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VEGETATION IN FALLOW VINEYARDS, SOUTH BASS ISLAND, OHIO[1]

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ABSTRACT

More than a third of the 1500-acre surface area of South Bass Island, Ottawa County, Ohio, is occupied by vineyards fallowed between 1900 and 1955. A floristic reconnaissance was made in July, 1962, to describe weed vegetation in an active vineyard, in four vineyards fallowed and unmowed from 7 to 24 years, and in areas mowed since retirement.

The active vineyard had the most diverse flora, but annual and biennial species composed the bulk of the vegetation. Perennial forbs were predominant in undisturbed vineyards fallowed 7 to 16 years and in older areas mowed after fallowing. Forest development was found to be more rapid on the north section of the island, where a 24-year-fallow vineyard supported a closed-canopy box elder-white ash forest. Box elder (*Acer negundo*) was not found in fields on the south section and forest development there apparently leads to a sugar maple-hackberry type.

Acquisition by a governmental or private agency of one or more fallow vineyards on each section of South Bass Island is recommended. Protection of such areas would preserve open space, provide areas for studies of later trends of vegetation development and assure availability of sites for terrestrial field studies by classes from the Stone Laboratory of The Ohio State University.

INTRODUCTION

Grapes were first cultivated on South Bass Island between 1850 and 1859 (Hudgins, 1943; Core, 1948; Langlois and Langlois, 1948). The climate, moderated by Lake Erie, is well suited to viniculture and the high income per acre yielded by the grape crop made it particularly attractive for the island's small farms. Production reached a maximum in 1890, when nearly 40 per cent of the island (600 acres) was planted with vines (Hudgins, 1943).

The island vineyard industry began to decline shortly after 1900. By 1930 more than 300 acres of vineyards had been fallowed and production per acre in the remaining vineyards had decreased by approximately 50 per cent. A major factor in this decline was severe sheet erosion, but economic factors also were important. In addition, rapid development of land transportation introduced competition with other, much larger grape-producing regions in other states for market outlets. The former advantageous location of the island on lake shipping lanes became a disadvantageous location, separated by a water barrier from railheads and highways (Hudgins, 1943; Core, 1948; Langlois and Langlois, 1948).

The Prohibition Enforcement Act of 1919 was a further setback. By this Act, winemaking was declared illegal, so, though part of the crop was sold as table grapes or pressed for juice, the total market shrank. Repeal of prohibition in 1933 partially revived the industry, but in 1942 only 270 acres were still planted to grapes (Hudgins, 1943). By 1962 the active vineyard area did not exceed 100 acres and one third of the island's surface was occupied by fallow vineyards.

The present study was undertaken to describe the existing vegetation and to determine the probable future trends of vegetation development on fallow vine-

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yards. This was, in part, a field exercise for a course in plant ecology at the Franz Theodore Stone Laboratory of The Ohio State University. Although the data obtained are qualitative, they are the most detailed record extant of this interesting and economically important aspect of the vegetation of the Island. I wish to acknowledge the help of my students, who assisted in reconnoitering the stands, and to express appreciation to Dr. Jacob Verduin, Mr. Louis Heineman, and Mr. Harry D. Lamb, who gave permission to study their lands and provided information on land-use history.

LOCATION AND DESCRIPTION

South Bass Island is the third largest of the 21 islands in the Erie Archipelago, western Lake Erie (Ottawa County, Ohio; lat 41° 39′ N, long 82° 50′ W). Its surface includes approximately 1510 acres (2.36 sq miles). The maximum elevation (Victory Hill) is 640+feet above mean sea level and about 70 feet above the low water level of Lake Erie (570.5 ft; U. S. Geological Survey, 1959). The island has the longest freeze-free season (205 days mean, with phenological events delayed in spring and extended in autumn as compared with inland stations) and the lowest average annual precipitation (28.99 in., 58.5 per cent during April through September) recorded for the State of Ohio (Hudgins, 1943; Verber, 1955). Vegetation on the island is luxuriant, suggesting either a low precipitation-evaporation ratio or upward movement of water from the lake and water table.

