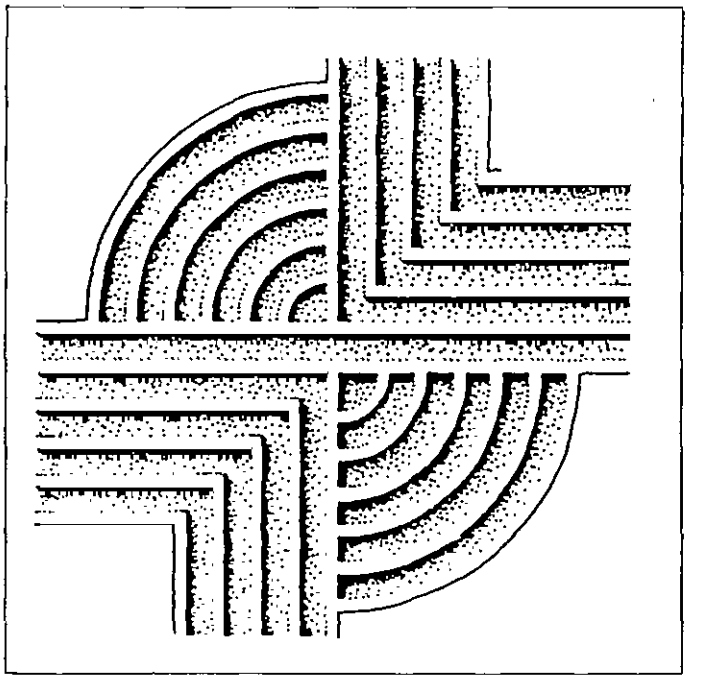
ANALYSIS OF PALEOETHNOBOTANICAL SAMPLES FROM A MISSISSIPPIAN HAMLET, 22OK793, OKTIBBEHA COUNTY, MISSISSIPPI



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ANALYSIS OF PALEOETHNOBOTANICAL SAMPLES FROM A MISSISSIPPIAN HAMLET, 22OK793, OKTIBBEHA COUNTY, MISSISSIPPI

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ABSTRACT

This study reports on the examination of a sample of charred plant remains from 11 features, 13 post holes, and four stratigraphic zones excavated in 1997 from a small Mississippian hamlet in Oktibbeha County, Mississippi. The site, recorded as 22OK793 and situated in east central Mississippi north of the town of Starkville, has been dated using the OCR technique to between A.D. 1350 and 1475..

The study provides the opportunity to examine samples from the same provenience collected using both water flotation and water screening. While there are similarities, it is clear once again that water screening selects against a number of fragile and less common plant remains.

The collection has produced quantities of wood charcoal, charred and calcined bone, hickory nutshell, acorn shell, and a very small number of seed. The wood charcoal, where identifiable, is dominated by pine, although small quantities of oak, hickory, and maple are also present. The seeds recovered from the site are all highly fragmented and are primarily grass or "weed" seeds. Those identifiable provide information concerning the environmental setting, but fail to reveal any plants of known economic significance (excepting the acorn and hickory).

Of even greater interest is the failure to identify any corn (or other cultigen) in the samples. Assuming that the field techniques have not somehow selected against the recovery of cultigens, this suggests that the site occupants, in spite of their Mississippian affiliations, were not actively engaged in agricultural activities. This stands in dramatic contrast to previous studies in the immediate site area where both cultigens and wild plant foods were identified in similar flotation samples.

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INTRODUCTION

Background

The materials examined in this study were provided by Dr. Janet Rafferty and Dr. Homes Hogue of the Cobb Institute of Archaeology at Mississippi State University. The materials included 65 plastic bags from 28 proveniences, each representing either the light fraction generated from water flotation or charcoal collected from water screening through 1/16-inch mesh. All soil from all proveniences was processed using one of these two techniques, although no information concerning the total volume of soil processed was provided for any of the proveniences. All of the proveniences were designed either as post holes, features (typically a number, occasionally further subdivided using a letter suffix), or stratigraphic zones.

Site 22OK793, situated about two miles north of the town of Starkville in Oktibbeha County, Mississippi (Figure 1), was excavated in 1997. The project was conducted in anticipation of the construction of the Starkville By-Pass (Homes Hogue, personal communication 1997). The site excavations revealed a small occupation area thought to include two prehistoric components. One represents a Middle Mississippian occupation dating to about A.D. 1350, while the other is a Late Mississippian occupation dating to about A.D. 1475.

