9. PLANTS USED BY THE OCCUPANTS OF SCATTERED VILLAGE

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Introduction

Charcoal fragments from 245 catalog lots representing 30 archeological features were examined. Most catalog lots contained material that had been size graded and material from two or more size grades were present in most lots. The material was inspected with a microscope at low magnification and any identifiable seeds, fruits, or similar botanical materials were tabulated. Wood charcoal was not part of this study except to the extent that it was the haystack in which the needle (seed) was hidden. In gross composition, the collection contains all the native cultivated subsistence plants known from the historic period and most of the wild fruits available today in the vicinity of the site. The domesticated form of the sunflower (*Helianthus annuus*) is the only representative of the commonly recognized native cultivars that may have originated in North America.

The most general goal of the study was extraction, identification, and description of plant remains of apparent cultural importance. Topics such as indications of seasonality, traditional food processing techniques and horticultural varieties were considered. Intersite comparisons, with a focus on comparable data from nearby villages (Slant Village and Huff Village and site 32MO291 in the Highway 180 By-Pass Project) were used to evaluate the possibility for use of the site by recent immigrant populations (eastern Hidatsas) not having a traditional corn-horticultural base. Data from waterscreened samples was compared to data from constant volume samples to determine whether there were differences in the kinds of specimens or the condition of specimens that correlate with the recovery method. Although a waterscreened collection yields large volume samples, it is a potentially abusive processing method while the constant volume samples produce substantially fewer specimens that are potentially less affected by the method of processing.

Sample Processing

It was clear that far more botanical remains had been recovered during excavation in high priority contexts than could be effectively studied with available time and funds. It was also likely that the site had been "over-sampled" with regard to the amount of material required to address most of the project research questions, given the abundance of plant remains in many excavated contexts. For these reasons, Stan Ahler and the author conferred and reached the conclusion that charred remains from only selected contexts would be studied. It was also determined that for reasons of thoroughness and consistency, and due to the complexities of quantification, the author rather than less specialized lab personnel in Flagstaff would conduct sorting and isolation of identifiable plant remains within the target samples.

The initial plan was to study remains from both features and non-feature (general level) contexts. Virtually all recovered charred materials (exclusive of wood charcoal previously

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isolated in the Flagstaff lab) from 32 individual features were isolated and sent to the author for his examination. Features were selected to represent as much variation as possible in several variables (see data in Table 9.1). All site time periods are represented; several different feature types are represented, ranging from hearths and burned layers to pits of various sizes, with some containing human interments; both inside- and outside-house contexts are represented; and all excavated areas (except Block 7) are represented. In addition to features, remains from non-feature, general level contexts in five excavation blocks representing different types of refuse and sediment accumulation were selected and isolated for possible study.

The selected feature samples comprised four standard boxes of remains or about four cubic feet of tightly packed, finely divided charred material. After the author conducted a preliminary survey of feature sample content, he and Ahler conferred and the decision was made to limit the study to the 32 feature contexts. In addition, it was decided that some contexts with particularly abundant remains would be further sampled, while sorting and analysis progressed, to achieve reliable data in an efficient manner (see more detailed discussion that follows).

Four types of samples were studied for charred plant remains. (1) Waterscreened samples (ws). These derive from relatively large volumes of feature matrix that was processed in the field waterscreen system by spraying pressurized water over excavated sediment on 16-per-inch (ca.1.17 mm) mesh screens, with botanical remains further isolated in the lab by water flotation of waterscreened residue. (2) Field flotation, feature level samples (fl). These are often large volumes of excavated feature matrix (perhaps a feature level or whole feature) that was processed entirely by flotation in the field (with 0.5 mm or finer mesh). (3) Constant volume flotation samples (cv). These are subsamples from excavated feature levels having measured volume (usually 6 liters in a 15-cm thick feature excavation level) that were processed by flotation in the field. (4) Piece-plotted samples (pp). These are individual botanical specimens (e.g., charred corn cob) or small concentrated samples of botanical remains that were plotted and collected without waterscreening or floating in the field.

It is useful to track the information gained from each type of sample. Waterscreened samples tend to be much larger in total excavated volume, but botanical remains contained therein are subject to some damage and degradation during recovery and loss of specimens smaller than the 16-per-inch screen size. Feature float samples can also have large volume, but are less subject to recovery damage or loss of smallest specimens. Constant volume samples are very small in total volume and require substantial field time and expense for extraction and handling, but are also less subject to recovery damage and loss of very small specimens. The data tables for the project record the sample type for each catalog number lot, facilitating comparison of information gained from each sample type.

The tabulated macrobotanical remains from 32MO31 consist of specimens observed in the residue from field water screening and laboratory flotation processes as well as field-identified specimens (piece-plotted). Batches of charcoal were, in most cases, examined with a low power (7X) stereomicroscope. This procedure allows one to scan a reasonable field of view while providing the magnification necessary to recognize most seeds and seed fragments

Table 9.1. Information about features selected for botanical analysis, organized by time period, Scattered Village (32MO31), 1998 excavations.

Period	Feature	Block	Sample Volume, m^3	Feature Type	Context
1	14	2	0.501	large undercut pit	outside house
1	26	3	0.548	ashy undercut pit	inside house
1	106	3	0.110	undercut pit	inside house
1	127	8	1.682	large undercut pit	inside house
1	130	9	0.704	undercut pit with burial	unknown
1	132	9	1.486	large undercut pit	unknown
1	146	8	0.002	small hearth	inside house
2	6	2	0.048	debris concentration	outside house
2	12	2	0.003	small hearth	outside house
2	55	3	0.179	pit with burial	unknown
2	60	4	0.009	small hearth	outside house
2	65	2	0.026	small hearth	outside house
2	73	3	0.341	large undercut pit	unknown
2	108	3	2.866	large burial pit	outside house
2	140	6	0.061	small undercut pit	inside house
2	144	6	0.134	ash pit	inside house
2	163	6	0.085	small undercut pit	inside house
2	178	2	0.546	large undercut pit	outside house
3	7	3	0.096	central hearth	inside house
3	17	3	0.090	central hearth	inside house
3	57	2	0.153	undercut pit	outside house
3	101	3	0.509	undercut pit	inside house
3	104	3	0.460	undercut pit	inside house
3	133	9	0.485	large undercut pit	unknown
4	52	1	0.103	debris concentration	outside house
4	56	1	0.080	basin with midden	outside house
4	58	1	0.075	charred layer	outside house
4	66	1	0.352	basin with midden	outside house
4	68	2	0.196	undercut pit	outside house
4	99	4	0.301	undercut pit	outside house
4	119	6	0.552	pit with burial	outside house
5	181	1	0.008	small hearth	previllage

in batches of fragmentary wood charcoal of about the same dimensions. Most lots of charcoal consisted of waterscreened debris that had been separated from heavier-than-water fraction and then size-graded at the PCRG laboratory in Flagstaff prior to being provided to the author for sorting and identification. When practical, the lots that resulted from field flotation were sorted without additional water separation. This allowed the full range of possible size grades to be inspected. Some lots from field floatation were large and contained enough fine-grained sediment to interfere with sorting. These samples were floated in Lincoln and then size-graded prior to sorting.

The process of sorting identifiable seeds from what is normally a much larger mass of highly fragmented wood charcoal is simple but progressively labor intensive with decreasing specimen size. Grade 3 and larger specimens can normally be sorted by hand with nothing more

than a good light source. Grade 4 materials normally require a microscope or at least a large illuminated magnifier. Complete stones of cherry and plum and multi-cupule segments of corncobs can normally be recognized and handled without optical aids but smaller specimens or fragmentary specimens are difficult to recognize without magnification. Three to ten-power magnification and a good light source are essential to efficiently process Grade 5 and smaller lots. An artist's small paintbrush is useful for manipulating the specimens under the magnifier and a moistened brush is the best tool for transferring small specimens to vials or other containers.

The collection of charcoal from 32MO31 was handled in a consistent manner. The largest size grade material was sorted first. All material larger than Grade 4 was examined. Specimens were identified and, if appropriate, notes about size and condition were recorded. If the specimens were likely to be subject to further inspection they were separated from the charcoal and placed in labeled vials or bags. Grade 4 and 5 lots and those lots which had not been size-graded were placed in containers that allowed a quick approximation of volume and the portion to be fully sorted was then separated. In most cases the entire lot was sorted but some large volume lots were sampled with between 10 and 50 percent of the sample subjected to examination under magnification. In the tables for this section the size of the sample examined microscopically is indicated in the column labeled "%."