Geology of the island has been discussed by Mohr (1931), Hudgins (1943), Carman (1946), Core (1948), and Langlois and Langlois (1948). Put-in-Bay Dolomite, underlaid by Tymochtee Shaly Dolomite (both Upper Silurian), forms the main mass of the island. Hydration of anhydrite lenses in the Tymochtee strata is believed (Verber and Stansbery, 1953) to have resulted in dome-shaped warping of both rock units. Subsequent solution of gypsum left weak-roofed, lenticular caverns. Collapse of primary caverns produced a karst-like topography, with numerous, relatively large but shallow sink holes and entirely subterranean drainage. Peripheral crevasses left when roofs of primary caverns collapsed formed many secondary caverns which honeycomb the island (Verber and Stansbery, 1953).

The island soils generally are shallow and are derived primarily from dolomitic bedrock, in places covered by a thin mantle, mostly of glacial till. Where the soil is developed from the bedrock, Randolph soil is present. Catawba loam, formed on unconsolidated materials which have a thickness of 5–20 feet above bedrock, is the soil type on which most vineyards have been established (Hudgins, 1943; Langolis and Langlois, 1948). Reaction in surface layers of Catawba loam is slightly acid, but at a depth of a few feet it is alkaline. With the exception of small areas of Rodman stony loam in Stand I and of Catawba gravelly loam in Stand IV, all sites in this study on the southern part of the island occurred on Catawba loam (Hudgins, 1943, fig. 5), and all sites on the northern part of the island (Stands V, VII, and VII) were in Hoytville-like soils, developed in thick till (J. L. Forsyth, personal communication).

METHODS

A floristic reconnaissance of one active and six fallow vineyards on South Bass Island was made during July 1962. Each area was searched thoroughly for vascular plants by walking up and down between the rows, or former rows, of vines. The microhabitat—mound, furrow, or shoulder between mound and furrow—in which each species occurred most frequently was noted. This microtopography was produced, when the vineyards were in use, by cultivation between rows of vines to control weeds. A covering of soil from the furrows also was used around the bases of grape plants to reduce winter damage.

Unknown or questionably identified species were collected for laboratory

examination, but were discarded after they had been identified or verified by comparison with specimens in the herbarium of the Franz Theodore Stone Laboratory, Put-in-Bay. Nomenclature is that of Fernald (1950).

DESCRIPTION IN STANDS

Four of the seven study areas (Stands I–IV) were located on the southern section of the island and ranged in elevation from 24 to 29 feet above low water level. The three study areas on the northern, or East Point section (Stands V–VII ranged from 17 to 19 feet above lake level (fig. 1).