One of the largest proveniences, Feature 1, represents the location of a Middle Mississippian circular structure about 11 feet in diameter. Post holes 2, 3, 4, 5, 6, 12, 13, and 17 are associated with this structure. Feature 1C represents the soil layer present prior to the house occupation, although it also includes materials deposited during the structure's occupation. Feature 1B is a daub layer that represents the destruction of the structure, as well as accumulation of artifacts post-dating the structure. Feature 1A is described as a thin dark layer overlying the daub, representing activity clearly post-dating the structure's abandonment and destruction. Features 7A and 7B are nearby daub concentrations which are also probably associated with this structure. Feature 5 was a dog burial within the confines of the house.

Features 2 and 4 were both intrusive into the daub layer (Feature 1B) and therefore are expected to postdate the destruction of the house, although no additional information is available concerning their age or association.

Feature 12 is a large pit several feet removed from the structure. Features 11 and 15 are reported to be late prehistoric shallow pits, while Feature 14, also a shallow pit, is thought to be Middle Mississippian.

Nearby the excavators found the remains of a prehistory gully cut into the underlying marl, filled with midden designated Zone B1. Under this, Zone B2 consisted primarily of clay, although some artifacts were still encountered. Zone B, where recovered, appears to include some limited cultural material. Additional information, of course, is available in the complete report of the excavations (currently being prepared).

All materials examined have been returned to the Cobb Institute of Archaeology for curation.

Extant Environmental Conditions

Situated in the east central part of Mississippi, Oktibbeha County spans four topographic areas -- the North Central Hills, the Flatwoods, the Pontotoc Ridge, and the Black Prairies. The Black Prairie Belt developed from Upper Cretaceous chalks and the portion adjacent to the Tombigbee River is primarily composed of ferruginous red sandy hills of the Eutaw Formation. The Pontotoc Hills form a belt about 5 miles in width between the Flatwoods to the west and the Black Prairie Belt to the east. This belt is

