

# Pinus virginiana in the Forest Primeval of Five Southern Indiana Counties

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The *Butler University Botanical Studies* journal was published by the Botany Department of Butler University, Indianapolis, Indiana, from 1929 to 1964. The scientific journal featured original papers primarily on plant ecology, taxonomy, and microbiology. The papers contain valuable historical studies, especially floristic surveys that document Indiana's vegetation in past decades. Authors were Butler faculty, current and former master's degree students and undergraduates, and other Indiana botanists. The journal was started by Stanley Cain, noted conservation biologist, and edited through most of its years of production by Ray C. Friesner, Butler's first botanist and founder of the department in 1919. The journal was distributed to learned societies and libraries through exchange.

During the years of the journal's publication, the Butler University Botany Department had an active program of research and student training. 201 bachelor's degrees and 75 master's degrees in Botany were conferred during this period. Thirty-five of these graduates went on to earn doctorates at other institutions.

The Botany Department attracted many notable faculty members and students. Distinguished faculty, in addition to Cain and Friesner, included John E. Potzger, a forest ecologist and palynologist, Willard Nelson Clute, co-founder of the American Fern Society, Marion T. Hall, former director of the Morton Arboretum, C. Mervin Palmer, Rex Webster, and John Pelton. Some of the former undergraduate and master's students who made active contributions to the fields of botany and ecology include Dwight W. Billings, Fay Kenoyer Daily, William A. Daily, Rexford Daudenmire, Francis Hueber, Frank McCormick, Scott McCoy, Robert Petty, Potzger, Helene Starcs, and Theodore Sperry. Cain, Daubenmire, Potzger, and Billings served as Presidents of the Ecological Society of America.

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# PINUS VIRGINIANA IN THE FOREST PRIMEVAL OF FIVE SOUTHERN INDIANA COUNTIES

By MILDRED I. ROSS

## INTRODUCTION

The numerous misconceptions of the primeval conditions in our country plainly show that the most common knowledge of an environment may become less than a half-truth by the time a second generation of men lives in that same area. New environmental conditions bring out the hidden potentialities of plants and animals and gradually men formulate new concepts and believe that they are describing the organism under primeval conditions. It is, of course, amazing how very little man placed on record about the things with which he was associated when he came into the wilderness where life was controlled by natural laws. This is true for accurate descriptions of the flora and the fauna of Indiana forests, of the prairies, of the relic colonies of northern and southern plants, and, in this case, of the presence of one particular species of pine.

*Pinus virginiana* in a deciduous forest must have been conspicuous enough, and it must have been of definite economic importance to Indians and pioneers alike, yet knowledge of its presence when white men came is now so veiled in obscurity that some men doubt that it was ever native in the forest primeval of Indiana.

The opinion of so-called pioneers quoted by Deam (4) is inadequate as an answer to the question because they were too far removed from the undisturbed primeval forest. For that reason the present study was undertaken, using as source of information, data obtained from records which greatly antedate the changes in primeval conditions brought about by the activities of civilized man.

## PINUS VIRGINIANA AND ITS DISTRIBUTION

*Pinus virginiana* is known under a variety of names, such as "old field pine," "Jersey pine," and "pitch pine." The latter is the name preferred by the pioneers. Green (7) says, "In the south it is known as 'possum pine' because of its dark, discouraged-looking branches."

Another very common name is "scrub pine," referring to the characteristic that even after death the side branches persist for many years, giving the tree a ragged, scrubby appearance.

Potzger (14) says, "It is found in the open fields, along roadsides, in pastures, ditches and fence corners." *Pinus virginiana* produces seeds abundantly. Sargent (17) says, "Cones develop most prolifically on exposed branches." Later on he says, "Seed production is most prolific, at least three-fourths of the cones bearing well developed seeds, and as many as 75 seeds to the cone were counted." Likewise, Deam (4) states, "It propagates easily from self sown seeds." Thus *Pinus virginiana* was ideally equipped to take control of many open areas under primeval forest conditions. It was necessarily limited in extent, being found on the crowns of knobs. The early pioneers made numerous ideal situations for the spread of pine, not only on the knobs along the Ohio River, but over a wide area in Indiana where the soil became impoverished by poor conservation practices.

The pattern of distribution of Virginia pine in the United States is roughly triangular in shape, as shown by Livingston and Shreve (12). The base of the triangle extends from Long Island and the sandy barrens of New Jersey to central Georgia. However, it is generally excluded from the coastal plain from Virginia to Georgia. The range extends westward over shale hills and mountain bases across the Alleghenies, terminating in Kentucky and the knobstone areas of Floyd, Clark, Scott and Washington counties in southern Indiana. Collingwood (3) says that its vertical gradient is from sea level to three thousand feet, but that it attains its largest size in the low hills and knobs of southern Indiana.