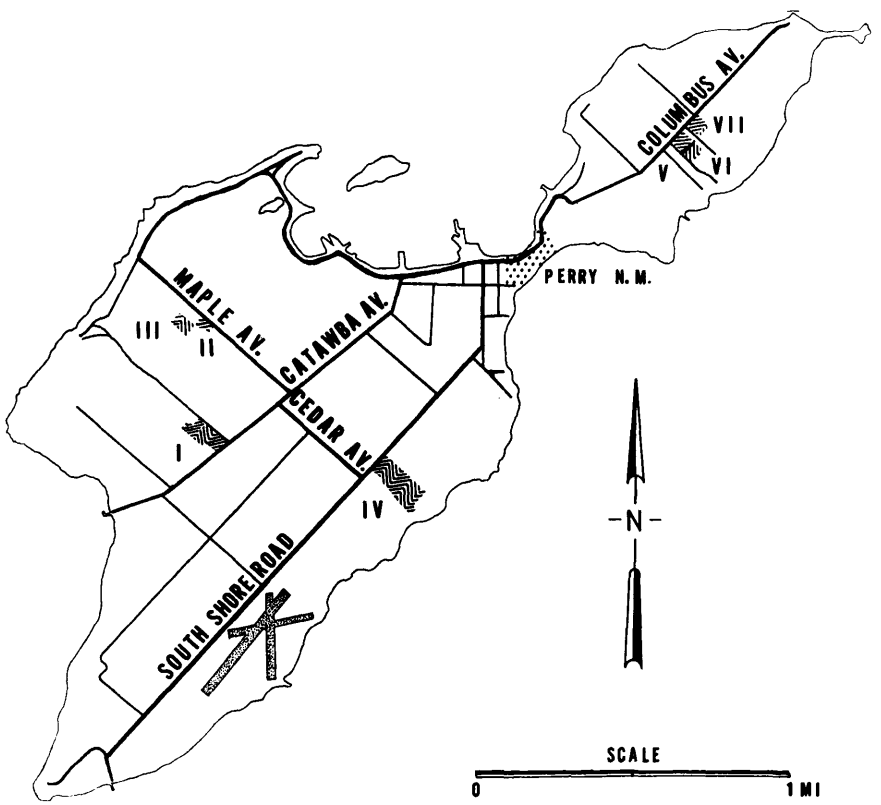

FIGURE 1. Outline map of South Bass Island, Lake Erie, to show location of study areas (shaded). Perry National Monument (stippled) is located on man-made land between the East Point section, to northeast, and the main, or south, section of the island.

Stand I. Heineman's vineyard on Catawba Avenue (24–29 feet above lake level) was in cultivation at the time of study. Grape plants were spaced about 8 feet apart in parallel rows oriented northwest-southeast; the rows were 6 to 8 feet apart. The furrows had been plowed to a depth of 8–10 inches at least once each year and the mounds had been hoed periodically. The mounds were shaded by grape vines supported by heavy wires stretched between posts, whereas the furrows were only partially shaded. The center of this field was slightly lower than either the east or west end and the vegetation in the central area generally was taller and more dense, but not noticeably different in composition.

Stand II. The Verduin farm west field on Maple Avenue (28 ft above lake

level) was last cultivated about 1955, seven years before study, and posts and supporting wires for the grapes still were present, but were leaning or had fallen down. The vegetation was formed chiefly of orchard grass (*Dactylis glomerata*), with a dense lower layer of Canada bluegrass (*Poa compressa*) and, in lesser abundance, Kentucky bluegrass (*P. pratensis*), and a discontinuous overstory of white sweet clover (*Melilotus alba*). Sumac (*Rhus typhina*) 6–8 feet tall was abundant on the mounds, but plants had only one or a few stems. An increment core from one sumac growing next to the rootcrown of a grape plant had 14 growth rings at the stem base. Sugar maples (*Acer saccharum*), several of which had reached heights of from 5–10 feet, were scattered on mounds throughout the area. Woody species were very sparse in the furrows.

Stand III. The Verduin farm east field on Maple Avenue (29 ft above lake level) was cultivated last about 1946, 16 years before study, but may have been disked at a later time. The grape plants and supporting wires had been removed. The vegetation, as compared with the adjacent Stand II, was characterized by a much more extensive cover of woody species, contributed chiefly by large clones of sumac, some of which were more than 20 feet in diameter. Chokecherry trees (*Prunus virginiana*) were scattered, but conspicuous because several were 20–25 feet tall and stood as emergents above the lower canopy of sumac. Sugar maples were less abundant than in Stand II. Herbaceous vegetation was sparse under sumac clones, but between clones, orchard grass was the most noticeable species, although Canada bluegrass covered more ground. White sweet clover also was present, but the plants were spaced more widely and were less conspicuous than in Stand II.

Stand IV. South Shore Road field (29 ft above lake level), northeast of the intersection of South Shore Road and Cedar Avenue, was cultivated until about 1950, 12 years before study. Stand III apparently was older, in terms of the number of years since last disturbance, than was Stand IV. However, because of the proximity and close floristic similarity of Stands II and III, it was decided to list them consecutively and thus to list Stand III before Stand IV.

The grape plants, posts, and supporting wires had been removed from Stand IV. Several chokecherry trees were 10–12 feet tall at the time of study. Sugar maple, chokecherry, and sumac were well distributed on the field. The sumac clones were intermediate in size between the few stemmed clones in Stand II and the many-stemmed clones in Stand III. Orchard grass was the most conspicuous grass, but Canada and Kentucky bluegrasses formed a lower, more continuous cover. Goldenrods (*Solidago spp.*) were abundant.

