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Forest Trees of Adair County, Iowa

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the middle ledges in the Pine creek conglomerate. It is seen to contain three rounded boulders from eight inches to one foot in diameter. One of these consists of gneiss, one of mica schist and one of quartzite. In a collection of 100 pebbles from this ledge, different rocks were represented by the number of pebbles indicated in the following list:

Greenstone.....	26	per cent
White quartz.....	26	“ “
Yellow chert.....	18	“ “
Granite (mostly red).....	7	“ “
Light red orthoclase.....	5	“ “
Coal measure rock.....	4	“ “
Black felsite.....	3	“ “
Quartz-biotite schist.....	3	“ “
Faintly pinkish white quartz.....	2	“ “
Quartz speckled with jasper.....	2	“ “
Red quartzite.....	1	“ “
Hornblende rock.....	1	“ “
Milky quartz.....	1	“ “
Gneiss.....	1	“ “

The author is inclined to the opinion that this conglomerate in Muscatine and that exposed on Pine creek are both outliers of the same formation, but he has no suggestion to offer as to what age they really belong farther than as above stated.

FOREST TREES OF ADAIR COUNTY, IOWA.

BY JAMES E. GOW.

In order to understand the forestry conditions of Adair county, a short description of the lay of the land and the nature of the soil is first necessary. The county lies along the crest of the “grand divide,” between the Mississippi and the Missouri, so that a line drawn along the crest of the ridge traverses it diagonally from northwest to southeast. The land is undulating enough to secure an easy natural drainage, but not so undulating as to be difficult of cultivation, except in a few isolated localities. The soil is a rich, black loam, varying in thickness from a few inches to ten or fifteen feet and underlain by a stiff, yellow clay. Here and there, the larger streams may be found flowing over beds of limestone, but as a rule

they flow either through the black surface soil or the yellow clay below it. Of these streams, North river and Middle river enter the Des Moines, while Grand river and the Nodaway flow into the Missouri. Although commonly called rivers, none of them attain to sufficient size, in Adair county, to deserve the name, but all become streams of considerable size before losing their identity in the Missouri or the Des Moines. The rivers along whose course is found the heaviest timber are Middle river and the west branch of the Middle Nodaway, and it is on these streams that the greatest variety of species have been found and most of the observations have been made. The prairie in Adair county is practically bare. The only trees or bushes ever found upon it in any abundance are the hazel and bur oak, and these have been largely grubbed out and destroyed. The wild plum, wild cherry and American crab, may occasionally be found on the high prairie, but they very seldom, if ever, occur there unless protected by other low timber, and as the bur oak and hazel are destroyed, they vanish also. So it is along the streams that the student of forestry must seek his information.

Even a cursory examination of these streams is sufficient to show that, with few exceptions, the southern or western bank is steep and rough, while the northern or eastern bank is smooth and rises with a gentle slope. Along most of the course of Middle river, through the county, the southwestern bank consists of steep clay bluffs, densely wooded and rising abruptly from the water, while the northeastern bank slopes up very gradually from the water—making a wide, level valley or bottom, which is usually either destitute of trees, or less heavily wooded than are the bluffs of the opposite bank. The same condition may be noticed quite generally with regard to the smaller streams. In driving along the road it is noticeable that the steepest hills face the north or east, and the gentler inclines the south or west. The reason for this must be that the erosion has been greater on the north than on the south bank, owing to the fact that the former receives the full rays of the spring sun, while the southern bluff lies in shadow most of the day. This, of course, would cause the snow and ice upon the northern slope to melt very quickly, making considerable erosion, while upon the southern bank it would melt much more slowly and hence cause much less erosion. Where the course of a stream is southward it is the left bank which

shows the greater signs of erosion, because it is exposed to the burning rays of the afternoon sun, while the right bank is in shadow during the hottest part of the day. The effect of this process upon the distribution of timber is evident. The steep bluff-land upon the southern or western bank of a stream is usually heavily wooded, while the flat "bottom" upon the northern or eastern side is often very sparsely covered with trees and sometimes quite bare. Before the advent of civilization the southern bluffs often held the moisture of the winter snows and spring rains until after the season of prairie fires, thus giving the trees sprouting upon their surface a chance to grow, and, when the trees had grown large enough, they further protected themselves from fire, the surrounding grass being killed out. But the northern bank, which had to face the rays of the spring sun, was well dried by the time the grass on the prairie was dry enough to burn, and so the trees growing upon its surface were destroyed. This is the process which must have taken place during many years before the day when the plow of the first white settler cut the soil of western Iowa. Its effects are still noticeable, but not so noticeable as they must have been at an earlier day. To-day, practically all of the trees in Adair county are of second growth. There are left only a few isolated specimens of the so-called first-growth timber. Since the days when the prairie fires ceased, seedlings have taken root in the fertile flats which form the northern and eastern banks of our streams, and have grown into trees of goodly size, and in some places the southern bluffs have been shorn of their trees. Still, in a general way, the primitive condition is still noticeable; the timber on the southern bluff is usually larger and thicker than that on the northern bottom. It is noticeable, too, on the prairie—wherever enough of the original brush has been left to indicate anything at all. The hazel and bur oak will grow on a southern or western slope, but they are not generally found in such a situation. Usually they seek the northeastern side of a hill, and there they flourish luxuriantly.