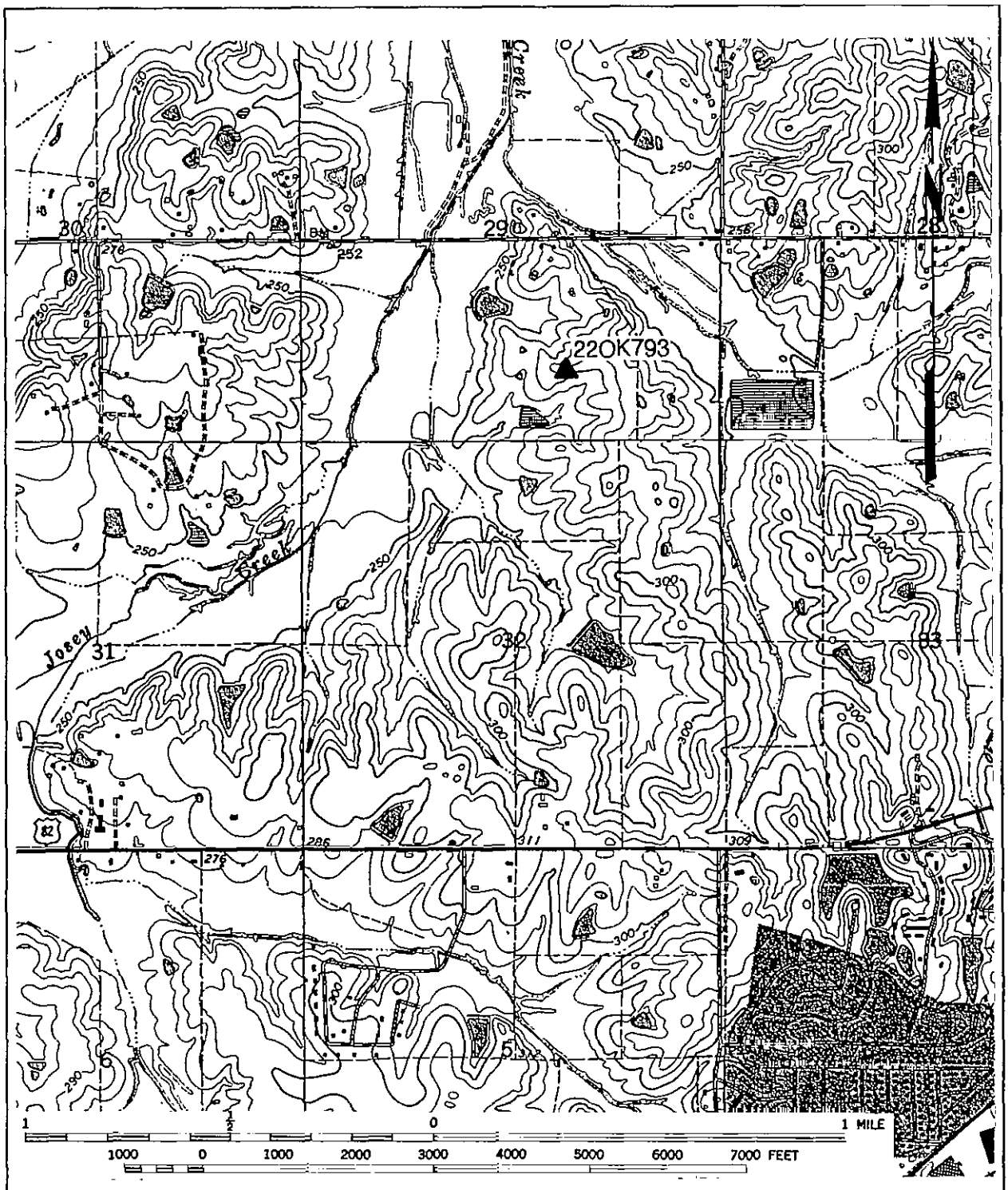

Figure 1. Portion of the Starkville 7.5 USGS topographic map showing 22OK793.

composed primarily of Ripley sands and clays, with some chalk. The hills rise gently 50 to 60 feet above the valleys on the western side but are steeper to the east where the valleys are narrower. The Flatwoods, a gently undulating to slightly wooded plain, has developed on the calcareous and micaceous Porters Creek clay. The is situated in this region, which has also been traditionally viewed as a rather dissected portion of the Gulf Central Plain called the clay hills. Soils have been classified as primarily Susquehanna-Savannah-Ruston series, although there is tremendous local variation (U.S. Department of Agriculture 1939:1072).

The climate is warm and humid, influenced by the subtropical latitude, the high land mass to the north, and the warm waters of the Gulf of Mexico to the south. Temperatures today range from an average of about 46° F in the winter to an average of about 81°F in the summer. As might be expected for the southern subtropics, the relative humidity for the region is high during both the winter and summer. Rainfall averages about 50 inches, with about 23 inches occurring in the April through September growing season. The average growing season is about 226 days.

While it is very difficult in many cases to project current environmental conditions back to even the Mississippian Period, both the soils and climate of the 22OK793 area are significant features when considering the success of aboriginal cultivation. Trawick Ward (1965:42-43) offers a brief synopsis of various soils and their effect on prehistoric cultivation, noting that most Mississippian sites are found associated with silt loams (as opposed to either clay or sand soils) because the tilth of these soils is easily maintained and they are relatively fertile. An even greater limiting factor is rainfall. Corn requires at least 20 inches of rainfall, which must be well distributed throughout the growing season (Wann 1977:183). Although the site area may be expected to produce a good corn yield, it holds the potential for greatly reduced yields and even crop failure.[1]

Braun (1950) classifies the region as part of the Gulf Slope section of her Oak-Pine Forest, although she observes that there is considerable diversity on a local level (Braun 1950:271-272). For example, the Black Prairies region was originally characterized by treeless areas occupied by prairie vegetation. Oaks were found on the higher reddish soils which "dot the prairie surface like islands" (Braun 1950:277) and the stream bottoms were dominated by dense hardwood forests. In contrast, the Flatwoods tended to be dominated by loblolly pines and post oaks. In the site vicinity, however, Braun identifies a broad band of pine associated mostly with upland oaks and hickories (Braun 1950:277).

Wenger (1968) discusses the silvics of a pine-hardwood forest and notes that pine is usually eliminated within 300 years of the beginning of the successional process, although the trend toward hardwood climax is slower on light sandy soils than on clay soils. Further, a pine forest may be artificially maintained. Regardless, it seems likely that there would be considerable diversity in species readily available to the Mississippian people.

This is especially likely since the site is situated on a west facing slope overlooking the lowland ecotone of Josey Creek, where a variety of more mesic vegetation is likely found. The upland location of the site, however, suggests that pine, oak, and hickory might dominate the collection.