There is no doubt that *Pinus virginiana* occupies a unique position in forest distribution. Livingston and Shreve (12) have selected it as a representative type of unusual distribution. They say the following, "*Pinus virginiana* has been used as an example of a type of distribution which is somewhat unusual among evergreen needle-leaved trees, occupying an area between the northern and southern evergreen needle-leaved forests and lying wholly within the deciduous region." A comprehensive study of *Pinus virginiana* in Indiana was made by Deam (4). We quote him as follows, "The distribution in Indiana is quite limited and has never been fully understood by authors who

variously give it as found throughout the southern part of Indiana. It is confined to the knob area of Clark, Floyd and Scott counties and the southeastern part of Washington County. In the original forests it is confined to the tops of the knobs where it is associated with *Quercus prinus* (Gray's Man. 8th ed.). It propagates easily from self-sown seed, hence is soon found on the lower slopes of cut-over lands and soon occupies fallow fields. It is now found in the open woods several miles east of the preceding counties, but pioneers of this section say that it was not a constituent of the original forests but has come in since the original forests were heavily cut over. It is helieved that it crowned the knobs over an area from 5-10 miles wide extending through the counties named and extending northward about 25 miles."

According to DenUyl (5), civilized man has extended the range of *Pinus virginiana* in Indiana by frequent planting on farmsteads and school and church grounds in southern Indiana. From these planted trees natural regeneration has occurred. It is now found in 29 counties not listed by Dr. Deam.

## GEOLOGY AND PHYSIOGRAPHY OF THE REGION

The area under consideration in southern Indiana is as a whole rugged, though notable exceptions occur, especially along the Ohio River where a plain has developed. The peak of relief is reached in the unglaciated portion of Floyd, Clark and Scott counties. Much of the region bordering the Ohio River has striking relief due to the cutting of the river. It is here also, that the largest, most prominent and well defined topographic form in Indiana, the Knobstone Escarpment, starts. This range of hills extends northward from the Ohio River for nearly 150 miles. Near the river it is rugged in appearance due to the many small streams which descend from the upland back of the crest which rises 400 to 600 feet above the lowlands and valleys below. "Prominences on this in Floyd, Washington, Clark and Scott counties," says Malott (13), "reach an altitude of over 1,000 feet." Everywhere the escarpment is steep-sloped, but rarely, if ever, unscalable. At places where the face is broken and dissected the prominent spurs appear from the distance as great knobs and conical hills. These are spoken of as "The Knobs."

## PIONEERS AND PIONEER SETTLEMENTS

The vast wilderness of which southern Indiana constituted a part was, at the time of the Revolutionary War, the favorite hunting ground of various Indian tribes. No real effort had been made by white men to settle it. After the end of the war, George Rogers Clark and men of his command received a grant of land (Clark's Grant) from the government. Being open for immediate occupation, many of the men and their families started there soon after. One of the first problems after reaching the new land was the location of a suitable place for a community.

At the falls of the Ohio River, a town site was laid out, and in 1783 Clarksville came into being. It is the oldest settlement in southeastern Indiana on the Ohio River. Only the most hardy and brave dared come into the wilderness to settle here for the Indians used all their cunning to kill and terrorize the white man. The process of taking up lands was necessarily slow, but by 1795 a second community had been established off the Ohio River. To it, Springville, goes the distinction of being the first "All American" town in the new grant not located on the River. Slowly at first, but with ever increasing tempo, the tide of immigration moved south and west, striking the other counties in southern Indiana under consideration as follows: Switzerland—1795; Floyd—1799; Scott—1805; and Jefferson—1805.

### HISTORICAL REFERENCES TO PINUS VIRGINIANA IN INDIANA

In order to know definitely whether the scrub pine was a constituent of the forests along the Ohio River when white men first arrived, one must of necessity consult historical records of earliest pioneer life in that region. Pine and its products would have had so many uses for pioneers that they could hardly have failed to make mention of them if the tree was actually present. This assumption proved to be correct, for frequent and specific reference to pine was found both in the field notes of the surveyors and in the description by the pioneers. The use of pine was both varied and extensive. Levering (11) says, "Pine boughs were laid across webbing attached to the sides of a bed in order to provide a comfortable place in which to sleep, since the pioneers had not brought featherbeds." In another reference, she says, "Fire hunting the deer was a favorite way