Whether the entire lot was examined or only a portion of it, the material was poured into a 9 cm diameter glass petri dish for inspection under the microscope. The microscope used has about a 3.5 cm field of view at 7X magnification. As a practical matter, it is essential that only enough charcoal to cover the bottom of the dish be added since a thicker layer results in some specimens being completely hidden from view. Stirring the layer of charcoal takes time, may damage specimens and some identifiable specimens still escape detection. A thin layer of similarly sized specimens also minimizes the need to change the focal plane of the microscope. By counting fragments in quadrants of the dish, it appears that each dish of Grade 4 material contained about 300 fragments and for Grade 5 the number was 10 times greater than that of Grade 4. Grade 4 specimens ranged from about 1mm to 4mm in diameter with most falling into the 3 mm to 4 mm range. The time required to process a lot of charcoal depends on the size and number of charcoal fragments, the frequency of identifiable specimens, and whether the identifiable specimens are physically segregated. Sorting 43 g (17%) of Grade 4 charcoal from Catalog lot 2906 and removing all of the identifiable specimens required 4.5 hours. Processing a lesser amount (29 g), but a very slightly larger percentage, of the Grade 5 material from the same catalog lot required five hours.

One aspect of water-screened collections is the presence, in some lots, of significant amounts of fine hair-roots from modern vegetation. Weaver (1965: 90, 129) provides impressive illustrations of the substantial root system of several prairie grasses. Although the Scattered Village area was not in native prairie grasses at the time of excavation, it is likely that modern sod grasses produced similar amounts of root material. Excavation levels that were removed by shovel contain longer root segments that can generally be removed with little loss of charcoal. Units that were excavated with a trowel contain large numbers of very short root fragments with lengths that are only a few times the diameter of charcoal fragments and which are impractical to

remove. Although the modern root fragments cannot be confused with the archeological specimens, they present an impediment to efficient handling of those lots in which they occur.

Archeological specimens were identified by comparison with modern seeds and fruits from known plants and by reference to published guides (e.g. Hitchcock 1950, Martin and Barkley 1961, Slife et al. 1960). Modern comparative material includes specimens collected by the author and collections available from universities and departments of agriculture in Nebraska and the Dakotas. The tables present quantities of seeds in two schemes. Some lots allowed all of the identifiable specimens to be observed, removed from the wood charcoal and accurately counted. These lots are presented as integer counts in the tables. Other lots contained too many specimens to allow them to be physically separated and counted individually. These lots were assessed by dividing a dish of charcoal into quadrants and counting the identifiable seeds and the number of charcoal fragments. This information was used to assign a percent value that was entered in the tables as an alpha code. Given the relatively homogenous nature of the size-graded lots this value can reasonably be taken as percent by weight or volume.

The Identified Plants

In this discussion (and the tables) colloquial names are often used for the plants and their fruits in order to make the text and tables more readily comprehensible for the largest number of readers. For example, sunflower (*Helianthus annuus*) seeds should be readily recognized as a potential foodstuff. Its fruit consists of a seed inside a papery achene. In most contexts "seeds" can stand for the edible seeds or achenes that do or did contain edible seeds. In a similar vein, corn (*Zea mays*) is the only plant familiar to most readers that is normally thought of as having "cobs." The anomalously large and woody nature of the female inflorescence of corn (the cob) makes it one of the most commonly recovered archeological indicators of subsistence activity during the last millennium. Although other seeds or portions of fruits may be properly known as kernels, corn is the only archeologically recovered plant from the Middle Missouri to which the term is frequently applied. Tables 9.2, 9.3, 9.4, and 9.5 present the excavation Features that associate with occupation periods TP1 through TP4. Table 9.6 presents a comparison of the ubiquity of the species by early (Periods 3 and 4) and late (Periods 1 and 2) periods.

Corn

Corn (*Zea mays*) is widely acknowledged to have been the primary horticultural food item of the semi-sedentary villagers. Whether in comments made by early Euroamerican explorers (summarized in Will and Hyde 1917) or recorded in Native American accounts (Wilson 1917, Gilmore 1919), corn was the main focus of horticulture activities in the villages, with secondary attention focused on beans, squash and sunflowers. Our knowledge of historic period corn varieties in the northern Great Plains is largely based on George Will's work (Will and Hyde 1917) which combined his interest in archeology with his family's commercial interests in the seed business (Walster 1956).

Table 9.2. Identified plant remains from Period 1 feature contexts, Scattered Village 2MO31), 1998 excavations.

Catalog Number	Recovery	Feature	Block	%	Corn Cob	Corn Kernel	Squash	Bean	Sunflower	Chokecherry	Wild Rose	Wild Plum	Buffalobery	Dogwood	Grape	Chenopodium	Grass1	Grass2	Knotweed	Other
Feature 14, large undercut pit, outside house																				
1345	ws	14	2	20	B	B		2		D		1	10			D	1			
1379	ws	14	2	100	B	D	d	2	1	D	E		E	2			2			
1415	ws	14	2	25	E	E				30	18		6	1						
1367	pp	14	2	100	1															
1378	pp	14	2	100	5															
1394	pp	14	2	100		2														
1312	cv	14	2	100	B	D					1					B	E			
1346	cv	14	2	100	B	D	1*	2		4			1			D	4			
1363	cv	14	2	100	B	D	d		1	1			11	11	1	B	D			Iv:E
1380	cv	14	2	100	B	E	1*	B	D	D	3	E	D	2		20	5			
1416	cv	14	2	100	E			1		3			1			E				
Feature 26, large undercut pit, inside house																				
1401	ws	26	3	50		D			1											
1433	ws	26	3	10	E	D			1							1				So:1*
1529	ws	26	3	10		D			10	1										
1563	ws	26	3	10		5			6											
1997	ws	26	3	25	D	D		3	5							1			2	Su:1
2008	ws	26	3	50	D	D	1*													
1404	cv	26	3	50	2															
1434	cv	26	3	100		D		1	6		1		1			2			1*	
1530	cv	26	3	100	2				6											
1564	cv	26	3	100			d		11		1					D				
1998	cv	26	3	50		2	d		4		1					1			D	So:d
2009	cv	26	3	100			1*									b				So:e
Feature 106, undercut pit, inside house																				
2310	ws	106	3	25	1	3							1						1*	Ms:1/So:1*
2266	cv	106	3	100	D	D			1											
2311	cv	106	3	100		D										d				

Table 9.2. Identified plant remains from Period 1 feature contexts, Scattered Village (32MO31), 1998 excavations (continued).

Catalog Number	Recovery	Feature	Block	%	Corn Cob	Corn Kernel	Squash	Bean	Sunflower	Chokecherry	Wild Rose	Wild Plum	Buffaloberry	Dogwood	Grape	Chenopodium	Grass1	Grass2	Knotweed	Other
Feature 127, large undercut pit, inside house																				
2617	ws	127	8	50	E	D														
2631	ws	127	8	100	D															
2664	ws	127	8	100	E	E														
2683	ws	127	8	50	D	D			1	1	3		1		1	B				
2705	ws	127	8	100	E	E			1	1	2									
2722	ws	127	8	100	E	E					3			1					1	
2746	ws	127	8	100	16	6			2	2	9	1	1	1						
2762	ws	127	8	100	6	10				2	1								1*	
2676	ws	127	8	100	E	E					4			3					1	
2780	ws	127	8	100	E	E			1	20	9			10						
2797	ws	127	8	100	30	25			1	8	32	1	2	2						
2814	ws	127	8	100		4				E				2						
2948	pp	127	8	50	D	B					1								1	
2618	cv	127	8	100	1	10											2			
2677	cv	127	8	100		7	1*									49*				So:26*
2684	cv	127	8	100	2	5										8*				
2706	cv	127	8	100												30*				
2723	cv	127	8	100		E										b				So:e
2747	cv	127	8	100												d				So:d
2763	cv	127	8	100		E										b				So:e
2781	cv	127	8	50												B			D	Iv:D
2798	cv	127	8	100		D			1							B			2	
2815	cv	127	8	100		1	e									103*				So:23*
2868	fl	127	8	100			1*									50*				

Table 9.2. Identified plant remains from Period 1 feature contexts, Scattered Village (32MO31), 1998 excavations (complete).

