BURGNER ACRES NATURAL AREA OF EASTERN ILLINOIS UNIVERSITY

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ABSTRACT. — A preliminary survey of a forest, Burgner Acres Natural Area, Coles County, Illinois, was made in 1955, and the trees and shrubs in six permanent quadrats of 100 square meters each were studied in some detail. In 1962, the six quadrats were re-examined and in addition over 1700 trees encountered along six line transects were identified and evaluated as to their relative dominance and frequence.

On January 29, 1955, Eastern Illinois University received its first land gift which has become known as Burgner Acres. This ten acre tract of forested land was presented to Eastern by Mrs. Helen Burgner Douglas as a memorial to her father and grandparents who were pioneer settlers in Coles County. The forest is located approximately 8 miles Northwest of Eastern Illinois University campus in Lafayette Township of Coles County (FIG. 1).

The tract is approximately 1300 feet long and 338 feet wide. It is described as the E. ½ of the W. ½ of the S.W. ¼ of the N.E. Qt. Section, Twsp. 12N. Range 8E. Its isolated relationship to the surrounding farm area is shown well by an aerial photograph (FIG. 2).

PLANT ECOLOGY STUDIES AT BURGNER ACRES

The Burgner Acres Forest is divided into three rather well defined study areas by Sycamore Creek which winds across the north end from west to east and then returns on the south end to flow from east to west (FIG. 3). The portion from the entrance to the stream is known as Area A and, until 1954, a sizeable area was mowed and maintained in park-like fashion. The portion of the forest betwen the stream channels is referred to as Area B and the remaining forest on the extreme south and beyond Sycamore Creek is called Area C. Plants have been observed and data collected since the spring of 1955. Six permanent quadrats of 100 square meters each were established in 1955 and were re-examined in 1962. Locations of the

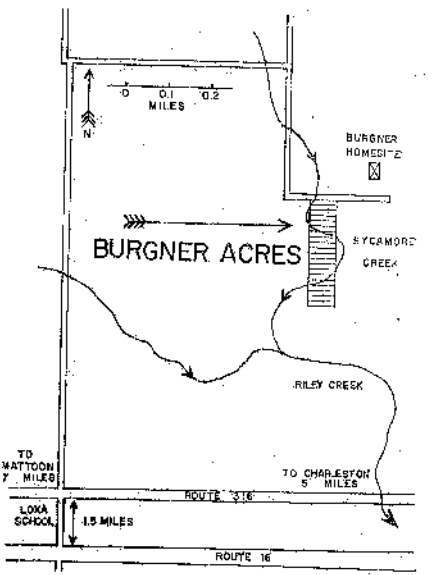

FIGURE 1. — Location Map of the Burgner Acres Natural Area.

permanent quadrats in the three areas are shown in FIGURE 3. Six line transects, approximately 50 feet apart, involving over 1700 trees were made in April, 1962. Observations relative to these studies follow (Henderson, 1962).

AREA A. — This area illustrates what happens to abandoned land in Eastern Illinois when left to go back to nature. In 1955, Quadrat 1 was a grass covered plot of 100 square meters. It remained in grass for the same reason that most pastures remain in grass in this area, namely, the continuous clipping by animals. However, in this case, it was man with his mechanical clipper, or the mower. In 1962, or seven years after mowing ceased, there were 68 trees found growing in this same quadrat. Red elm was most abundant with 51 specimens followed with 10 hickory, 5 hawthorn, and 2 walnut. This evidence would seem to support the theory that most abandoned land in East Central Illinois would more than likely return to a forest type of vegetation rather than a grassland or prairie type (Damann, 1955).