of killing it. The hunter would go along the stream in his canoe with a pine knot flaming at the bow. When the deer came down to the water's edge to drink or to the salt licks found frequently near the water, the light would shine in its eyes and it would stand immobile, an easy target for the hunter." Collingwood (3) makes the following statement: "The early settlers burned this wood (pine) in kilns to obtain charcoal and tar." Dunn (6) in telling of the domestic needs of the Indians says that they made maple sugar in sugar troughs. "The joints of these (sugar troughs) and their canoes were stopped with gum from evergreen trees and beeswax." Another interesting reference to the use of pine was taken from the History of the Ohio Falls Cities (9). Daniel Boone and his hunters of Kentucky were in the Ohio River country when one of them was captured by the Indians. He was to be burned at the stake. Bogart (10) says, "The Indians had collected their fagots from the pitch pine. . . ." The same author states, "The settlers found, as had the Indians before them, that the evergreens gave forth their resins easily if burned in a kiln. This was used to seal the joints of their canoes to make them leakproof and seaworthy."

The field notes of the surveyors with reference to pitch pine were terse and to the point. Just to quote a few of these: "Third rate soil, covered with pitch pine"; "Soil poor, hilly, pitch pine"; "Broken low ridges, covered with cedar and pine"; "Pitch pine, third rate soil, mountainous."

The names, "Borden's Pine Knob" and "Piney Point," appear in records of the Ohio River country. Since objects are usually named by the first person to see them and are usually somewhat descriptive, in all probability the pioneers were the first whites to see these two points. Surely they must have been the ones who named them. High, conspicuous peaks bearing pine would likely have the word "pine" in any name given them. Thus, Piney Point and Pine Knob would be good names for such points. These statements all refer to the conditions in the forest primeval in certain areas in southern Indiana, and to well established practices of Indians and the earliest white settlers prior to 1807.

## METHODS

In a study interested primarily in facts, mere descriptions about trees and forests are never so reliable as an actual listing of trees,

together with diameter measurements. For that reason, the original United States Land Survey records and the descriptive field notes for Floyd, Scott, Switzerland, Clark and Jefferson counties were used as a basis of study. In the counties mentioned, the surveys were made between 1799 and 1809. At every section and quarter section corners, two witness trees were recorded by their common names, together with their DBH. The listed stems were tabulated as tables I-V in the original thesis, all of which are summarized as table I in the present paper.\* All species named in the surveys were listed to show the forest association and some of the more obvious conditions with which Jersey Pine had to compete in its struggle for survival.

## RESULTS

Details of the forest composition in the counties under study are shown in summarized form in table I. Pine is recorded in only Floyd and Clark counties. The small total of fourteen stems constitutes the record. The stems ranged from 6 to 15 inches DBH. The most abundant tree of the forest association was beech and the most prominently associated with it were sugar maple (*Acer saccharum*), hickories (*Carya spp.*) and tulip poplar (*Liriodendron tulipifera*).

## DISCUSSION

The real reason for distribution patterns of plants is frequently difficult to discover, for both climate and soil may play a part, either separately or jointly. The problem is especially difficult in the case of *Pinus virginiana* because of the wide range of climate it apparently finds suitable to its needs, as Livingston and Shreve point out (12). The most logical assumption as to the cause of such a distribution pattern is that edaphic and light factors may contribute the major controls. Literature makes reference to several characteristics of the scrub pine that may play a part in its distribution range. Potzger (5) and Sargent (17) point out that while this pine is a prolific reproducer it has the weakness of being very intolerant. This weakness at once eliminates it as a competitor in a broad-leaved forest. Such a forest covered all the favorable sites in Indiana at the turn of the 19th century. The climate of southern Indiana makes possible development of a deciduous forest because of ample rainfall, favorable

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\* The original thesis is on file in the Butler University library and is available on loan therefrom.

temperature conditions, many sunny days and moderate evaporation. Recorded data (table I) shows that it was forest, composed chiefly of beech, sugar maple, oaks and tulip poplar, and associated with them were other species of broad-leaved trees. In the light of these facts, one wonders how this pine could have established itself in a broad-leaved forest. It is also not surprising that the pioneers of a later date assumed that the Jersey pine had been brought in by the first settlers and represented an escape from a few planted trees.

The points discussed in the previous paragraphs do not represent the whole story, for soil factors, too, play a part in the ability of the tree to establish itself and meet competition. Potzger (14) pointed out that Virginia pine grows well in the poorest soil. Such soil was not wanting in the counties along the Ohio River. The surveyors made frequent reference to the fact that the soil was shallow and poor, especially on the steep slopes and high cliffs along the river. The settlers made similar observations and commented on it.

Poor soil and steep slopes are usually not favorable to the establishment of a dense broad-leaved forest. Open stands or scrubby growth with abundant light filtering through the poorly developed crown cover would favor establishment of light-demanding species. Such a condition was ideal for an intolerant species like *Pinus virginiana*. It could grow here, but it could not invade the lowlands nor the upland flats where a deciduous forest presented a closed crown cover.

