forest trees on a large commercial scale to the essentially waste lands of the region there is left the vast area of good agri-

cultural land which in the future must and will produce a large part of the posts and repair material needed on the farms. This agricultural region offers two lines of planting problems for consideration. First, planting from standpoint of protection. This phase of forestry has been an importane one to the dweller on the prairies since settlement first began. Without agitation on the part of those early interested in forestry in this country windbreaks were planted as soon as settlers began pushing out across the prairies. Seeds and cuttings of species native along the waterways were first used because easily accessible and cheap. A little later seeds of eastern species were sent out to the prairies by relatives of the settlers, and men like Prof. Parry of Davenport, Iowa; Prof. Henry H. McAfee, who was secretary of the original American Forestry Association organized in Chicago on September 10th, 1875; ex-Governor Furnas of Nebraska; Arthur Bryant of Princeton, Illinois, and Prof. Budd of Iowa were instrumental in introducing evergreens from both the east and the west. In this way all of the native species and a very large number of exotics have been given trial and it is safe to say that the problem of the species best adapted for windbreak planting in this section is pretty thoroughly solved. What we do not know and what seem very important problems to be solved during the next few years are, first, just what influences windbreaks of different species have upon wind currents of varying velocities and upon rapidity of evaporation under differences of temperature and humidity; second, just how far windbreaks of varying heights will produce a calm to the leeward under differences of topography, and, third, the influence of the nearness and denseness of windbreaks upon grain and fruit production, plant diseases and injuries by frost. Our own efficient Weather Service has done a little preliminary work along these lines and we know of the results obtained by M. Becquerel in the Rhone Valley and others, yet the problems above referred to are really unsolved and offer an extremely interesting field to the investigator.

Every year throughout this region soil erosion is causing greater injury to fields and their crops, barren ridges and bottom lands. Both the increase in price and in the crop production possibilities of the land are yearly making it more necessary that this serious damage from erosion be prevented. Many land owners appreciate the seriousness of allowing erosion to continue, while others do not, and until all know there should be a vigorous campaign of education along this one line. Such efforts as have been made to prevent erosion have been unsystematic and temporary. A few desultory studies have been made here and there, but more thorough investigations are needed with the results so presented that owners of land susceptible to erosion will not allow it to begin and upon lands where it has begun effective measures will be carried out to prevent further injury.

Within the limits of this region there are a few areas subject to soil movement by wind and in several instances actual sand dunes are forming. Throughout the country as a whole damage resulting from dune formation and movement is very much larger than ordinarily supposed. As most of the dune areas are adjacent to waterways and large bodies of water, it may be that the actual work of dune reclamation belongs to the War Department, but experience abroad, as well as in this country, has shown conclusively that grass planting alone as a means of dune reclamation cannot be otherwise than a temporary expedient. If the solution of the dune problems belongs in any scientific bureau of our government it is in the Forest Service.

Second, planting from the standpoint of production.

In the light of experience in other parts of the country and abroad it is probable that the large areas in this section previously referred to as essentially non-agricultural land, amounting to nearly 90,000,000 acres, can only be effectively and profitably handled from a forestry standpoint by the states or by the national government. As extensive studies have been made of lands of this class west of the Mississippi their problems will not be considered here.

There are, however, many millions of acres of agricultural land which should and will produce over small areas and in small quantities the posts, repair material and fuel needed on the farms of the region. The long-continued trial of species for windbreaks has shown to a certain extent the species best adapted to the requirements of farm planting. Recent studies have given considerable data of greater or less value upon growth and something as to soil and moisture requirements of the trees which have so far been successful. There are, however, some interesting problems yet to be solved. One of the most valuable trees for this region, the European Larch, is an exotic. There are other exotics which, upon thorough trial, may prove equally as valuable. Those foreigners among our trees which are partial failures, such as the Scotch Pine, may upon the introduction of seed from the best trees growing in Europe or by selection here, be made very much more profitable. Without doubt breeding and selection, though requiring a long period of time, will improve the hardiness and shape of the Hardy Catalpa, Russian Olive and Mulberry; will fix the thornless form of the Honey Locust, and produce a straight growing and thornless form of Osage Orange and last and most important produce a borer resistant Black Locust.

Under the severe conditions of winter and summer droughts on our prairies proper culture is extremely important in the successful production of a forest crop. We may profit somewhat by the experience gained in the production of fruit and grain crops by dry-farming, yet as a whole the cultural methods necessary in successful tree growing are unsolved problems. Those who have been observing results of tree growing in this great central prairie region will agree that the plantings on the prairies have so far yielded but a fraction of a per cent of what they would have yielded with proper culture and protection. In many instances the returns from groves put out on rich prairie land have been fair, but this has been in spite of proper care rather than because of it.

The early promiscuous mixed plantings made up of a great variety of species did not prove satisfactory and tree planters have gradually swung to the opposite extreme and are planting too much in pure stand. Either extreme is far from right with all species under prairie conditions, yet with our present lack of knowledge planters are probably safer in putting out their trees in pure stands than attempting mixtures. There are certain combinations of species usually advised for prairie plantings and yet we do not know what the result will be under the varying soil and climatic conditions of the prairies. We cannot give advice for the western country based upon results obtained here in the East. This problem of proper mixture of species demands early solution.

Who Will Solve the Problems.

A consideration of the problems suggested leads directly to the question as to who can best solve them. Whether the National Forest Service should take hold of the matter or whether the states interested are in a position to begin a series

of scientific investigations requiring a long period of years and carry them to a successful completion is a difficult question to answer. At present the states are not willing to provide sufficient funds for the maintenance of organizations under which such work might be carried out. However, with the example of several eastern states before them, there is a growing sentiment throughout the entire region that the several states interested should carry on work in forestry in so far as it is confined to their limits. It seems reasonable that problems which are of vital interest and importance to the whole region should not be left to the separate states, but should be solved through the efforts of the National Forest Service. If this is not done one state through lack of interest or ability may hold back the proper forestal development of all the states interested. Upon whomsoever the responsibility of the solution of these problems falls, it is exceedingly necessary that investigations should begin soon that we may have the knowledge absolutely required to successfully practice forestry over the prairies of our great middle west in a way consonant with the intelligence and energy of her people.