Catalog Number	Recovery	Feature	Block	%	Corn Cob	Corn Kernel	Squash	Bean	Sunflower	Chokecherry	Wild Rose	Wild Plum	Buffaloberry	Dogwood	Grape	Chenopodium	Grass1	Grass2	Knotweed	Other
Feature 130, undercut pit with burial, uncertain location																				
2669	ws	130	9	50	3	3					2								e	
2703	ws	130	9	10	D				1				2							
2731	ws	130	9	100	D	3	1*				2			1					d	
2792	ws	130	9	100	60	4					2								e	
2793	ws	130	9	50	D	D		30			6								1	
2670	cv	130	9	100												1				
2704	cv	130	9	100	E				3		3		2							
2720	cv	130	9	100												b				
2794	cv	130	9	100	1											E				
Feature 132, large undercut pit, uncertain location																				
2689	ws	132	9	25	D	D			2										b	
2738	ws	132	9	100		3														
2744	ws	132	9	100	D	D			1		1									
2782	ws	132	9	100	B	B	1*		2		6									
2801	ws	132	9	100		3					1									
2844	ws	132	9	25	D	D	b			2	2						1		b	
2857	ws	132	9	25	D	D	b				2	1		1				1	b	
2866	ws	132	9	100		D	d			1	1						D			
2690	cv	132	9	100	E	E	e									1				
2739	cv	132	9	100							2					d				
2745	cv	132	9	100	E	1										1				
2783	cv	132	9	100		1			1							3			e	
2802	cv	132	9	100												d				So:d
2845	cv	132	9	100			d									d	1			So:d
2858	cv	132	9	100												D				Iv:E/Pw:e/So:e

Notes: 1. Recovery: ws=waterscreen of entire feature level; cv=constant volume field float sample, generally 6 liters volume; fl=field float of entire feature level. 2. Upper case letters (A-E) indicate carbonized specimens. Lower case letters (a-e) indicate uncarbonized specimens. A=50%-100%, B=6%-49.9%, C=2%-5.9%, D=0.5%-1.9%, E=<0.5%. 3. Actual counts marked with an asterisk are uncarbonized specimens. 4. Key for Other Column: Hk=Hackberry (Celtis sp.), Iv=Iva xanthifolia, Ms=Mustard (Brassica sp.), Pw=Pigweed (Amaranthus sp.), Su=Sumac (Rhus sp.), So=Solanaceae.

Table 9.3. Identified plant remains from Period 2 feature contexts, Scattered Village (32MO31), 1998 excavations.

Catalog Number	Recovery	Feature	Block	%	Corn Cob	Corn Kernel	Squash	Bean	Sunflower	Chokecherry	Wild Rose	Wild Plum	Buffaloberry	Dogwood	Grape	Chenopodium	Grass1	Grass2	Knotweed	Other
Feature 6, burned debris layer, outside house																				
1185	ws	6	2	100	E	D					1		1	1						
1180	cv	6	2	100	D	D				1										Pw:D
Feature 12, other hearth, outside house																				
1273	fl	12	2	100	B	E			3	E		E	D			B	9			
Feature 55, undercut pit with burial, uncertain location																				
1800	ws	55	3	50	E		d				2				1*	e		e	e	
1713	fl	55	3	100	D	D	d		2				2			e				
1727	fl	55	3	100		D			4		1			1*		e	1			So:d
Feature 60, other hearth, outside house																				
1924	fl	60	4	100	D	D		4	1							5		6		
1831	fl	60	4	100	1	D	d	1	2					1*		e				
Feature 65, other hearth, outside house																				
1871	fl	65	2	50		E														
Feature 73, large undercut pit, uncertain location																				
1987	ws	73	3	20	D	B	e		1	1	3								d	Hk:1*/So:e
2010	ws	73	3	20	E	E	d								2				e	
2088	ws	73	3	100	B	B	b			1	1					D			e	
1988	cv	73	3	100			d		1							d		e		
2011	cv	73	3	100		1	b								1*	d				
2089	cv	73	3	100		D	d													
Feature 99, undercut pit, outside house																				
2131	ws	99	4	100	D	D	1*			1	6	1								
2149	ws	99	4	100	D	D					2									
2196	ws	99	4	50	D	D				13	6			1				e	11*	
2211	ws	99	4	100	D	D				10	2			5						
2217	ws	99	4	100	D	D				D		1		D						

Table 9.3. Identified plant remains from Period 2 feature contexts, Scattered Village (32MO31), 1998 excavations (continued).

Catalog Number	Recovery	Feature	Block	%	Corn Cob	Corn Kernel	Squash	Bean	Sunflower	Chokecherry	Wild Rose	Wild Plum	Buffaloberry	Dogwood	Grape	Chenopodium	Grass1	Grass2	Knotweed	Other
Feature 99, undercut pit, continued																				
2132	cv	99	4	100	D	D										e				So:e
2150	cv	99	4	100			d		1				1			e				So:e
2197	cv	99	4	100	2	3								1		e				So:e
2212	cv	99	4	100		6	4*		1					1		E			e	
2218	cv	99	4	100												e				
Feature 108, large deep burial pit, outside house																				
2547	ws	108	3	25	D	D	d				2								d	
2553	ws	108	3	50	D	D	d		2	1	4		1	1					d	
2558	ws	108	3	10	D	E	d			1	1									
2561	ws	108	3	10	D	D	e		1	1	3		1	2					e	
2578	ws	108	3	25	D		e			1				2					B	
2598	ws	108	3	20		D	d			E						e			e	
2626	ws	108	3	100	D		e													
2649	ws	108	3	25	D	D	e		1	1	15			5						
2657	ws	108	3	50	D	D	D		1	1	3		1	1					d	
2567	ws	108	3	100	D	D	d		1		11								b	
2681	ws	108	3	100	E	D	d		1		2			1					E	
2749	ws	108	3	100	E	E		1			1	1		1						
2726	ws	108	3	100	E				2		1								1	
2278	cv	108	3	100		D			1											
2288	cv	108	3	100		D	e		D							b				
2301	cv	108	3	100			d		1							b				
2303	cv	108	3	100						1	1					b				
2435	cv	108	3	100		1										b				
2449	cv	108	3	50		D	e				3					b				
2462	cv	108	3	100	D						3		2						d	So:d
2599	cv	108	3	100												b				

Table 9.3. Identified plant remains from Period 2 feature contexts, Scattered Village (32MO31), 1998 excavations (complete).

Catalog Number	Recovery	Feature	Block	%	Corn Cob	Corn Kernel	Squash	Bean	Sunflower	Chokecherry	Wild Rose	Wild Plum	Buffaloberry	Dogwood	Grape	Chenopodium	Grass1	Grass2	Knotweed	Other
Feature 108, large deep burial pit, continued																				
2658	cv	108	3	100			e									b				
2650	cv	108	3	100		E	e				1					b			d	
2682	cv	108	3	100		E	d									b			e	
2727	cv	108	3	100			d									b				
2750	cv	108	3	100			d									b				
Feature 140, small undercut pit, inside house																				
2761	ws	140	6	50		D					1			1					E	
2799	ws	140	6	100	B	D			3		8									
2808	ws	140	6	100	B	B			1		3									Ms:1
Feature 144, basin pit, inside house																				
2800	ws	144	6	100		3	e													
2778	fl	144	6	100	E		d									1				Ms:1/So:d
2790	fl	144	6	50	D	D													1*	Ms:1
Feature 163, small undercut pit, inside house																				
2876	ws	163	6	100	E				2	E	3									
2877	cv	163	6	100												E				
Feature 178, large undercut pit, outside house																				
2026	ws	178	2	50	D	D	1*		1		D			2					1	
2198	ws	178	2	100	B	D	b	4	1		2			1			1		e	
2207	ws	178	2	100	D		d													
2215	ws	178	2	100	B	D	b			1			1		1			d	b	
1927	cv	178	2	100		B			8				B							
1955	cv	178	2	100	D	B	d		D			1	D				1			
1964	cv	178	2	100	D	D	d		1				E			d	1			
2027	cv	178	2	50		E							E			e				
2199	cv	178	2	50	D		d		1								2			
2208	cv	178	2	100			e									e				
2216	cv	178	2	100			e		1							d			d	

Notes: 1. Recovery: ws=waterscreen of entire feature level; cv=constant volume field float sample, generally 6 liters volume; fl=field float of entire feature level. 2. Upper case letters (A-E) indicate carbonized specimens. Lower case letters (a-e) indicate uncarbonized specimens. A=50%-100%, B=6%-49.9%, C=2%-5.9%, D=0.5%-1.9%, E=<0.5%. 3. Actual counts marked with an asterisk are uncarbonized specimens. 4. Key for Other Column: Hk=Hackberry (Celtis sp.), Iv=Iva xanthifolia, Ms=Mustard (Brassica sp.), Pw=Pigweed (Amaranthus sp.), Su=Sumac (Rhus sp.), So=Solanaceae.

Table 9.4. Identified plant remains from Period 3 feature contexts, Scattered Village (32MO31), 1998 excavations.

Catalog Number	Recovery	Feature	Block	%	Corn Cob	Corn Kernel	Squash	Bean	Sunflower	Chokecherry	Wild Rose	Wild Plum	Buffaloberry	Dogwood	Grape	Chenopodium	Grass1	Grass2	Knotweed	Other
Feature 7, central hearth inside house																				
1207	ws	7	3	100																
1208	ws	7	3	100	1	1														
1209	ws	7	3	100		1	1*													
1210	ws	7	3	100	1	3							1							
1255	ws	7	3	100		E											2		1	
1264	ws	7	3	25	D	D								1		1				
1240	fl	7	3	100		E	e													
1241	fl	7	3	100													1			
2153	fl	7	3	100	D	E			1							B				
1254	cv	7	3	100	D	E					1			1			1			
1265	cv	7	3	100	D	E										1				
2157	cv	7	3	10	E	E				1						1	1			
Feature 17, central hearth inside house																				
1351	fl	17	3	100	2											e				
1352	fl	17	3	25	E	D			10		2						1			
2187	fl	17	3	50	E	E	1*	3	13				1							
2188	fl	17	3	50		E			4				2				1			
Feature 57, undercut pit, outside house																				
1717	ws	57	2	100	E	E	e		1					1				E		
1732	ws	57	2	100		E	e		1						1*					
1744	ws	57	2	25		D	d			1					1*			E		
1756	ws	57	2	25	D	D	d		3		1									
1718	cv	57	2	100					1							d				So:e
1745	cv	57	2	100		E	e									d				So:d
1733	cv	57	2	100	E	E	1*									D	E			So:e
1757	cv	57	2	100		E	1*				1					1				

Table 9.4. Identified plant remains from Period 3 feature contexts, Scattered Village (32MO31), 1998 excavations (continued).