The area, then, in which this pine could establish itself was very limited. In a rugged topography such as one finds in the Knobs area, there were always open places, mainly along the outer rims and slopes of the hills. Weathering rock and soil provided many cracks and small crevices in which a species like the scrub pine could gain a foothold and maintain itself. Shade here is greatly eliminated as a control factor. Seedlings received the necessary south-slope sunlight and there they could multiply rapidly. This would not be possible under a canopy of broad-leaved trees controlling crown cover on the flats.

Thus there is no denying that in the Ohio River counties limited habitat sites were ideal for a species with the characteristics of the Jersey pine. Historical accounts definitely describe the presence of the tree in such limited areas. The fact that the Indians were well

acquainted with it and used it in many ways and later taught the white man these uses, is almost conclusive proof that the pine antedates the coming of civilized man. As conclusive proof that *Pinus virginiana* was a constituent in the forest primeval of southern Indiana at the time the settlers came, we have records by the surveyors, of stems 12 to 15 inches DBH. Potzger (15) estimates that it would take approximately 60 years for Jersey pine to grow 15 inches DBH. In other words, the 15-inch DBH tree would have been a seedling in 1747, or antedating by many years the arrival of the first settler.

All these voluminous records point conclusively to the fact that Virginia pine was a component in the forest primeval of southern Indiana. The fact that the surveyors did not record it in Scott County, where Dr. Deam lists it as native, may mean that *Pinus virginiana* extended its range into adjacent counties after civilized man cut the dense broad-leaved forest, or that the line of distribution was so narrow that the trees escaped the large-meshed survey net. Since there is no specific need to discuss in detail the broad-leaved forest primeval against which *Pinus virginiana* had to compete, it may suffice to point out that it was a typical mixed mesophytic forest in which beech and sugar maple usually played the leading role by way of abundance. However, here as in central Indiana, as reported by Potzger and Potzger (16), local habitat factors may at times find expression in a forest association constituted chiefly of oaks and hickories.

## SUMMARY AND CONCLUSIONS

1. The study concerns itself with the problem of whether or not *Pinus virginiana* was a component of the primeval forests of Clark, Floyd, Scott, Jefferson and Switzerland counties, Indiana.

2. Sources of information on the question were the surveyors' field notes and records of witness trees in the original United States land survey made in these counties between 1799 and 1809, and historical accounts of early pioneer life in the area.

3. From the evidence on hand, it is concluded that *Pinus virginiana* was present along the Ohio River in at least Floyd and Clark counties when the pioneers arrived.

4. Historical reports definitely state that the pioneers learned to use pine and products from it for various purposes. Statements

are also made that the Indians knew the pine and used it in various ways.

5. In the survey records, only a few stems are reported, but stems up to 16 inches DBH were included. Growth to such diameter represents at least 60 years of growth, antedating the coming of the pioneers by at least 40 years.

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TABLE I

Genera and species cited as "witness trees" in Clark, Floyd, Jefferson, Scott and Switzerland Counties

| Species                  | Clark | Floyd | Jefferson | Scott | Switzerland | Total |
|--------------------------|-------|-------|-----------|-------|-------------|-------|
| <i>Acer saccharum</i>    | 26    | 49    | 218       | 32    | 172         | 497   |
| <i>Fagus grandifolia</i> | 311   | 273   | 1049      | 446   | 255         | 2334  |
| <i>Fraxinus</i> spp.     | 39    | 28    | 88        | 19    | 96          | 270   |
| <i>Carya</i> spp.        | 51    | 57    | 128       | 39    | 124         | 399   |
| <i>Quercus alba</i>      | 169   | 141   | 144       | 82    | 139         | 675   |
| <i>Q. velutina</i>       | 79    | 73    | 25        | 17    | 20          | 214   |
| All other <i>Q.</i> spp. | 125   | 33    | 100       | 28    | 14          | 300   |
| <i>Liriodendron</i>      | 51    | 50    | 80        | 34    | 20          | 235   |
| <i>Juglans</i> spp.      | 11    | 17    | 36        | 3     | 11          | 78    |
| <i>Ostrya virginiana</i> | 4     | 5     | 18        | 6     | 17          | 50    |
| <i>Pinus virginiana</i>  | 6     | 8     | 0         | 0     | 0           | 14    |
| <i>Ulmus</i> spp.        | 21    | 9     | 77        | 26    | 58          | 191   |
| All other spp.           | 150   | 131   | 302       | 106   | 273         | 962   |
| Total Stems              | 1043  | 874   | 2265      | 838   | 1199        | 6219  |