[1] The driest year recorded was 1952 when only 31 inches of rain fell, greatly reducing corn and other agricultural yields.

METHODS

There are a range of significant biases which potentially affect the collection and interpretation of ethnobotanical collections (see, for example, Figure 4.1 in Popper 1988). It is important to remind the reader that what is discarded, what is preserved, and what is identified all affect our interpretation of ethnobotanical samples.

While the materials from 22OK793 represent a number of different features, most produced very small quantities of ethnobotanical remains (only Feature 1B can be regarded as producing an adequate sample). Since all of the soil from these various features was subjected to either mechical water flotation or water screening, we can't say that the sampling stratigraphy is responsible for the low yields -- clearly the soils contained very sparse amounts of carbonized material.

Given the general small sample sizes it is likely that extensive discussions are probably not warranted. Certainly the nature of the samples, the size of the collections, and the condition of the materials all affect the ability of this study to offer substantive analyses.

All of the samples were provided in a semi-cleaned state. That is, the quantity of both sand and uncarbonized organic material appears to have been significantly reduced by pre-sorting. As a result, there was relatively little "trash" in any of the samples. It was, however, also immediately clear that traditional analysis of the samples by sifting the charcoal through a series of graded screens, with materials in the upper screens identified and the total weights extrapolated, would have eliminated the vast majority of the carbonized material (because of its small size).

Consequently, each of the samples was first hand sorted to remove the organic debris, daub, and other non-ethnobotanical remains. The resulting material was then examined under low magnification (7x to 30x). While this was a very time consuming approach, it was viewed as the only practical approach to dealing with the collections.

Wood charcoal was identified, where possible, to the genus level, using comparative samples, Panshin and de Zeeuw (1970), and Koehler (1917). Wood charcoal samples were broken in half to expose a fresh transverse surface. Carbonized plant foods and food remains were not broken but were identified on the basis of gross morphological features. Seed identification, relied on U.S.D.A. (1948, 1971), Martin and Barkley (1961), and Montgomery (1977).

RESULTS

Flotation Samples

As previously discussed, 29 proveniences were provided for analysis as flotation samples. Twelve of these were pits or features, four were stratigraphic zones, and 13 were post holes. Tables 1 and 2 list the components of the various samples.

Considering the post holes first, in all but one case (post hole 17), wood charcoal was the most abundant material, accounting for between 69% and 100% of each sample. Only one of these post holes, number 1, produced a small quantity of noncarbonized wood. While this represent accidental inclusions, it is just as likely that it includes a small quantity of heartwood which was not burned and survived because of its high pitch content.

Also present in a few samples were small quantities of sand or pebbles. Bone was found in only one post hole (number 1). Hickory nutshell was encountered in three post holes and comprised two-thirds of the material (by weight) in post hole 17. While the economic significance is hickory is discussed in greater detail below, it is likely that their inclusion in the post holes represents use of the nut meat by the site's occupants.

In addition, two of the post hole samples yielded seeds. Post hole 1 produced a fragmentary seed coat which appears to be a grass seed, but which could not be further identified. Post hole 11 produced one seed of meadow rue (*Thalictrum* sp.). This plant is typically found in rich, low woods in both the Southern coastal plain and piedmont. The plant flowers in mid to late spring, producing seeds in late spring to early summer. This plant does not appear to have economic significance and probably represents an accidental inclusion.

Even this limited range of materials coming from the post holes suggests some mixing of sheet midden in the process of placing the posts, or alternatively, the gradual filling of rotted posts by still accumulating occupational sheet midden. Either way, the fragmentary nature of the remains is suggestive of considerable mechanical damage, such as pedestrian traffic or associated occupational activities.

Seven of the post holes produced fragments sufficiently large for species identification, which is shown in Table 2. Pine (*Pinus* sp.) is found in five of the seven samples (71%), comprising the majority of four samples (80%). This seems appropriate considering the site's ecological location and local dominance of pines. Also present, and also typical of the upland setting, are small quantities of both oak (*Quercus* sp.), found in three samples and dominant in two, and hickory (*Carya* sp.), recovered from only one sample, where it represents the only wood identified.

Present in one sample is maple (*Acer* sp.). This most likely represents either the red maple (*A. rubrum*) or silver maple (*A. saccharinum*). While the maple can be found on a variety of soils, it tends to prefer slightly low, wet soils and may indicate use of resources from the lowlands west of the site area.