Catalog Number	Recovery	Feature	Block	%	Corn Cob	Corn Kernel	Squash	Bean	Sunflower	Chokecherry	Wild Rose	Wild Plum	Buffaloberry	Dogwood	Grape	Chenopodium	Grass1	Grass2	Knotweed	Other	
Feature 101, undercut pit, inside house																					
2164	ws	101	3	50		D	d										1		e		Ms:1*
2165	ws	101	3	50		D			1												
2201	ws	101	3	25	E	D	d	1	1									e			
2203	ws	101	3	25		2			1									e	e		
2223	ws	101	3	50		D	d					1						e			
2156	cv	101	3	100		E	d									e					
2184	cv	101	3	100		1			1		1		2								Su:1
2202	cv	101	3	100		D			1								1				
2204	cv	101	3	100			d											d	d		
2224	cv	101	3	100														d			
Feature 104, undercut pit, inside house																					
2909	ws	104	3	100	12	2															
2225	ws	104	3	25	8	2	1*			1											
2241	ws	104	3	25	12	6			1												
2247	ws	104	3	25		D						1			1*						
2257	ws	104	3	25		9			1										e		
2263	ws	104	3	100		1			1												
2267	ws	104	3	25		D															
2226	cv	104	3	50		3										e					
2242	cv	104	3	50		3										1					
2248	cv	104	3	50		1										1					
2258	cv	104	3	100	1	E	1*				1					E					
2268	cv	104	3	100		1												e			

Table 9.4. Identified plant remains from Period 3 feature contexts, Scattered Village (32MO31), 1998 excavations (complete).

Catalog Number	Recovery	Feature	Block	%	Corn Cob	Corn Kernel	Squash	Bean	Sunflower	Chokecherry	Wild Rose	Wild Plum	Buffaloberry	Dogwood	Grape	Chenopodium	Grass1	Grass2	Knotweed	Other
Feature 133, large undercut pit, uncertain location																				
2709	ws	133	9	100	D	B		1	1		1									
2724	ws	133	9	100	D	D		1	2									e	e	
2732	ws	133	9	100	D	D	d		1		2							d	d	
2742	ws	133	9	100	D	D	d								1			e		
2765	ws	133	9	100	D	D	d	1	1						1			e	e	
2710	cv	133	9	100												b				So:d
2725	cv	133	9	25		1	b									1			1	
2733	cv	133	9	100	E	E														Pw:b
2743	cv	133	9	25												b				So:d
2766	cv	133	9	25			3*									d				So:e

Notes: 1. Recovery: ws=waterscreen of entire feature level; cv=constant volume field float sample, generally 6 liters volume; fl=field float of entire feature level. 2. Upper case letters (A-E) indicate carbonized specimens. Lower case letters (a-e) indicate uncarbonized specimens. A=50%-100%, B=6%-49.9%, C=2%-5.9%, D=0.5%-1.9%, E=<0.5%. 3. Actual counts marked with an asterisk are uncarbonized specimens. 4. Key for Other Column: Hk=Hackberry (Celtis sp.), Iv=Iva xanthifolia, Ms=Mustard (Brassica sp.), Pw=Pigweed (Amaranthus sp.), Su=Sumac (Rhus sp.), So=Solanaceae.

Table 9.5. Identified plant remains from Period 4 feature contexts, Scattered Village (32MO31), 1998 excavations.

Catalog Number	Recovery	Feature	Block	%	Corn Cob	Corn Kernel	Squash	Bean	Sunflower	Chokecherry	Wild Rose	Wild Plum	Buffaloberry	Dogwood	Grape	Chenopodium	Grass1	Grass2	Knotweed	Other
Feature 52, concentrated debris layer																				
1672	ws	52	1	100	E	E	e													
1673	ws	52	1	100		D														
1674	ws	52	1	100		D													1	
1675	ws	52	1	100	E	E	e				E								e	
1683	cv	52	1	100		1										1				
Feature 56, basin with midden																				
1714	ws	56	1	100	E										3*	1				
1721	ws	56	1	100	E		e													
Feature 58, charred debris layer																				
1750	fl	58	1	100	B	C	6*					1				E	1		3	
1947	fl	58	1	40	A	D	3*	E	2	4						D				
2906	fl	58	1	17	B	B	1	12	4	12	18	1	1	1	9	240	23		6	Iv:2/Su:1
Feature 66, basin with midden																				
1876	ws	66	1	25	D		e			2					4*			e	e	
1909	ws	66	1	100			e													
1935	ws	66	1	100	E	E	e													
2907	ws	66	1	50	E	E				2	D				6*	e			e	
1877	cv	66	1	100		E										e		e	e	
1910	cv	66	1	100		E	1*									d				
Feature 68, undercut pit, outside house																				
1911	ws	68	2	100			d													
1933	ws	68	2	100			e													
1965	ws	68	2	100		E	e		2		1									
1967	ws	68	2	100		E	1*									E		e	e	
1968	cv	68	2	100		E			1							e				
1913	cv	68	2	100			e									1				
1934	cv	68	2	50		E	e									d				So:d
1953	cv	68	2	10												e				
1966	cv	68	2	100		E										b				

Table 9.5. Identified plant remains from Period 4 feature contexts, Scattered Village (32MO31), 1998 excavations (continued).

Catalog Number	Recovery	Feature	Block	%	Corn Cob	Corn Kernel	Squash	Bean	Sunflower	Chokecherry	Wild Rose	Wild Plum	Buffaloberry	Dogwood	Grape	Chenopodium	Grass1	Grass2	Knotweed	Other
Feature 119, undercut pit with burial, outside house																				
2527	ws	119	6	100		D					2									
2544	ws	119	6	100	D	D		1	1	1	5							1*		
2565	ws	119	6	50	D	D				1	2				1					
2571	ws	119	6	100	D	D		1	1		1									
2596	ws	119	6	100	E	D					1		1	1	1*					Ms:1
2602	ws	119	6	100	1	D	d				3			1						
2622	ws	119	6	100	D	B				1	2								d	
2635	ws	119	6	100	B	B				1	1	1								
2651	ws	119	6	100	E	D				1	2								2*	Ms:1
2528	cv	119	6	100		D								1		15				Ms:2/Pw:E
2545	cv	119	6	100		D								1						Pw:E
2566	cv	119	6	100																Ms:2/Pw:E
2572	cv	119	6	100		1							1			e				
2603	cv	119	6	100		1								1	1	e				So:e
2623	cv	119	6	100		D					D									Pw:e/So:e
2652	cv	119	6	100		D										d				

Notes: 1. Recovery: ws=waterscreen of entire feature level; cv=constant volume field float sample, generally 6 liters volume; fl=field float of entire feature level. 2. Upper case letters (A-E) indicate carbonized specimens. Lower case letters (a-e) indicate uncarbonized specimens. A=50%-100%, B=6%-49.9%, C=2%-5.9%, D=0.5%-1.9%, E=<0.5%. 3. Actual counts marked with an asterisk are uncarbonized specimens. 4. Key for Other Column: Hk=Hackberry (Celtis sp.), Iv=Iva xanthifolia, Ms=Mustard (Brassica sp.), Pw=Pigweed (Amaranthus sp.), Su=Sumac (Rhus sp.), So=Solanaceae.

No comprehensive summary of archeological specimens from the Dakotas has been prepared but Hugh Cutler at the Missouri Botanical Gardens in St. Louis examined much of the material recovered during the major salvage excavations. In the early 1970s Cutler and Leonard Blake compiled a tabular summary of the archeological materials that they had examined. Cutler noted the dominance of 8-rowed corn varieties in the period after A.D. 1200 in most parts of eastern North America (Cutler and Blake 1973:6). The corn from North Dakota examined by Cutler and Blake was predominantly of 8-rowed varieties with 10-rowed forms next most common (Cutler and Blake 1973:53-55). The same study indicates that for collections in which the mean number of rows on corncobs was between 8 and 9, the median cupule-width ranged from 7.2 mm to 9.4 mm. A cupule is the portion of a cob that contained a pair of corn kernels and is the most durable portion of a corncob as seen in archeological collections from the Middle Missouri. Although corncobs can shrink as much as 25% when carbonized (Cutler and Blake 1973:4), the cupule provides a good relative indicator of the size of the original cob. Determining the width of individual cupules is of limited value since the cupule-width near the tip of the cob can vary substantially from that measured over much of the length of a cob. When complete sections of cobs are not present it may be possible to determine the number of rows of kernels on the cob by measuring the angle of convergence of the sides of a cupule. The same can be done with kernels, but kernels are quite prone to swelling during carbonization and in archeological contexts many are too fragmentary to allow meaningful measurement.