As has been said, there is very little of the first-growth timber remaining in Adair county. The first settlers of the county found along the streams a thick growth of large, well developed trees. Since then almost all of these trees have been removed, until there remains very little timber which was well grown at the time of the first settlement of the county,

forty years ago. In its place has appeared a growth of smaller trees, which were saplings when the older trees were destroyed, or have grown from the seed since that time. Here and there may be seen a relic of the first growth—some giant of the forest who towers high above all the trees about him—but, as a rule, the forest of to-day is made up of younger and smaller trees than those which composed the forest of forty years ago.

The area, however, of the timber land along the streams remains about what it was at an earlier day. It may possibly be a trifle less, but only a trifle. The second growth covers substantially the same area that was covered by the first growth. The chief denudation of the country has come about, not through the destruction of the larger trees which grow along the rivers, but through the removal of the bur oak, hazel, and other prairie species. Before the settlement of the county—if we may trust the accounts of the earliest settlers—a large part of the prairie was covered with brush. To-day the greater part of the brush is gone and the land upon which it grew is under cultivation. The absence of the brush from the prairie tends to increase erosion and decrease the conservation of moisture in the soil, but its destruction was inevitable because necessary to the successful carrying on of agriculture; and, as conditions grow harder and the land becomes more densely populated and more closely farmed, the destruction of that which is left will become necessary and inevitable. But as the prairie brush is destroyed greater care than ever should be taken to preserve the large and really valuable timber along the rivers, and to extend its area if possible. The people of Adair county have not carelessly destroyed their forests as have the people of many portions of the country. They have preserved them, but it cannot be said that they have preserved them understandingly. The second growth has come in so thick in many places as to choke itself. Valuable walnut, ash or hickory trees are often prevented from making a good growth by the thickets of maple, elm or elder in which they grow, and, too often, when the needs of the farmer force him to cut firewood for himself, he takes all the trees from a certain area, instead of cutting out only those which can best be spared and leaving the remainder. A little popular education on the subject of forestry might remedy these difficulties and teach our farmers to take a greater interest in their forests and better care of them.

During the past twenty-five or thirty years the extent of artificial groves in Adair county has grown from nothing at all to many acres. Almost every farm-house now has a yard full of trees and a wind-break to the north, and hedges of maple, willow and osage orange line many of the roads. Unfortunately, the best species for the purpose are seldom used in these groves. Instead of planting walnut, ash or white oak, our farmers usually plant the soft maple, on account of its rapid growth, and the result is that no sooner do the trees arrive at a respectable size than the winds play havoc with them. The box elder is much used, more on lawns, however, than in groves, and although rather soft it is a good tree and a very pretty one when properly trimmed. The willow figures occasionally in groves, but more frequently in hedges on low lands, where the maple is also sometimes used. Groves of walnut or of ash are occasionally met with, but are not common. The cottonwood is used but rarely and the oak never, so far as we know. While these artificial groves are of little value in conserving moisture, preventing erosion and preserving true forest conditions, they are useful in breaking the force of the winter winds, and they exert more or less of a civilizing influence by adding to the beauty of the monotonous prairie landscape and the comfort of life on the farm.

In Adair county a few species of trees, which are common elsewhere in Iowa, are conspicuous for their absence. The butternut, sycamore and hard maple are found in Madison county, along the course of the Middle river, but we have been unable to discover that a single specimen has ever been found growing wild on this side of the line. The Missouri hickory grows along the Nodaway, it is said, north of the state line, but does not extend this far north. The pawpaw is found occasionally in southern Iowa, but has not been found in Adair county. The fact of a few birch trees having been observed, some twenty years ago, near the town of Casey, on the north line of the county, led to a search through that locality, but no birches were found and none have been found in any part of the county. Both the butternut and birch are reported as being common along the course of the North Raccoon river in Guthrie county.

Following is a list of the species of forest trees found growing in Adair county. The nomenclature of Wood has been followed throughout:

Ulmus americana L. White elm. Common on banks of streams and in valleys, sometimes growing a little way up the sides of bluffs and occasionally found on upland. Attains its greatest size on low ground. Well distributed throughout the county. Frequently planted as a shade tree

Ulmus fulva L. Red elm. Slippery elm. Found only on low land. Common. A smaller species than the preceding.

Ulmus racemosa Thomas. Rock elm. A rare species which we have not found within the county. Has been reported by an early settler, well acquainted with the native timber, as growing in scattered locations along the west branch of the Middle Nodaway.