Stand V. The Columbus Avenue south stand, East Point (19 ft above lake level), is one of three on the northern part of the island. These three East Point stands were originally parts of a single vineyard cultivated last about 1938, 24 years before study. The area comprising Stand V had been mowed periodically until about 1954, nine years before study. The vegetation was an open stand of box elder (*Acer negundo*), with a discontinuous canopy 10–12 feet tall, and with a dense field layer, which was composed of many species found in the herbaceous vegetation of Stand IV. The most important species in the field layers were orchard grass, Canada and Kentucky bluegrasses, and goldenrods. Roots of most of the herbs were concentrated in the upper 2 inches of the soil. This condition may have been a reflection of the loosening of this upper layer by disking after abandonment of the vineyard. Grape plants and supporting wires had been removed.

Stand VI. The Columbus Avenue southeast stand, East Point (19 ft above lake level), adjoined the east side of Stand V and was about 50 feet from Columbus Avenue. Stand VI had not been mowed for at least 15 years before study. All trees cored in the dense, 15–20-feet-tall box elder forest on this site exhibited 14 or 15 growth rings and had multiple stems. Mounds and furrows were well

preserved, but the grape plants and supports had been removed. There was virtually no herbaceous undergrowth, although avens (*Geum canadense*) and an unidentified sedge were represented by a few, depauperate individuals, and there was almost no litter on the forest floor. Two species of mosses (not identified) covered less than 1 percent of the ground. Exposed box elder roots indicated that severe sheet erosion had occurred, at least on the mounds.

Stand VII. The Columbus Avenue north stand, East Point (17 ft above lake level), which had not been mowed since cultivation ceased in 1938, was approximately 50 yards northeast of Stands V and VI. Increment cores indicated that the largest box elders (8–10 in. d.b.h.) were approximately 22 and 24 years old, the largest white ash (*Fraxinus americana*) stems were 18–20 years old, and the largest hackberry (*Celtis occidentalis*) stems were 16 years old. Many trees had multiple stems and probably reflect an early attempt to eliminate trees by cutting. The relatively wide range in ages of the stems also may have been due to cutting, rather than to differences in time of establishment of seedlings.

Mound and furrow topography was well preserved in this stand and old wires and posts, now fallen, still were present. The canopy trees, most of which were box elders, were about 30 feet tall. The forest floor was almost barren of litter and catnip (*Nepeta cataria*), avens, and a sedge (*Carex* sp.) were the only herbaceous species observed, although the herbaceous layer was more extensive than in Stand VI. The density of tree stems in this forest was much lower than that in Stand VI, probably as a result of natural mortality. Several standing and recently fallen dead trees indicated that the thinning process still was in operation.

RESULTS

Floristic observations from the seven stands are summarized in Table 1. Stands are identified by Roman numerals which correspond to numbers in the preceding descriptions. Species are grouped by longevity (annuals, biennials, perennials, determined by reference to McDonald [1937] and Gibson [1961]) and by growth-form (grasses and sedges; broad-leaved herbaceous plants, or forbs; and woody plants). The presence of a species in a given stand is indicated by the placement of any symbol in the column for that stand, opposite the name of the species. The symbols indicate the microhabitat in which the species occurred most frequently, but do not pertain to relative abundances: M = mound; S = shoulders; F = furrow; X = species of general distribution, with about equal frequency in all microtopographic situations.

The order of listing of the species within each longevity-growth-form class was determined primarily by the initial stand in which the species was observed and secondly by the number of stands in which the species occurred. The third order of listing was alphabetical, when more than one species occurred within a rank established by primary and secondary qualifications.

DISCUSSION

Abandoned vineyards of various ages on South Bass Island present an excellent series for the study of vegetation development in the Ohio Lake Region. Observations made during the present reconnaissance suggest at least two general patterns of development, one of which appears to lead to establishment of a sugar maple-hackberry forest (Stands II, III, IV), the other to establishment of a box elder-white ash forest (Stand VII).