With the exception of seeds of Chenopods, fragments of corncobs and corn kernels are the most numerous remains in the Scattered Village collection. Although the seeds of some weedy plants can be numerous, the remains of corn dominate samples quantified by either volume or weight. Fragments of cupules and kernels are common even in the Grade 5 samples. Larger cupules in this collection are about 8 mm in width while many of those in the smallest size grade approach 4 mm in width. Cupule-widths of specimens with complete or nearly complete radial sections are typically 8 mm or wider although a few cob tips are present and predictably exhibited narrower cupule-widths. Some cupules and larger cob fragments from the site retained the lower glumes but most isolated cupules do not retain any significant portion of the more fragile floral elements.

Feature 58 contains an unusual lot of cob fragments. There are many segments in the range of 1 cm to 5 cm in length that present complete sections of cobs. On balance, the Feature 58 sample looks like an average of 20 years of identifications by Hugh Cutler (Cutler and Blake 1973). Based on the length of a segment of cob that contains three cupules, most grains were about 3 mm in thickness. Eight-rowed cob fragments account for 60 percent of the cob fragments while fourteen rowed cobs represented about 20 percent and segments with ten and twelve rows each account for 10 percent. Buffalobird Woman mentioned Hidatsa corn with 14, 12, an 8 rows of kernels although these attributes were not linked to the varieties she named (Wilson 1917:40,58).

Squash

Squash was the cultivated plant second to corn in the frequency of recovery from archeological sites during the salvage era (Nickel 1977:55). In their compendium of identified specimens from the Dakotas, Cutler and Blake (1973) report finding examples of the following

species of squash: *Cucurbita pepo*, *C. maxima*, *C. moschata*, and possibly *C. mixta*. Several varieties of *C. pepo* are by far the most common kind of squash from sites in the Dakotas. Other species were found at only a single site. Cutler and Whitaker (1961) discuss the utility of different portions of the fruits of the Cucurbits for identifying species. They illustrate seeds, peduncles, and rind fragments of most of the Cucurbits and those species likely to be confused with them. They favor the peduncle (stem) for identification purposes but note that seeds are useful if they are "not seriously damaged by abrasion, shrinking and decay" (Cutler and Whitaker 1961:474). Squash seeds are one of the few archeological seeds that are regularly recovered as uncarbonized specimens from open sites in the plains. Although uncarbonized seeds from other plants are recovered, for most there are acceptable alternative explanations for their presence in archeological deposits such as the activities of small animals. The Middle Missouri is an area in which "wild" populations of squash do not exist and specimens rarely persist in gardens for more than a year without human attention. The presence of squash seeds in archeological deposits in the Dakotas can confidently be attributed to the site's occupants rather than to animal agents. Squash peduncles are much less common from Middle Missouri sites and the writer is not aware of any that are not carbonized.

The Scattered Village collection contains a number of squash seeds that, with two exceptions, are not carbonized. The uncarbonized seeds and seed fragments are distributed across all of the excavation blocks and most features. They are absent from F6, F12, F65, F140, F163 associated with occupation Period 2 and are not found in F106 associated with occupation Period 1. Most of the squash seeds from Scattered Village are quite fragmentary. The uncarbonized seeds range from 15 mm by 8 mm to 7 mm by 5 mm. Only 11 features contained seeds complete enough to yield both length and width measurements. The appearance and size of the seeds is consistent with an identification of *Cucurbita pepo*, by far the most common species reported from North Dakota. Based on size, it is likely that two cultivated varieties are present. A few carbonized fragments of rind and two small carbonized bases of squash peduncles were present in Feature 58. The rind fragments point to the genus *Cucurbita* but do not offer enough information to identify a species or variety (Cutler and Whitaker 1961:479). The peduncle bases are small in diameter but lack enough of the stem to allow one to confidently differentiate between *C. pepo* and *C. moschata*. Size alone suggests that these specimens are from a form that would be considered a rather small pumpkin or squash. This also suggests *C. pepo* rather than *C. moschata*.

Beans

Common garden beans (*Phaseolus vulgaris*) have been recovered from several collections in the Middle Missouri. The archeological specimens consist of individual bean seeds and often only one half of a seed is present. Kaplan (1956) wrote one of the few studies of archeological beans and his work focused on specimens from dry contexts in the American Southwest. Bean seeds are a distant third in the collections from salvage era excavations from the Middle Missouri but have been a consistent but minor component of water screened collections. While corn is known for its contribution of starch and sugar to diets, beans are a recognized source of plant protein. Unusual, perhaps catastrophic, events often leave behind samples with large numbers of otherwise perishable specimens. This writer examined a collection of beans from 39CA4 that included several hundred complete beans and complete

halves that allowed accurate length and width measurements. By far the largest number of specimens measured 10 mm by 6 mm although the range included specimens as small as 6 mm by 3 mm and as large as 15 mm by 8 mm. The collection from Scattered Village is more typical of other collections from the Middle Missouri than is 39CA4 in the number of specimens and their distribution. Measurable bean seeds occurred in 9 of 30 features for which there are identifiable botanical specimens. Scattered Village bean specimens ranged from 5mm by 3 mm to 12 mm by 7 mm with mean dimensions of 8.8 mm by 5.3 mm. There are several specimens close to 11 mm by 7 mm and several others close to 7 mm by 4.5 mm. Size-based varieties have not yet been identified in the regional archeological record. The dimensions for the bean seeds mentioned above from 39CA4 fit well within the range listed by Kaplan (1956:205) for *Phaseolus vulgaris* varieties from the American Southwest, although the smallest archeological specimens are somewhat smaller than those listed by Kaplan.

Most Scattered Village beans are also well within the size range recorded by Kaplan and, as with 39CA4, the smallest specimens are slightly below Kaplan's lower limit. Measurable bean seeds are slightly more numerous in features assigned to occupation periods 1 and 2 but they occur in slightly more features assigned to periods 3 and 4. The differences in the number of specimens and their distribution are slight and do not suggest any significant variation in the role or type of beans during the main periods of occupation.

Kaplan did not place much emphasis on seed size since individual pods contain beans that vary in size with the largest being those in the center of a pod. Careful experimentation with modern seeds will be required to allow one to evaluate the significance of size variation in archeological collections of carbonized seeds. Color of seeds and growth habits of bean plants are apt to have been significant elements in defining native horticultural varieties. Seed-coat color is, of course, absent in carbonized seeds and vine fragments have not been identified in regional collections.

Sunflower

Sunflowers (*Helianthus annuus*) are the traditional cultivated food plant least frequently recovered from archeological excavations in the Great Plains. They had been recovered from most areas of the Plains by the beginning of the reservoir salvage era but until the last quarter of the 20th century a site collection that contained sunflowers was exceptional. Their scarcity was noted by Wedel (1943:72). Various articles by Charles Heiser, published over a period of 35 years, have provided both botanical assessments of wild and cultivated sunflowers and an analysis of the historical and archeological origins of the cultivated forms.

Sunflowers were a conspicuous element in the early historic gardens of the Mandan and Hidatsa and drew comments by explorers. Although more ornamental than most crop plants, the sunflower was valuable because of its substantial oil (fat) content. It is not surprising that early writers readily recognized sunflowers as cultivated plants since the ornamental large-headed forms of sunflowers had been introduced into Europe long before the first recorded contact with Native Americans in the Dakotas (Heiser 1951:437). Heiser (1954:302-305) considered alternative locations for the origin of large seeded forms of *H. annuus* and indicated a preference for an origin in central or eastern portions of the U.S. He (1951:Fig. 5, 1955:Fig. 4) illustrated

achenes from a series of cultivated varieties of the domesticated sunflower along with wild forms. His cultivated varieties included some that he considered "Indian" varieties including ones attributed to the Arikara. His 1951 article includes a table of dimensions for the achenes of the various modern and "Indian" forms.

Heiser (1951:442) also demonstrated that achenes of his "Indian" varieties were, on average, narrower for any given length than the modern agricultural forms. In his more recent overview of North American domesticated plants he included an endnote (Heiser 1985:Note 2) in which he discussed the occurrence of "very long, narrow achenes" from sites in North Dakota that might indicate the role of another species of *Helianthus* in the suite of large-seeded forms. Although Heiser also noted that the North Dakota specimens might simply represent one extreme of the normal range of variation for *H. annuus,* he draws attention to the presence of very narrow achenes in the northern Great Plains.