Much of Area A was not mowed and along the stream there exists a typical flood plain type of forest vegetation. A total of 539 trees was counted over the entire Area A. This number resulted from a random sampling of the area by walking transect and does not imply that there were only 539 trees present. Each tree was named and size or basal area occupied by the tree was deter-

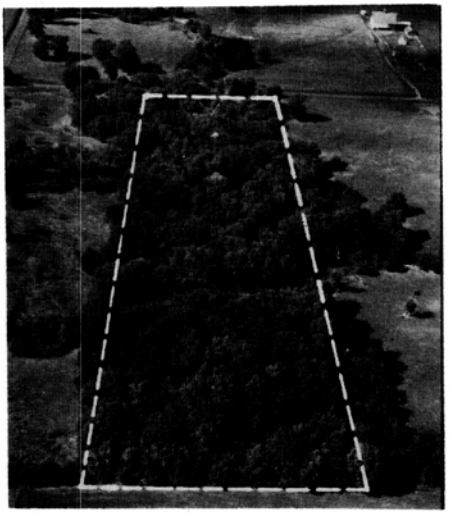

FIGURE 2. — Aerial Photograph of Burgner Acres. Note pastured and cultivated land surrounding the narrow strip of forest.

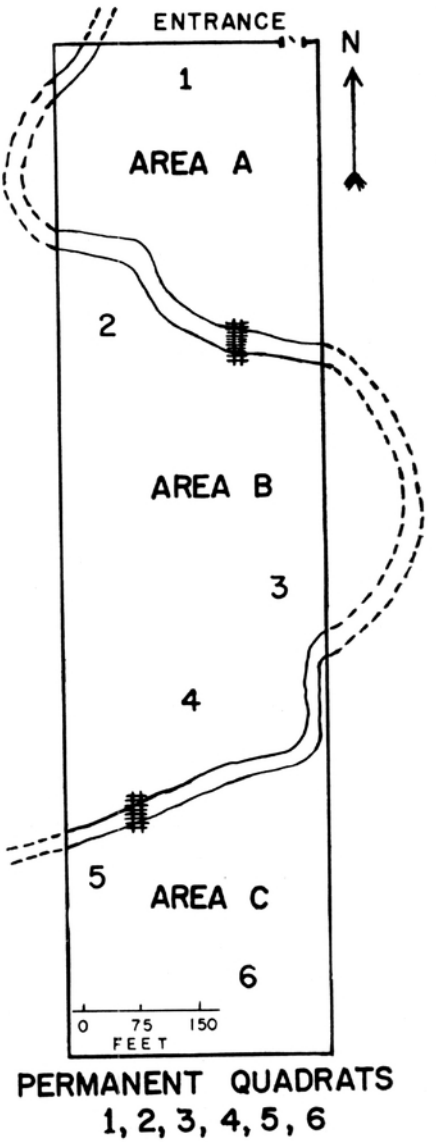

FIGURE 3. — Location Map of Permanent Quadrats in Areas A, B, and C of Burgner Acres.

mined. The results are expressed as both the relative percent of total number counted and also the percent of basal area occupied by each tree. Fifteen different tree species were encountered in the random count of Area A. Twenty species were encountered in the entire forest; they have been arranged alphabetically in TABLE 1 for comparison of their occurrence in the three study areas. It should be noted that ash, hackberry, red elm, shagbark hickory, and hawthorn occupied 88 percent of the basal area and thus would be considered the five dominant trees in Area A (TABLE 2).

AREA B.—The least disturbed portion of the forest lies between the two creek channels and has been designated as Area B (FIG. 3). A total of 667 trees was encountered in six line transects with ash, shagbark hickory, red elm, bitternut hickory, and hackberry occupying 84 percent of the total basal area (TABLE 2). Other trees present in order of decreasing basal area were red oak, osage orange, sycamore, crab apple, hawthorn, black cherry, black haw, white mulberry, black locust, honey locust, and wahoo (TABLE 1).

Three permanent Quadrats (2, 3, and 4) are located in Area B. Quadrat 2 had 84 trees present in 1962, with 39 being ash. Unfortunately, the tree count data for 1955 was not completed because of a more detailed analysis made of herbs and shrubs present.

Quadrat 3 is located near the east border of the forest on a gentle slope and had 55 trees of all sizes present in 1955. In 1962, 139 trees were found in the same area. The marked increase was due mainly to seedling trees, less than 1 inch in diameter, of ash, elm, and hickory. Ash trees increased from 20 to 50 and elm from 12 to 42 between 1955 and 1962.

Quadrat 4 is located on rich bottom land or flood plain in a more mature part of the forest. Only 38 trees were

TABLE 1.—Summary of Tree Count made in the Three Areas of Burgner Acres, April 16, 1962.