A rich weed flora was found to exist in cultivated vineyards. In the most disturbed areas, furrows between rows of grape vines, herbaceous species, particularly annuals and biennials, were the most abundant plants and provided the bulk of the cover. Pigweed (*Amaranthus retroflexus*), ragweed (*Ambrosia artemisiifolia*), lambs quarters (*Chenopodium album*), orchard grass (*Dactylis glomerata*), white and yellow sweet clover (*Melilotus alba, M. officinalis*), knotweeds (*Poly-*

TABLE 1

Vascular plants observed in a cultivated vineyard (Stand I) and in six fallow vineyards on South Bass Island. Locations and characteristics of the stands are described in the text

	I	II	III	IV	V	VI	VII
Annual grasses							
Bromus secalinus	X[a]						
Bromus tectorum[b]	MF						
Digitaria sanguinalis	MF						
Echinochloa crusgalli	F						
Secale cereale	F						
Setaria lutescens	F						
Setaria viridis	F						
Annual forbs							
Amaranthus retroflexus	S						
Ambrosia artemisiifolia var. *elatior*	X						
Anthemis cotula	F						
Capsella bursa-pastoris	F						
Chenopodium album	MF						
Euphorbia supina	F						
Galinsoga ciliata	F						
Matricaria chamomilla[b]	X						
Matricaria matricarioides[b]	X						
Polygonum aviculare	F						
Polygonum persicaria	MF						
Portulaca oleracea	F						
Sisymbrium officinale	F						
Abutilon theophrasti	F		X				
Euphorbia dentata	X		X				
Medicago lupulina	F	M	F				
Erigeron canadensis	F	F		X			
Sonchus oleraceus		S					
Biennial forbs							
Lactuca scariola	F						
Lepidium campestre	F						
Stellaria media	F						
Tragopogon pratensis[b]	F						
Arctium minus	SF	F					
Malva rotundifolia	F		X				
Daucus carota	SF	MF	M	X	X		
Melilotus alba	F	F	F	X	X		
Melilotus officinalis		F	F				
Lactuca canadensis			X				
Perennial grasses and sedges							
Agropyron repens	F						
Dactylis glomerata	F	X	X	X	X		
Phleum pratense	F	FS		X	X		
Poa compressa	F	F	MF	X	X		
Poa pratensis	M	F	F	X	X		
Carex spp.		M	F	X	X	X	X
Perennial forbs							
Allium canadense	S						
Apocynum (cannabinum?)	M						
Cerastium vulgatum	X						
Convolvulus arvensis	M						
Geranium robertianum	M						
Oxalis europaea	F						
Plantago lanceolata	F						
Potentilla recta	F						
Taraxacum officinale	X						
Unidentified mint	F						
Achillea millefolium	F	F					
Plantago rugelii	MS	X					
Trifolium hybridum	F	F	F				

TABLE 1. *Continued*

	I	II	III	IV	V	VI	VII
Asclepias syriaca	M	F		X			
Cirsium arvense	M	S		X			
Rumex crispus	FS	F		X			
Trifolium pratense	F	F	F	X			
Solidago spp.	S	F[3][c]	M	X[2]	X		
Hypericum perforatum		F	S				
Medicago sativa		F	S				
Asparagus officinalis		M	F	X			
Aster spp.		F[2]		X	X		
Geum canadense		X		X	X	X	X
Cirsium vulgare			FS				
Rumex obtusifolius			X				
Nepeta cataria							F
Woody perennials							
Acer saccharum	M	MF	F	X			
Prunus virginiana	M	M	MF	X			
Rubus sp.	MF	F	F	X	X		
Rhus radicans	F	M	F	X			X
Rhus typhina	MF	MF	MF	X			X
Juglans regia L.		M					
Morus alba		M	F	X			
Parthenocissus quinquefolia		M		X			
Rosa sp.		M	F	X			
Celtis occidentalis		M			X		X
Sambucus canadensis		X				X	X
Catalpa speciosa[b]			M	X			
Quercus rubra			F				
Juniperus virginiana			M	X			
Prunus sp.				X			
Rhus glabra				X			
Juglans nigra				X	X		
Cornus amomum				X	X		X
Ulmus rubra					X		
Acer negundo					X	X	X
Fraxinus americana							X
Fraxinus quadrangulata							X
Floristic resume—numbers of species							
Annual grasses (7)[d]							
Total species	7	—	—	—	—	—	—
Peculiar to stand	7	—	—	—	—	—	—
Annual forbs (18)							
Total species	17	3	3	1	—	—	—
Peculiar to stand	13	1	—	—	—	—	—
Biennial forbs (10)							
Total species	8	4	5	2	2	—	—
Peculiar to stand	4	—	1	—	—	—	—
Perennial grasses and sedges (6)							
Total species	5	5	4	5	5	1	1
Peculiar to stand	1	—	—	—	—	—	—
Perennial forbs (29)							
Total species	18	16	8	9	3	1	2
Peculiar to stand	10	—	2	—	—	—	1
Woody perennials (22)							
Total species	5	11	10	14	6	2	8
Peculiar to stand	—	1	1	2	1	—	2
All species (92)							
Total species	60	39	30	31	16	4	11
Peculiar to stand	35	2	4	2	1	0	3