Posts which have burned in situ, or which have been charred prior to setting, typically result in post holes with only one species of wood identified. Examples may be post holes 2 and 7, where only pine was present in the samples, post hole 17, where only oak was found, and post holes 4, where only hickory was found. Those post holes with multiple species identified may have collected debris from the site as the original post rotted out.

The use of pine as a common post is not surprising, given the ubiquity of pine and its typically good resistance to decay and insects. Oak, especially the post and white oaks, are very resistant and would have made excellent posts. The

Table 1.
Analysis of Ethnobotanical Samples from Post Holes, wt. in grams

	Wood Charcoal		Unearb. Organic		Bone		Other		Hickory Nutshell		Seeds			
Provenience	wt	%	wt	%	wt	%	wt	%	wt	%	wt	%	Total	Seeds
post hole 1	0.73*	79.4			0.15	16.3					0.04	4.3	0.92	1 - UID frag
post hole 2	0.02	100.0											0.02	
post hole 3	0.07	38.9					0.11**	61.1					0.18	
post hole 4	0.10	90.9							0.01	9.1			0.11	
post hole 5	0.14	73.7					0.05**	26.3					0.19	
post hole 6	0.22	68.8					0.07*	21.9	0.03	9.3			0.32	
post hole 11	0.56	93.3					0.03**	5.0			0.01	1.7	0.60	1 - Thalictrum sp.
post hole 12	0.03	100.0											0.03	
post hole 12 N½	0.02	100.0											0.02	
post hole 13	0.02	100.0											0.02	
post hole 14	0.08	100.0											0.08	
post hole 17	0.04	33.3							0.08	66.7			0.12	
post hole 18	0.08	100.0											0.08	
post hole 19	0.03	100.0											0.03	

WS = water screened; all others are water floated samples

* includes some partially noncarbonized wood ** stone or lithics

Table 2.
Wood Charcoal Identified from post holes at 22OK793, by percent

post hole	*Pinus* sp.	*Quercus* sp.	*Carya* sp.	*Acer* sp.
1	33.3	66.7		
2	100.0			
4			100.0	
6	50.0			50.0
7	100.0			
14	50.0	50.0		
17		100.0		

use of oak would likely have been limited only by the difficulty working the wood using stone tools. The use of hickory for a post, however, is somewhat surprising since the wood offers almost no resistance to decay and typically lasts a very short time in ground contact.

Table 3 lists the 16 flotation samples and the seven water screened samples. In all but two cases (Feature 7B and 22S102-104W, Zone B1), wood charcoal dominates the collections, accounting for 43% to 98% of each sample. The charcoal pieces from these samples were not large enough to permit species identification.

In general noncarbonized organics (primarily rootlets) were uncommon, comprising a significant percentage of only the samples from Feature 7B and Zone c in 16N24W. Bone was found as a minor constituent of 15 samples, while sand and other non-organic materials were recovered from 10 samples.

Hickory nutshell was found in 11 of the flotation samples and two of the water screened samples. In most cases the nutshell comprises only a small percentage of the total sample, although nutshell was especially abundant in Features 14 and 15 — identified as Middle Mississippian and late prehistoric pits respectively.

Acorn was found in only one sample — Feature 1 — where only a very small quantity was identified. Of course, acorn shell is considerably more fragile than hickory nutshell, so its recovery is typically less common.

The use of both hickory nuts and acorns as a supplemental food source by native Americans is well documented in virtually ever portion of the Southeast. Hickories and oaks would have been relatively common in the site vicinity, as previously discussed, although agricultural clearing and second-growth succession (if present) would tend to limit hickory and encourage oak (see Moore 1984). The extent to which resident peoples would have actually destroyed a significant food resource is not known. Hickories tend to produce an abundant crop every one to five years, usually with light crops in the intervening years (Fowells 1965; Schopmeyer 1974). Crop yields range from about two to three bushels per tree in a good year (Schopmeyer 1974). Oak trees will produce a good crop every one to ten years, also with a highly variable yield (200 to 2,000 acorns per tree) (Fowells 1965).

The presence of these nut resources indicates that the residents at 22OK793 were in the area during the fall, as fruits ripened and fell to the ground; or perhaps the nuts were gathered then and stored for later use.