Tree Species	Area A		Area B		Area C	
	Percent of Number	Percent Basal Area	Percent of Number	Percent Basal Area	Percent of Number	Percent Basal Area
Acer saccharum (Sugar Maple)	3.3	0.2	.....	.....	4.4	0.1
Carya ovata (Shagbark Hickory)	6.3	13.4	11.8	24.7	8.0	17.7
Carya cordiformis (Bitternut H.)	.....	.....	4.5	9.7	1.5	0.1
Celtis occidentalis (Hackberry)	30.2	17.3	14.2	7.6	7.4	8.1
Cercis canadensis (Redbud)	.....	.....	.....	.....	0.6	0.6
Crataegus spp. (Hawthorn)	5.9	6.5	5.5	0.9	.....	.....
Euonymus atropurpureus (Wahoo)	0.4	0.01	2.4	0.1	0.6	0.1
Fraxinus americana (White Ash)	14.0	35.8	23.5	27.9	45.4	17.1
Gleditsia triacanthos (Honey Locust)	0.7	0.4	0.4	0.1	1.5	2.7
Juglans nigra (Black Walnut)	1.1	5.1	.....	.....	.....	.....
Maclura pomifera (Osage Orange)	.....	.....	1.3	2.6	0.2	4.0
Malus ioensis (Crab Apple)	8.7	2.2	4.2	1.0	3.3	0.5
Morus alba (White Mulberry)	3.1	0.5	0.6	0.1	.....	.....
Platanus occidentalis (Sycamore)	.....	.....	0.3	2.1	.....	.....
Prunus serotina (Black Cherry)	1.1	0.03	4.2	0.5	0.6	0.8
Quercus alba (White Oak)	2.6	2.3	1.0	2.1	4.0	45.5
Quercus rubra (Red Oak)	.....	.....	2.1	7.0	.....	.....
Robinia pseudoacacia (Black Locust)	0.7	0.8	0.1	0.1	.....	.....
Ulmus rubra (Red Elm)	21.1	15.4	19.5	12.8	17.6	2.2
Viburnum prunifolium (Black Haw)	0.7	0.02	4.0	0.2	4.7	0.4
Total Number of Trees Sampled	539		667		522	
Total Basal Area (Square Inches)		4,973		11,371		9,480

found in this 100 square meter area in 1955, and this number decreased to 28 in 1962. The tree that decreased the most was hackberry which showed a loss of 15 specimens to 6. A large bur oak produces dense shade on this Quadrat and this undoubtedly has a marked effect upon seedling production and survival. Several extremely hot and dry summers might also have contributed to the decrease of hackberry. (Henderson, 1962).

AREA C. — This portion of Burgner Acres is occupied by a forest type typical of many of the upland forests in East Central Illinois in which the dominants are white oak and hickory. A total of 522 trees was sampled with white oak, shagbark hickory, white ash, hackberry, and osage orange occupying 93 percent of the basal area (TABLE 2). Other trees in the order of their decreasing basal area were honey locust, red elm, black cherry, redbud, crab apple, black haw, bitternut hickory, sugar maple, and wahoo (TABLE 1).

Two permanent quadrats are located in this area. Quadrat 5 is on the west border of the forest on a slope that faces to north adjacent to Sycamore Creek (FIG. 3). In 1955, it had 92 trees present and the number increased to 136 in 1962. This increase was due almost entirely to sugar maple reproduction. Young maple trees increased from 55 to 90.

Quadrat 6 is on the level upland near the southeast corner of the forest (FIG. 3). It had only 54 trees in 1955, and that number decreased to 46 in 1962. Hackberry, bitternut hickory, and oaks showed decreases in this area.

LARGE SPECIMEN TREES

A large black haw (*Viburnum prunifolium*) growing near the entrance to the forest in Area A was declared the State of Illinois Champion Black Haw Viburnum in the Big Tree Project of the United States sponsored by the American Forestry Association (Besley, 1955). This specimen of black haw, when measured by the plant ecology class on May 3, 1955, was found to have a circumference of 1'11" at 3 feet height. Standard measurements are made at breast height of 4 feet. However, since this specimen branches at about this point, it was necessary to measure at a lower level for a full trunk measurement. Maximum height was 21'10" with a spread of over 23 feet. On July 25, 1965, the circumference was 2'1", showing a growth of 2 inches in circumference in eleven years.