[a]Symbols indicate microsites in which species was most abundant: F=furrow; M=mound; S=shoulder between mound and furrow; X=generally distributed and equally abundant in all microsites.

[b]Species not listed for South Bass Island in Core (1948).

[c]Bracketed figures indicate number of conspicuously different species of genus present.

[d]Numbers in parentheses indicate total number of species of age-groups and growth-forms encountered in all stands.

gonum spp.), red clover (*Trifolium pratense*) and several other herbaceous species contributed most of the cover. Woody species that sprout vigorously from subterranean organs, including poison ivy (*Rhus radicans*), staghorn sumac (*R. typhina*), and blackberry (*Rubus* sp.), also survived in the furrows, but made only a minor contribution to the vegetation cover. The greatest density of woody species was on mounds between grape plants. In this microhabitat, which is disturbed much less by cultural techniques than is the furrow area, sugar maple, chokecherry, staghorn sumac, and blackberry were represented by many individuals.

The general pattern of greater density of woody species on mounds was observed also in vineyards fallowed for 7, 12, and 16 years (Stands II, III, IV). However, the density of woody plants in furrows was greater in fields fallowed for increasingly longer periods, due largely to vegetative spread of sumac and chokecherry.

Thirteen woody species not observed in Stand I were found in these three abandoned vineyards, but some or all of the species may have been present in the stands during cultivation. The most striking floristic contrast between the abandoned and cultivated vineyards was the great difference in actual and relative numbers of annual species. None of the seven annual species of grass, only four of the 17 species of annual forbs, and four of the eight species of biennial forbs found in the cultivated vineyard were observed in fallowed vineyards (table 1). Ten species of perennial forbs observed in the cultivated vineyard were not found in the fallow fields. Eight other species of perennial forbs, one perennial sedge, one annual forb, and two biennial forbs were observed in the fallow areas, but not in the cultivated vineyard. Twelve perennial herbaceous species, including both grasses and forbs, were common to the cultivated and fallow vineyards. Although more species of perennial herbs were present in the cultivated vineyard than in all of the fallow vineyards, they contributed but a small percentage of the total cover in the cultivated area, but were predominant in fallow fields. The observation that a cultivated field is richer in species (60) than fields fallow for several years (4 to 39 species), however, is in contrast to all previous studies of a similar nature that have come to my attention.

The fact that most species which occurred on fallow fields were present in the cultivated vineyard is in accord with the concept of initial floristic composition (Clements, 1916; Egler, 1954). However, the cultural methods employed in vineyards, which are directed principally toward the inter-row areas, or furrows, doubtless are much more favorable to persistence of perennial species than is the periodic, often annual, wholefield plowing used in field crops.

The East Point stands (V, VI, VII) illustrate vegetation response to management practices. These stands originally were parts of a single vineyard which was fallowed 24 years before study. In Stand V, which was mowed until about 8 years before study, ten species of herbaceous plants were observed which also were present in fallow vineyards on the south part of the island (Stands II, III, IV). This suggests that development of the herbaceous component of oldfield vegetation is similar on the two sections of the island. The most abundant woody species in Stand V, however, was box elder (*Acer negundo*), a species not found in stands on the south section of the island during this study. In Stand VI, which had been unmowed for about 15 years, the box elder canopy was closed and oldfield herbaceous species, with the exception of a few depauperate individuals, were absent. Stand VII had not been mowed or cultivated since the vineyard was fallowed 24 years before study, and supported a well developed box elder-white ash forest.