Scattered Village sunflower achenes range from over 10 mm in length and 5 mm in width down to 3 mm in length by 1.5 mm in width. Achenes exist with all lengths between 5 mm and 10 mm but most are close to 2 mm in width irrespective of length. Carbonized seeds and achenes of the sunflower can be expected to shrink at least 10 per cent from their uncarbonized dimensions. Even with a reasonable allowance for shrinkage, most of the large Scattered Village achenes are narrower than any of those tabulated by Heiser (1951:441) and seem to justify his interest in the size and unusual proportions of specimens from North Dakota.

Uncarbonized achenes of large sunflower varieties are virtually absent from archeological collections in the Middle Missouri. Uncarbonized small achenes typical of modern weedy forms of the plant are common in most archeological collections but they are absent from the Scattered Village collection. It is often unclear whether uncarbonized examples of a common weed seed have a cultural origin or whether they became incorporated in the site matrix as a consequence of the natural rain of seeds. All of the tabulated sunflower seeds and achenes from Scattered Village are carbonized. This may be attributed to the urban setting of the site, in which large numbers of weeds were discouraged for the past several decades.

Wild Fruits

The collection from Scattered Village contains examples of six native species of plants that produce edible berries or fruit. The readily recognized fruits of chokecherry (*Prunus virginiana*), wild plum (*Prunus americana*), grape (*Vitis vulpina*) and buffaloberry (*Shepherdia argentea*) as well as the less obvious fruits of wild rose (*Rosa* sp.) and dogwood (*Cornus stolonifera*) are all represented by specimens (including seeds, pits, stones, and achenes). The seeds of wild grapes are relatively uncommon, occur most frequently in features associated with occupation periods three and four and occur as both charred and uncarbonized specimens. The pits of plum are the largest but least frequently recovered of the fruits. This is typical of most of the collections resulting from systematic water screen recovery. This circumstance contrasts dramatically with the listings for North and South Dakota resulting from specimens provided to Cutler and Blake (1973) from reservoir salvage excavations. In these early collections, plum is much more commonly listed than chokecherry, and buffaloberry is absent. Only carbonized

specimens of plum were observed in the Scattered Village collection and most are fragmentary. No specimens retained portions of the fleshy fruit.

The woody seeds (achenes) of the wild rose are a common element in the Scattered Village collection. They occur as both intact and fragmentary specimens. A single complete rose hip (berry or fruit) is also present. A single rose hip typically contains several seeds and consequently the counts in the tables must be discounted if the contribution of roses is compared with the fruits of chokecherry and buffaloberry. Rose hips have significant value as a source of useful vitamins and the persistence on the plant of mature rose hips may have allowed them to be gathered over a longer period than moister fruits of other plants. The paucity of complete hips and many fragmentary seeds may indicate pounding or grinding of the fruit in a manner documented for chokecherry in the ethnobotanical literature.

Given that chokecherry and buffaloberry produce a single pit in each berry, they appear to be the most significant fruit resources represented in the Scattered Village collection. The cherry pits occur as complete and fragmentary specimens but charred berries are absent. An interesting aspect of the "complete" cherry pits is that, in several catalog lots (e.g. Cat 2797) with multiple specimens, all the cherry pits were perforated by the gnawing of a small rodent. In other catalog lots (e.g. Cat 2196) with multiple complete cherry pits, none of the specimens evidence gnawing. The rodent damaged pits suggest that some numbers of dried cherries were stored (Wilson 1916:186), while the undamaged pits may indicate waste from fruits consumed fresh (Wilson 1916:218). Fragmentary cherry pits may result from damage during carbonization, deposition or recovery. However, many Plains groups pounded the fruit of wild cherries with stone or wood hammers in preparation for storage or cooking. Typically the entire fruit, including the pits, was pulverized and the dried fruit stored for use during the following months, so it is to be expected that fragmentary pits would be more ubiquitous than complete specimens (Gilmore 1919:36-37, Pl 11b; Weitzner 1979:216; Wilson 1916:218-220). A few carbonized seeds (from within pits) were identified but it is not clear whether they were released during processing of foodstuffs by the occupants of Scattered Village or by fragmentation related to preservation or recovery.

Buffaloberries are represented in the Scattered Village collection by carbonized berries (Cat No. 2150 and 2906) and complete and fragmentary pits. Many of the identified pits are embedded in fragmentary berries. Some fragments of pits are also recognizable but the pits of buffaloberries are significantly smaller and more thin-walled than those of wild cherries so with comparable processing (pounding) the fragmentary specimens are likely to be represented in a smaller size-grade than would the fragments of chokecherry. Gilmore (1919:54) provides little information but did report that buffaloberry fruit was used fresh and dried for later use. Wilson (1916:251) reported that his Hidatsa informant described only use of fresh fruit and did not describe storage or preservation. In spite of the fact that his informant "did not especially esteem them" (Wilson 1916:306), buffaloberries are well represented in the Scattered Village collection and most of the water-screened collections from village sites along the Missouri River. Buffaloberries are poorly represented in features associated with the early village occupation periods (3 and 4).

Stones from the Red Osier or dogwood are present, generally in low numbers in most features. The few concentrations are in features associated with the late village occupation period 1 and to a lesser extent period 2. A small number of uncarbonized specimens are present. Many of the stones are fragmentary with one of the two seed chambers broken. Gilmore (1919:56) reported only the use of dogwood bark as a smoking material. Wilson (1916:266) also reported the use of the bark for smoking and the use of the fresh fruit as a condiment. His informant claimed that berries of both dogwood and buffaloberry were much more palatable after frost. There is no mention in Wilson's notes of the storage or processing of dogwood fruit for use in later seasons. The reference to fresh use and harvest after frost may provide some indication of the season of deposition of the features or levels with the features.

Seeds of wild grapes are not numerous in the Scattered Village collection but they occur in features associated with all periods of occupation. However, they are disproportionately represented in features of occupation periods three and four. Uncarbonized grape seeds are about as numerous as carbonized ones. The appearance of the uncarbonized grape seeds suggests some antiquity but their age is impossible to quantify. Gilmore (1919:50) attributes use of fresh and stored grapes to the Pawnee while Wilson (1916:250) reported only the use of fresh fruit by his Hidatsa informants. Except for rose hips, the wild grapes are the earliest of the native fruit to mature.

Local Grasses and Weedy Plants

Seeds of grasses (other than corn) have not been recovered in large numbers and are rarely identified to species. Grasses belong to a large family with many genera and species (Hitchcock 1950, Martin and Barkley 1961) and several of these are native to North Dakota (Stevens 1963). Numerous closely related forms and the absence of some floral parts in carbonized archeological specimens complicate species level identification. The specimens listed in the tables for Scattered Village as Grass1 all appear to be from a single species and all specimens are carbonized. The naked seeds are large and have a narrow size range (4.0 mm to 4.5 mm in length and 1.0 mm to 1.25 mm in width and thickness). The carbonized seeds approach the size of small grains of wild rice (*Zizania aquatica*) carbonized by the author. However, wild rice seeds show a distinct lateral embryo that extends much of the length of the seed (Dore 1969) while the Grass1 specimens show basal-lateral embryos (Martin and Barkley 1961:133). The vicinity of Scattered Village is also far to the west of the known distribution of wild rice in North Dakota. The author's collection of seeds of common native forage grasses does not contain examples that clearly match this grass. Comparative specimens of some grama grasses (Bouteloua spp.) most closely match the larger carbonized archeological specimens. Unfortunately, most manuals illustrate grass seeds enveloped in papery floral parts that mask the details of the naked seed.

The group of seeds listed in the tables under the heading Grass2 consists of one or more forms that may belong to the genus *Panicum,* although the carbonized specimens are swollen and in fact may represent another genus. These seeds were compared with modern uncarbonized specimens of Indian ricegrass (*Oryzopsis hymenoides*), which does occur in the western half of North Dakota, but the unknown seeds from Scattered Village do not match the ricegrass specimens except in the most general attributes. All of the specimens in the Grass2 category are

distinct from the uniform members of the Grass1 group. Aaberg (1997:183) noted that Native American groups in the Plains had many non-subsistence uses for grasses but few if any grasses were documented as foodstuffs. Seeds in this group are smaller and more globular than the ones tabulated as Grass1. The carbonized seeds in both archeological groups could be present in the collection as a result of non-subsistence activities and the uncarbonized seeds may be present as a result of non-cultural seed rain.

One or more additional species of plants are represented in the tables in the column labeled Knotweed. These specimens are typically triangular in cross section but some are more flattened. They are most similar to members of the genus *Polygonum* which are known as smartweeds or knotweeds but this category might include examples of other genera (e.g. *Rumex*) within the buckwheat family (Martin and Barkley 1961:147-150). There is considerable variation in form in the carbonized specimens that are quite distorted by heat. Aaberg (1997:18) discussed the problem of specific identification of archeological seeds of the knotweeds recovered from On-A-Slant Village (32MO26). Carbonized specimens do not permit the evaluation of the shape and disposition of the cotyledons which have been used to differentiate some of the similar forms of *Polygonum* (Martin and Barkley 1961:Figs. 71, 72, 73). Additional comparative material, including specimens carbonized under known conditions, might help to confidently narrow the range of possible species.