Quercus macrocarpa Michx. Bur oak. Scrub oak. This species is very common and occurs most frequently on the sides and summits of river bluffs and on the high prairie, where it is a gnarled, stunted, shrubby tree, varying in height from ten to twenty feet. Occasionally, however, it may be found growing in rich river bottoms, where it becomes much straighter, resembling the white oak in its habit of growth and attaining a height of thirty or forty feet. It is the most abundant species of oak and one of the most abundant trees in Adair county. On the prairie it and the hazel appear to be inseparable companions. The bur oak is almost the only tree which safely resisted the prairie fires and grew in abundance on the open prairie, before the advent of civilization. Clumps of it are found scattered over the prairie at intervals—remnants, evidently, of the more abundant growth which once covered the country.

Quercus rubra L. Red oak. A handsome, straight tree, found in tolerable abundance on the bluffs near the larger streams and occasionally on bottom land or in thickets of bur oak on the high prairie.

Quercus alba L. White oak. Not uncommon. Found along the larger streams—seldom, if ever, on prairie. Prefers rough, clay bluffs.

Quercus coccinea var. *tinctoria* Wang. Black oak. Not so abundant as the red oak and occupies the same habitat. Does not attain the size of either of the preceding species.

Negundo aceroides Moench. Box elder. This is probably the most common of all the trees native to Adair county. It is found along all the streams wherever there is any timber at all and is often planted on lawns and in groves on the prairie, where it flourishes.

Acer rubrum L. Red maple. Soft maple. Swamp maple. Quite common. Grows luxuriantly on the banks of streams and in all low, moist places. Very frequently planted in groves and on lawns, where its soft wood is often broken by high winds which it is unable to resist without the protection of larger timber.

Carya alba N. Shell-bark hickory. Common along the larger streams, where it grows well up on the bluffs, and occasionally in the bottoms.

Carya glabra Torr. Pig nut. A somewhat smaller and coarser species than the preceding. Usually found on lower land. The two species are about equally common.

Juglans nigra L. Walnut. Common along the larger streams, where it grows luxuriantly and attains a good height. Never seen on the prairie, except when planted there, which is not often the case. The walnut was much more abundant a quarter of a century ago than it is to-day, although it is still a very common tree. Owing to the value of the wood it has probably suffered more at the hands of woodmen than has any other tree found in Adair county.

Tilia americana L. Basswood. Linden. Quite common in all river bottoms. Seldom seen elsewhere.

Populus canadensis Desf. Cottonwood. Not rare. May be found in occasional clumps in all low, moist situations. Is occasionally planted in groves or hedges.

Celtis occidentalis L. Hackberry. Not rare. Found only in timber along the larger streams—always on low land. Is occasionally transplanted and makes a very handsome lawn tree.

Aesculus flava Ait. Buckeye. A tolerably common species along Middle river and the Nodaway, but never found on Grand river.

Gleditsia tracanthus L. Honey locust. Not common. Is found in scattered groups along both the Nodaway and Middle river.

Prunus serotina Ehr. Wild cherry. Tolerably common along the roads and on all waste land.

Prunus americana L. American plum. Wild plum. Very common on all low lands. About equally abundant in the larger timber and along the small prairie streams where it and the wild crab are often the only species of trees. Occurs occasionally on the uplands in company with hazel, bur oak and sumac.

Ostrya virginica Willd. Ironwood. Not uncommon along the Nodaway, and may be found on Middle river, but not abundantly.

Crataegus coccinea L. Hawthorn. White thorn. Red haw. Common on low land, usually in larger timber.

C. tomentosa L. Black haw. Not very common. Found in greater abundance on the west than on the east side of the county.

Pyrus coronaria L. Crab apple. Very common on all low land, whether open or covered by larger timber.

Cornus paniculata L'Her. Dogwood. Common in thickets, both in valleys and on the higher land.

Rhus glabra L. Sumac. Common in thickets along the side and crest of river bluffs and on the high prairie. Found usually with hazel and bur oak.

Sambucus canadensis L. Elderberry. Common in thickets on all waste, rich land. Prefers the bottoms.

Prunus virginiana L. Chokecherry. Fairly common on all low land. Usually found in hick ts of other timber.

Corylus americana Walt. Hazel. Very common on all rough, rolling land, especially near the larger streams. Very seldom found on low land. Originally a great part of the prairie was covered with hazel, but most of it has been removed. A good deal yet remains, however, and all along the larger streams it is very abundant.

Salix nigra Marshall. Willow. Tolerably common on all low, moist ground.

Vitis aestivalis L. Wild grape. Common in all timber.

Lonicera parviflora Lam. Not common. Found occasionally in heavy thickets.

EFFECTS OF A SLEET STORM ON TIMBER.

BY JAMES E. GOW.

On the night of the 9th and the morning of the 10th of February, 1898, a heavy sleet storm passed over Adair county, Iowa. The storm began not very long after midnight with a brisk rain which froze as it fell and adhered tenaciously to trees and other objects with which it came in contact. The