Among the tree species which occur in the overstory layer of forested sections of South Bass Island, sugar maple and red oak (*Quercus rubra*) were observed only in vineyards on the southern section of the island. White ash (*Fraxinus ameri-*

cana), slippery elm (*Ulmus rubra*), and box elder were noticed only in fallow vineyards on East Point; blue ash (*Fraxinus quadrangulata*) was observed only on East Point, though it is known to be present in many places on the southern part of the island. Hackberry and black walnut (*Juglans nigra*) were found in vineyards on East Point; blue ash (*Fraxinus quadrangulata*) was observed only on fallow vineyards in the south section of the island, but, judging from the kinds and relative numbers of tree species found in these stands, the future forest will be composed predominantly of sugar maple, with hackberry, red oak, and black walnut as associated canopy species. In contrast, a box elder-white ash forest type had developed in the least disturbed area (Stand VII) on East Point.

Forest development on the island's northern section (Stands V, VI, VII) is more rapid than on the southern sections, due largely to substitution of box elder as the principal oldfield tree species. Box elder forms denser stands and grows more rapidly in height and diameter than tree species characteristic of oldfields on the southern section. The importance of box elder in the East Point section apparently is correlated with proximity of seed trees and site factors that result in a higher and less variable soil moisture content.

Core (1948: 11) and Langlois and Langlois (1948: 4) observed that former crop lands and vineyards on South Bass Island "are invaded by cedars and sumacs, while grazing livestock keep the deciduous trees from re-establishing themselves." Several relatively old stands of cedar were noticed during the present study, one of which, located north of Cedar Avenue between Catawba Avenue and South Shore Road, occupied at least 20 acres. An increment core from a cedar in this stand had approximately 49 growth rings (1962). Thus, the stand may have originated about 1913, or during the World War I era. These stands may be evidence of a former pattern of vegetation development modified by grazing. (An unsubstantiated claim has been made that the Cedar Avenue stand was planted. Additional stem-age determinations and spacing studies are required to verify or refute this claim.)

A single red cedar (*Juniperus virginiana*) was observed in Stand III and three cedars were seen in Stand IV, but there was no conspicuous trend toward the development of a cedar forest on any field studied during the present investigation, nor on any other recently fallowed vineyard observed on the island. Three factors largely may be responsible for the apparent shift to hardwood predominance in the developmental process in oldfields on South Bass Island. 1) Cows, horses, sheep, and other stock species once kept on island farms have not been maintained. When stock animals were present, their preference for broadleaved species as browse favored survival of cedar, and their trampling and feeding, by reducing ground cover, may have favored cedar establishment. 2) Much of the earlier abandonment of vineyards may have been forced by erosion of shallow soils (Hudgins, 1943). Such erosion would have removed acid surface horizons and exposed calcareous subsoil and bedrock. Cedar is noted for its abundance on such alkaline sites. 3) Core (1948) and Langlois and Langlois (1948) apparently based their concept of vegetation development on old cedar stands and did not give adequate consideration to more recently fallowed tracts. Support for this point of view is found in contemporary work by Hudgins (1943), whose observations generally are in accord with those of the present study insofar as the northern section of the island is concerned. Hudgins concluded that, "idle lands are being invaded rapidly by growths of sumac, cherry, hackberry, and other native species . . ." Hudgins' statement apparently was based on studies of recently retired vineyards and suggests that the shift in the developmental trend had occurred before 1942. This is supported by the Langlois' report which states that, "There were [only] forty cows on the island in 1943" (Langlois and Langlois, 1948: 6). Except in areas where cattle were concentrated, therefore, it is unlikely that they would have exerted a significant influence on floristic composition of woody vegetation. No livestock were observed on the island in 1962.

Several other former vineyards on the southern section of the island supported perennial grasslands with large clones of sumac and scattered chokecherries. Other shrub and tree species either were represented by very few individuals or were absent. The largest of these areas, formerly a commercial hunting tract, is approximately 200 yards east of Stand II. This vegetation type was produced from fallow vineyard vegetation, probably beginning while the vegetation was in a stage comparable to Stands II, III, or IV of the present survey, by annual mowing. Mowing eliminated sugar maple, hackberry, cedar, and other species which do not sprout from the base or which decline in vigor after repeated cutting. When management was terminated, sumac and cherry developed rapidly from subterranean organs that persisted in the mowed fields. Invasion by other woody species apparently has been slow and the sprout stands probably will retain their unusual composition for several decades at least.