Seeds of plants commonly known as goosefoot, lambsquarter, or just chenopods (*Chenopodium* spp.) have presented problems in archeological collections for years. As early as the 1930s M.R. Gilmore, V. Jones and others had come to the conclusion that one or more species of *Chenopodium* had been intensively cultivated in the Southeastern U.S. (Gilmore 1932). Most of the early specimens were from dry caves or shelters where uncarbonized specimens could be expected. In open archeological sites, uncarbonized plant materials were typically scarce or absent. Uncarbonized seeds of goosefoot or other chenopods were infrequently recovered from the salvage era archeological sites along the Missouri River. Perhaps because these plants produce large numbers of seeds as part of the natural seed rain and because the seeds are often cached in small hordes by burrowing animals, they were occasionally included in material from the Dakotas submitted to Cutler and Blake (1973) for analysis. Following the adoption of water screen recovery, uncarbonized chenopod seeds and those of several other weedy plants became common in archeological collections. More important to understanding the range of botanical resources used by prehistoric and early historic occupants of the Dakotas, carbonized specimens of chenopods (and other small-seeded weeds) were recovered. The seeds of *Cheopodium* and similar weeds present two problems for the interpretation of regional archeological collections. First, how to measure the antiquity of uncarbonized specimens and second, how to determine whether the archeological specimens (carbonized or not) were elements in the subsistence system or played some other role.

Botanical studies of long-term seed viability, such as those summarized by Quick (1961), indicate that many plant seeds can remain viable for several decades if afforded the proper environment. These studies do not offer much help in assessing the preservation of identifiable remnants of specific seeds in uncontrolled environments. If one assumes that these seeds are readily preserved (for a few centuries) in the normal soil matrix of regional archeological sites, they would seem to be substantially under represented in archeological collections. Assessing

the potential economic role of the archeological specimens is easier when the plant shows some evidence of horticultural modification of portions of the plant that are edible, such as the large seeds of cultivated forms of sunflower. In the absence of clear evidence of cultural modification, the regular association of weedy seeds with the remains of other plant foods may buttress arguments about the function of the seeds.

Chenopod seeds from Scattered Village are present as both carbonized and uncarbonized seeds. The size of carbonized seeds (ca. 1 mm) is typical of what one would expect from wild forms of the plant, unlike some of the seeds recovered from Huff Village (Nickel 2000). At Scattered Village chenopod seeds are close to corn and squash in their ubiquity. The carbonized specimens have a more restricted distribution and are present in eight features associated with village occupation periods 1 and 2 as opposed to five features associated with periods 3 and 4. Most carbonized seeds are puffed and many "popped" opened with the carbonized embryo partially outside the seed. Feature 58 contains large numbers of charred chenopod seeds and it contains an unusual number of large size-grade corncob fragments, charred grass seeds, charred knotweed seeds, and charred *Iva* seeds as well as examples of all the other cultivated plants and all the wild fruits.

Relatively small numbers of seeds of several other plants were identified and tabulated in the "Other" column. Seeds of a solanaceous plant were relatively common. None of these seeds are carbonized. Aaberg (1997:190) identified a small number of seeds of *Solanum triflorum*, a nightshade, in the Slant Village collection. The Scattered Village specimens are similar to illustrated examples of this plant but the group contains a large number of species with similar fruits and seeds so a specific identification is not offered. Hidatsa consumed the fruit of ground cherries (Physalis sp.) and it is possible that the Scattered Village specimens belong to this genus. It is not clear that the Scattered Village specimens are archeological. A small number of seeds that best compare with those of species of *Brassica* (mustard or rape) are present. Some specimens are carbonized, but while others give the appearance of being carbonized, when fractured they prove not to be charred. It not obvious that this category reflects subsistence activities. One fragment of the seed of a hackberry tree (*Celtis occidentalis*) was identified. This low level of representation is a bit surprising since the hard stoney pits of hackberry trees are fairly durable and the tree is often used in street planting in cities in the Plains and Midwest. It is possible that additional hackberry seeds exist in the heavy-fraction. Hackberry fruits are edible but there is little ethnographic reference to their use in North Dakota, perhaps reflecting a rather restricted distribution outside of modern cultivation (Stevens 1963:116). A couple of carbonized seeds belonging to a species of sumac were recovered. Aaberg identified a similarly small number of carbonized seeds from Slant Village as most likely to be smooth sumac (*Rhus glabra*). The Scattered Village specimens seem too large to be smooth sumac and compare more favorably with seeds of skunkbush sumac (*Rhus trilobata*). Wilson (1916) does not mention sumac and Gilmore (1919:47-48) mentions only medicinal use of the fruit, a use that might be supported by the regular recovery of a small number of specimens.

Seeds of a species of pigweed (*Amaranthus*) were recovered from a small number of features. Most pigweed seeds were not carbonized although charred pigweed seeds were a small percentage of the carbonized debris in Features 6 and 119. Uncarbonized seeds of pigweed are typically smaller than those of goosefoot and consequently they may be better represented in

material below size grade 5. Aaberg (1997:168-175) has provided a good review of the distribution of archeological *Amaranthus* seeds in the U.S. and in particular for the northern Great Plains. Scattered Village specimens have the potential to have been a significant element in subsistence base but they may also have become carbonized through non-subsistence activities.

As in the Slant Village collection, a small number of marsh elder seeds (achenes) were identified in the Scattered Village collection. The specimens are clearly not *Iva annua*, a plant that exists in some archeological collections as a large-seeded cultivated variety. Large-seeded *I. annua* were recovered at Huff Village (32MO11) and Helb (39CA208). Benn (1974) identified carbonized achenes of *I. annua* at the Mitchell site (39DV2). The Scattered Village marsh elder achenes are typical of the local species *Iva xanthifolia* (Stevens 1963:281). The author's comparative sample was collected along the eroded bank of the Knife River near the historic Hidatsa villages (Knife River Indian Villages National Historic Site). Carbonized *Iva xanthifolia* achenes have also been identified in a complex of weed seeds associated with a burned lodge at the Bagnell site (32OL16). Marsh elder (whether *I. annua* or *I. xanthifolia*) is a coarse weed that favors disturbed habitat and is related to ragweed and sunflowers. Achenes are somewhat smaller than those of the wild sunflowers but Native botanists familiar with the value of sunflowers would almost certainly have recognized similar value in the seeds of marsh elder. Carbonized specimens of marsh elder are not numerous in the Scattered Village collection but they may be under represented in the sample studied because of their small size. As with sunflowers, all the marsh elder seeds at Scattered Village were carbonized.

Conclusions

The collection of carbonized seeds and related plant parts from Scattered Village presents a fairly complete sample of the potential subsistence species. Present are corn, beans, squash, and domesticated sunflower. Compared to other regional collections the cultivated plants that are absent from Scattered Village include large-seeded goosefoot (*Chenopodium* sp.), large-seeded marsh elder (*Iva annua*) and tobacco (*Nicotiana* sp.). Because tobacco is not really a subsistence item it might not be preserved or disposed of in the same location as food items. Although large numbers of tobacco seeds probably were present they are small in size (and volume) and might be present in the samples smaller than grade 5. Although present throughout the Middle Missouri in historic times, the origin and cultural distribution of tobacco is complex (Switzer 1969:3-15). The large-seeded goosefoot and marsh elder have been recovered from older village sites in the Middle Missouri but are not known from the early historic period and may well have dropped out of cultivation prior to the period 4 occupation of Scattered Village. Such specimens are present in the early Mandan site at Huff Village but were not identified by Aaberg (1997) in the collection from the Mandan occupation at Slant Village that would most closely compare with Scattered Village. Alternatively, the suite of plants identified in this collection may reflect a subsistence tradition that placed more emphasis on gathering activities and adopted only the most productive cultigens from the suite already available in the region. The tabulation of frequency of occurrence by catalog lot indicates less use of all the wild fruits in periods 3 and 4 but little difference in the frequency of occurrence of either cultivated plants or weeds/grasses.

Interpreting how the occupants of Scattered Village used the resources they found available in the local environment and those that they brought with them from places they lived in prior to moving to Scattered Village is handicapped by a lack of detailed environmental studies. State inventories such as Stevens' usually contain information on the distribution of species but these often present a picture painted with a broad brush. An exception is the study of the Missouri River vegetation along the stretch of river from just below Scattered Village to Garrison Dam (Burgess et al. 1973). Even this study does not contain enough detail about non-floodplain environs to allow one to assess how the plants in the locality around Slant Village compare with those in proximity to Scattered Village.