Several researchers have described the complementary nutritional nature of hickory nuts and acorns (Asch et al. 1972; Caddell 1982: 34; Styles 1981:81); summary data are presented in Table 4. Hickory nuts, when compared to acorn, have a higher caloric yield, similar to corn. Acorns have relatively high quantities of carbohydrates, but are low in protein and fats. Hickory is high in protein and fat, but low in carbohydrates.

The relative infrequency of acorn may suggest that this resource was little valued and may also indicate that relatively little nearby ground was

Table 3.
Analysis of Ethnobotanical Samples from Features and Unit Contexts, wt. in grams

	Wood Charcoal		Uncarb. Organic		Bone		Other		Hickory Nutshell		Acorn Shell		Seeds			
Provenience	wt	%	wt	%	wt	%	wt	%	wt	%	wt	%	wt	%	Total	Seeds
Fea 1A	3.51	75.8	0.91	19.7					0.18	3.9	t	t	0.03	0.6	4.63	1 - *Smilax* sp. 1 - *Ilex* sp. 2 - UID frags
Fea 1B	22.62	74.2	6.05	19.9	0.90	3.0	0.46**	1.5	0.38	1.2			0.06	0.2	30.47	6 - UID frags
Fea 1B WS	2.34	92.1					0.20	7.9							2.54	
Fea 1C	0.65	43.0	0.36	23.8	0.41	27.2			0.09	6.0					1.51	
Fea 1C WS	10.77	92.1	0.11	0.9	0.52	4.4	0.30	2.6							11.70	
Fea 2	3.27	62.4	1.52	29.0	0.32	6.1	0.10**	1.9	0.02	0.4			0.01	0.2	5.24	2 - UID frags
Fea 2 WS	1.86	96.4	0.07	3.6											1.93	
Fea 4	0.64	64.7	0.22	22.2	0.11	11.1			0.02	2.0			t	t	0.99	2 - UID frags
Fea 4 WS	1.29	62.0	0.41	19.2	0.09	4.3			0.29	14.0					2.08	
Fea 5	2.93	60.2	1.45	29.8	0.19	3.9			0.30	6.1					4.87	
Fea 7A	0.29	61.7	0.17	36.2									0.01	2.1	0.47	1 - UID frag
Fea 7B	0.25	36.7	0.41	60.3	0.01	1.5							0.01	1.5	0.68	2 - UID frags
Fea 11	0.09	90.0	0.01	10.0											0.10	
Fea 11 WS	0.12	48.0			0.02	8.0	0.11**	44.0							0.25	
Fea 12	2.33	60.4	0.45	11.7	0.76	19.7	0.14**	3.6	0.18	4.6					3.86	
Fea 14	2.85	61.0	0.11	2.4	0.09	1.9			1.62	34.7					4.67	
Fea 15	0.83	62.9	0.17	12.9					0.32	24.2					1.32	
16-18N24W, Z B	0.47	71.2	0.15	22.7	0.01	1.5	0.02**	3.0	0.01	1.5			t	0.1	0.66	1 - UID frag
16-18N24W, Z B WS	5.73	65.9			1.26	14.5	1.71**	19.6							8.70	
22S102-104W, Z B1	0.14	37.8	0.01	2.7	0.05	13.5	0.16**	43.3	0.01	2.7					0.37	
22S102-104W, Z B1 WS	2.57	52.0			0.92	18.6	1.06**	21.5	0.39	7.9					4.94	
22S102W, Z B2	0.15	88.2	0.02	11.8											0.17	
16N24W, Z. C	0.08	57.1	0.06	42.9											0.14	

WS = water screened; all others are water floated samples
* includes some partially noncarbonized wood ** stone or lithics

in succession. This tends to be supported by the absence of corn in any of the samples. There is absolutely no indication of cultigens at 22OK793.

Seeds were recovered from seven of the flotation samples, but were not unexpectedly absent from the water screened collections.

Table 4.
Nutritional Composition of various plant foods, per 100 g

Food	Water %	Calories	Protein	Fat	Carbohydrates Total	Carbohydrates Fiber
Corn, whole grain, raw	13.8	348	8.9	3.9	72.2	2.0
Hickory nuts	3.3	673	13.2	68.7	12.8	1.9
Acorns:						
White Oak	47.3	221	2.8	3.3	43.9	1.3
Red Oak	38.2	299	3.4	12.9	42.1	1.9

The seven proveniences yielded a total of 18 seeds or seed fragments, only two of which were identifiable. The rest were so damaged that positive identification was not practical, although all appeared to "weedy" species.