The diameters of the other larger trees encountered in April of 1954 were:

Ulmus rubra, red elm, 52 in.
Celtis occidentalis, hackberry, 33.5 in.
Maclura pomifera, osage orange, 33.5 in.
Platanus occidentalis, sycamore, 33 in.
Quercus macrocarpa, bur oak, 33 in.
Quercus alba, white oak, 27.5 in.
Juglans nigra, black walnut, 25.5 in.
Fraxinus americana, white ash, 22 in.
Carya ovata, shagbark hickory, 22 in.
Carya cordiformis, bitternut hickory, 20 in.
Quercus muhlenbergii, chestnut oak, 19 in.
Crataegus mollis, hawthorn, 13 in.

DISCUSSION AND SUMMARY

A comparison of the dominant trees in the Burgner Acres forest comprises TABLE 2. This summary is based upon 1728 trees encountered on April 16, 1962, along six line transects. White ash was found to occupy the highest percentage of basal area in both study regions A and B. Hackberry ranked second to white ash in Area A with red elm and shagbark hickory a very close third and fourth based on their relative dominance. However, with 51 percent of the species encountered in Area A being hackberry and red elm, it would appear that this portion of the Burgner Acres is a rather typical mesic flood plain forest.

The terrain of Area B shows the most variation in topography with an increase of elevation ranging from approximately 20 to 40 feet on the north end. There is a gentle slope facing to the south back to flood plain level where this area is bounded by Sycamore Creek. In this area, shagbark hickory occupied essentially the same basal area as white

ash followed by red elm, bitternut hickory and hackberry, respectively. The oaks failed to rank within the first five species. White oak occupied 2.1 percent and red oak 7.0 percent of the basal area. When combined these two species would rank fifth above hackberry. Thus, this forest type would appear to be moving toward elm-ash-hackberry complex in competition with shagbark and bitternut hickory.

The extreme south end of the forest (Area C) appears to be a white oak and shagbark hickory association with these two species occupying 64 percent of the basal area. Only 12 percent of the trees encountered in this area were oak and hickory, which indicates the specimens encountered were quite large. White ash ranked third in basal area, but 45 percent of the species encountered were white ash. Red elm and hackberry accounted for 25 percent of trees encountered. Thus, with 70 percent of trees counted being either elm, ash, or hackberry, the data would seem to indicate that the oak-hickory association would be replaced eventually by the more mesic elm-ash-hackberry complex with a good possibility that sugar maple will gain significantly in importance. This is evidenced by the increase of maples in Quadrat 5 from 55 to 90 specimens between 1955 and 1962.

A more comprehensive and detailed study of the woody vegetation of Burgner Acres has been completed by Blackmore and Ebinger (1964-65) and is being prepared for publication. Unpublished data, not cited but pertinent to Burgner Acres, on file at Eastern Illinois University are: Brown, K. (1955) Floristic study of Burgner Acres; Jones, W. (1962) Bird nesting study of Burgner Acres; Peterka, H. E. (1964-66) Study of bird populations in Burgner Acres; and Poorman, A. (1959) Winter population of birds and mammals of Burgner Acres.

TABLE 2.—Comparison of Relative Frequency Determined by Percent of 1728 Trees Encountered and Relative Dominance Determined by Basal Area Occupied in Burgner Acres Forest on April 16, 1962.

Area A			Area B			Area C		
Species	Relative Frequency %	Basal Area %	Species	Relative Frequency %	Basal Area %	Species	Relative Frequency %	Basal Area %
White Ash.....	14	36	White Ash...	24	28	White Oak...	4	46
Hackberry.....	30	17	Shagbark....	12	25	Shagbark....	8	18
Red Elm.....	21	15	Red Elm....	20	13	White Ash...	45	17
Shagbark.....	6	13	Bitternut....	5	10	Hackberry...	7	8
Hawthorn.....	6	7	Hackberry...	14	8	Osage Orange	1	4
Totals.....	77	88		75	84		65	93

Acknowledgments

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