Corn is present as numerous single and multi-cupule cob fragments as well as kernel fragments in the Scattered Village collection. Most fragments indicate eight rowed cobs that are typical of the Northern Flint variety that Cutler has described for the region (Cutler 1967). Many of the cob fragments in the lot from Feature 58 retain the lower glumes and in some cupules the base of the kernel is still attached to the cob. One explanation for this would be the cutting of immature or green corn kernels off the cob. Also present in Feature 58 are some small thin kernels with a wrinkled surface atypical of the bulk of the carbonized kernels at the site. These may be immature kernels or kernels of a sweet corn (Weatherwax 1954:200) or what Buffalobird Woman called gummy corn (Wilson 1917:58). Squash are represented by a few complete seeds, many small seed fragments, and a few carbonized fragments of rind and stem. The seeds probably represent two varieties of medium to small pumpkins. Sunflower seeds (and achenes) are present and span the size range from small wild types to long thin domesticated forms that may be restricted to the northern village horticulturalists.

Some lots of charcoal, including carbonized corn cupules, lack fine detail and sharp edges. A comparison with Ahler's tabulation of sherd fragmentation shows some correspondence. Features with highly fragmented sherds tend to contain charcoal in poor condition, perhaps indicating abuse after or in conjunction with deposition. However, a bean half recovered from a constant volume sample in Feature 14 (Cat. 1380) contains the fragile embryo so well preserved that it could have served as the model for Figure C in Toole and Toole's discussion of bean germination (Toole and Toole, 1961). The presence in waterscreened lots of some cob samples with glumes and kernel-bases intact suggests that recovery methods were not a major factor in the condition of the lots of charcoal in question. The cob fragments from waterscreened lots 1255 and 1345 are in good condition as are those from field-floated lot 1273. It is possible that some of the variation in the condition of the corn samples reflects the amount of stirring of coals in the hearth or other pre-deposition activities. Although the waterscreening process may apply different forces on the macrobotanical specimens than does floatation processing, these do not seem to result in major differences in the condition of the specimens recovered.

Wild fruits are well represented. As in other water screened collections that the author has examined, wild cherry and buffaloberry are the most numerous and most ubiquitous. The fragmented seeds indicate that most of the cherries were pulverized probably in preparation for drying. A few dried buffaloberries also indicate the use of stored produce. The local wild rose is represented by numerous seeds and a complete hip (fruit). The rather long period of fruit production and persistence on the stem allow rose hips to be harvested over an extended season.

Small numbers of grape seeds, plum pits, and stones from dogwood indicate opportunistic collecting of most of the fresh fruits available in the local environs. Feature 58 is unique in that it contains examples of all of the identified fruits, all the cultigens, and many carbonized weed and grass seeds.

The assemblage of weedy and grass seeds is the most problematic. Several of the plants are represented by both carbonized and uncarbonized specimens. The antiquity of many of the uncarbonzied specimens is questionable. Nonetheless, substantial numbers of carbonized chenopod seeds in some features (7, 14, 58, 119, 127) certainly suggest its use as a food item. The size of the seeds does not indicate a cultivated variety of the genus but is typical of wild weedy populations. Featue 58 is unique in its suite of weed and grass seeds. It contains carbonized chenopods, large grass seeds, knotweed seeds, and marsh elder.

Looking at summary data from Slant Village (Aaberg 1997:193-194) one can see some contrast with Scattered Village. Cultigens in the Slant Village collection increase considerably from Period 3 (equivalent to Scattered Village Periods 3 and 4) to Period 2 (equivalent to Scattered Village Periods 1 and 2). As seen in the ubiquity table (Table 9.6) the cultigens and weed/grass groups change relatively little at Scattered Village. The apparent similarity in the ubiquity of the group of weedy plants at the two sites may be a reflection of Aaberg's greater willingness to consider uncharred specimens of these plants as cultural. The far greater presence of traditional cultigens in the most recent period (2) at Slant Village than in the equivalent period (3/4) at Scattered Village suggest a continued reliance on non-horticultural produce by the occupants of Scattered Village. This is consistent with the rise in ubiquity of fruits when the Scattered Village periods 1and 2 are compared with periods 3 and 4 (Table 9.6). However, overall the species composition of the collections shows much in common.

Comparing the collections from Scattered Village and those from the Highway 1806 Project (Aaberg 2000) is more difficult because the Highway macrobotanical collection resulted almost entirely from laboratory-screened samples from which sorted specimens were provided to Aaberg. He identified 8 of the Scattered Village taxa in the cultural remains from 32MO291 with the most notable absence being squash seeds. Much of the overall difference can be attributed to uncharred specimens of probable modern origin. The site's agricultural setting and construction related feature discovery and excavation processes probably account for many of the differences.

The collection from Scattered Village presented a problem that relates to both intersite comparisons and recovery methods. Some lots contained small numbers of specimens segregated by the excavators or laboratory personnel. Some lots contained small amounts of the full size range of material that had been recovered by constant volume samples. The waterscreened samples were consistently larger in volume than the others but within this class there was substantial variation in the amount of recovered material. While some lots could be fully sorted and all identifiable specimens counted, other lots required the use of a system that resulted in an assessment of the proportion of the sample that was identifiable. The result is an admittedly awkward dual scheme for presenting the measure of abundance. After working with this collection, it seems that it would have been preferable to have used another system to produce estimated counts for those lots with large amounts of charcoal and large numbers of

Table 9.6. Ubiquity of various plant taxa from all samples and all recovery types according to collapsed time periods at Scattered Village (32MO31), 1998 excavations.

	Period 1 & 2 – 145 Catalog Units		Period 3 & 4 – 97 Catalog Units	
Plant Taxon	N Units with Cultural Specimens	Percent Units with Cultural Specimens	N Units with Cultural Specimens	Percent Units with Cultural Specimens
Cob	88	61%	42	43%
Kernels	103	71%	79	81%
Squash	61	42%	39	40%
Bean	12	8%	9	9%
Sunflower	54	37%	26	27%
All cultigens	*318*	*44%*	*195*	*40%*
Cherry	35	24%	12	12%
Rose	57	39%	22	23%
Plum	10	7%	5	5%
Buffaloberry	27	19%	7	7%
Dogwood	28	19%	9	9%
Grape	5	3%	5	5%
All fruit	*162*	*19%*	*60*	*10%*
Chenopod	26	18%	18	19%
Grass1	16	11%	11	11%
Grass2	2	1%	2	2%
Knotweed	13	9%	5	5%
Other	9	6%	10	10%
All weeds	*66*	*9%*	*46*	*9%*

identifiable specimens. This problem can exist with waterscreened lots, field-floated lots, and constant-volume samples when both charcoal fragments and identifiable specimens are numerous. Actual counts are intuitively more comparable but it is not clear that they truly improve interpretation. At Slant Village Aaberg (1997:187) found 13 rose achenes in the combined float and waterscreened samples from multiple features with nearly 3000 liters of fill. In the Highway 1806 collections he reported 5 rose achenes from two pits (out of 73) at one site (out of three). Several individual features at Scattered Village contain as many or more rose achenes as the combined counts from the Slant Village and Highway 1806 projects. Looking at the distribution of the macrobotanical remains from Scattered Village, it is obvious that the macrobotanical remains are not uniformly distributed in space or by volume of matrix. They normally are not uniformly distributed within the levels of even a single feature.

Piece-plotted and field floated lots are special cases and are difficult to compare with the waterscreened and constant-volume samples. As employed at Scattered Village, piece-plotting and field floatation imply that the excavator was aware of the anomalous nature of the matrix being excavated unlike the other two recovery methods. At Scattered Village the constant-volume samples are more likely to contain large numbers of those taxa that are small enough to be missed or only partially recovered by waterscreening (e.g. chenopods, amaranths, grasses, etc.). The mat of natural and cultural debris in the waterscreens normally reduces the effective hole-size and produces a partial sample of these plants, but it is difficult to attach value to the

counts. The Scattered Village constant-volume samples are dominated by uncarbonized specimens, most of which are likely to be non-cultural. Also, many constant-volume lots substantially under represent many of the clearly cultural specimens. This is undoubtedly because of the size of the samples and more importantly the highly non-random distribution of the carbonized macrobotanical specimens. The Scattered Village waterscreen samples under represent the number and perhaps the distribution of very small seeds although some specimens of virtually all taxa are present in the waterscreened collection. However, only the dry size-graded material of grades 3, 4, and 5 were examined. There are materials at smaller size grades. Systematic sampling of the less-than grade-5 waterscreen debris might well reduce the apparent differences between the recovery methods for the small seeds. The waterscreened lots contain more and, in many cases, more useful specimens of most groups (e.g. corn cobs, corn kernels, squash, beans, sunflower, most fruits). When Aaberg (1997:165) compared waterscreened and float samples from Slant Village, he found the waterscreened material "to contain a record far richer than that contained in the matrix float samples." It is this author's opinion that in collections from major village sites along the Missouri River, constant volume samples would need to be huge in order to offset the problem of the uneven distribution of identifiable specimens in the site matrix. The waterscreen bias against very small specimens can largely be offset by selective field floatation of features or levels recognized to contain significant amounts of charcoal.