PRESERVATION OF FALLOW VINEYARDS FOR MULTIPLE PURPOSES

Acquisition of one or more representative fallow vineyards on each of the two sections of South Bass Island by a governmental, educational, or private conservation agency is desirable. Such tracts, protected from further disturbances, would conserve open space in an area which, in the not-distant future, undoubtedly will become more and more heavily populated by summer visitors, would permit future studies to determine the nature of later trends in vegetation development on the island, and would assure continued availability of local field-study areas for classes from the Stone Laboratory. Information developed by studies of vegetation trends on such protected areas would be of significant value in regional land-use planning and to individual land owners, as well as representing a contribution to a more intensive knowledge of the vegetation of Ohio.

SUMMARY

A floristic reconnaissance of six former vineyards, fallowed from 7 to 24 years, and one active vineyard on South Bass Island, Lake Erie, was made in July, 1962, to infer general trends of vegetation development. Presence records were obtained for 92 species in the seven stands. Of this total, 60 species (65%) were present in the active vineyard. Only 39 species (42%) were present in the most floristically diverse fallow vineyard, the 7-year-old stand. Five woody species were present in the active vineyard and were most abundant on mounds between grape plants. Furrows, which had been cultivated annually, supported an herbaceous cover composed principally of annual and biennial forbs. The relative scarcity of woody species in furrow areas of fallow vineyards suggested persistence of the pattern established during the period of cultivation.

The herbaceous component of the oldfield developmental series apparently is relatively uniform over the entire island, but oldfield forest types differ markedly. In stands on the southern section of the island, reproduction suggests the eventual establishment of a sugar maple-hackberry forest type. The oldest stand studied (24 years old), located on the northern section of the island, comprised a 30-foot-tall box elder-white ash forest. It is apparent that initial oldfield forest types on the two sections of the island are different and that the velocity of forest development is considerably greater in the northern section.

Earlier writers suggested that oldfield forests on the island were composed largely of red cedar. The apparent change of the developmental trend during the past 20 to 30 years may be due largely to elimination of livestock. Stands composed predominantly of sumac and chokecherry are products of selective elimination of woody species by annual mowing and subsequent termination of management.

It is strongly recommended that representative fallow vineyards be acquired and protected to conserve open space on the island, to permit continued studies of

developmental trends in the vegetation, and to assure continued availability of local terrestrial habitats for fieldwork by classes from the Stone Laboratory of The Ohio State University.

LITERATURE CITED

Carman, J. E. 1946. The geologic interpretation of scenic features in Ohio. Ohio J. Sci. 46: 241–283.

Clements, F. E. 1916. Plant succession—an analysis of the development of vegetation. Carnegie Inst. Washington, Publ. 242, 512 p.

Core, E. L. 1948. The flora of the Erie Islands, an annotated list of vascular plants. Ohio State Univ., Franz Theodore Stone Lab., Contr. 9: 1–106.

Egler, F. E. 1954. Vegetation science concepts, I. Initial floristic composition, a factor in old-field vegetation development. Vegetatio 4: 412–417.

Fernald, M. L. 1950. Gray's manual of botany. 8th ed. American Book Co., New York, 1632 pp.

Gibson, M. 1961. Life-forms of Kentucky flowering plants. Am. Midland Nat. 66: 1–60.

Hudgins, B. 1943. The South Bass Island community (Put-in-Bay). Econ. Geogr. 19: 16–36.

Langlois, T. H., and **Marina H. Langlois.** 1948. South Bass Island and islanders. Ohio State Univ., Franz Theodore Stone Lab., Contr. 10: 1–139.

McDonald, E. S. 1937. The life-forms of the flowering plants of Indiana. Am. Midland Nat. 18: 687–773.

Mohr, E. B. 1931. The geology of the Bass Islands. Ohio State Univ., M. S. Thesis, 62 pp.

U. S. Geological Survey. 1959. Put-in-Bay, 7.5 minute topographic map. Washington.

Verber, J. L. 1955. The climates of South Bass Island, western Lake Erie. Ecology 36: 388–400.

Verber, J. L., and **D. H. Stansbery.** 1953. Caves in the Lake Erie Islands. Ohio J. Sci. 53: 358–362.