The identified seeds include one example of greenbrier (*Smilax* sp.) and one of *Ilex* sp. The greenbrier is today most common in cut-over habitats, although it would likely have been found in any disturbed areas. They are most common in moist thickets and deciduous woods and might have been present in the lowlands west of the site. It is also possible that the plant would have been found in some of the gully areas in the immediate site vicinity. The plants typically flower in late April and May, and produce seeds in the late fall.

The specimen of *Ilex* sp. most likely represents either the winterberry (*Ilex verticillata*) or the gallberry (*Ilex glabra*). Both tend to be found in low woods and pocossins. The plants flower in May to June and seed from September through November. The winterberry is also known as black alder and the seeds have approximately the same effect when ingested as those of yaupon (*I. vomitoria*), causing nausea, vomiting, and purging (Millspaugh 1974:418).

The remaining seems are all small and are likely Gramineae or grasses. They would likely be considered "weeds," or plants of no obvious economic use, but often found in waste places or growing in disturbed soils.

Species ubiquity, which is simply the percentage of proveniences in which a particular species was present, provides information on how wide spread a species is within the archaeological record (as preserved, collected, and analyzed). The most common plant remain was wood charcoal, found in all of the proveniences. Hickory nutshell was found in 75% of the features, but only 23% of the post holes. Acorn was found in none of the post holes and only 8% of the features. Overall, hickory nutshell has a 48% ubiquity, acorn a 3% ubiquity, and seeds only a 31% ubiquity.

This data must be very cautiously interpreted, given the small sample size, our limited information regarding collection procedures, and our understanding of differential preservation (especially between dense hickory nutshell and fragile acorn shell). Regardless, it suggests that hickory was a relatively common plant food commodity and that seeds were fairly commonly incorporated into the archaeological record (suggesting that they were common in the site vicinity).

It is also useful to compare and contrast the results of the flotation sampling from those of the water screening. In four cases, wood charcoal is appreciably more common in the water screened samples than in the flotation samples, with a corresponding decline in the diversity of the sample constituents. This is very much what we might expect from water screening — the larger, less fragile items, such as wood charcoal, are collected at the expense of other items, such as seeds, small bones, and even hickory nutshell.

In two cases the proportion of wood charcoal actually declined, although careful examination of the data reveals that it was replaced by very large amounts of trash, especially

large sand grains. In another sample the proportion of wood charcoal declined, being replaced by a very large collection of hickory nutshell — far larger than would have been suggested by the flotation sample. Since hickory nutshell is relatively dense and heavy, it may be that it was not completely floated, with much of it sinking into the heavy fraction.

In general, however, the data from 22OK793 supports the notion that water screening is a poor substitute for flotation, if recovery of ethnobotanical remains is the primary goal (water screening, of course, can be quite useful in the pursuit of other data, such as beads, collection of faunal remains, and so forth).

Summary

The samples from 22OK793 are for the most part very unremarkable. Wood charcoal is the most common constituent and the species present mirror the ecological setting of the site. Identified seeds also suggest use of the adjacent lowlands, although none appear to be have been collected as food resources.

Perhaps the most remarkable discovery is the absence of corn. No evidence of corn was found in any of the samples, from any of the various time periods represented at the site. There are at least six sites with very well documented corn from Mississippi. Cutler and Blake (1977) document remains from Lyon's Bluff (22OK1), Buford (Tallahatchee County), Hays (22CO612), and Bond's (22TU530). Materials from the Owl Creek Mound (22CS502) have been described (Trinkley 1994a), as have those from 22OK595 (Trinkley 1994b). These sites have dates as early as A.D. 800 and as late as A.D. 1500. The total absence of corn at 22OK793 has resulted in the description of the site as a Mississippian "hamlet" rather than "farmstead."

The site occupants did exploit hickory nuts, perhaps extensively. These would have been available in the fall through perhaps the early winter (depending on competition with local animals). The seeds present at the site include examples of both warm weather plants, such as grasses, and also species that seed in the late fall or early winter.

The ethnobotanical remains seem to suggest that 22OK793 was occupied either prior to the harvest of the corn crop or after the bulk of the crop had been consumed. It does not appear to be associated with any intensive agricultural pursuits.

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