Variability in Maize from Eighteenth-Century Catawba Towns

Mary Elizabeth Fitts

THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

Office of State Archaeology
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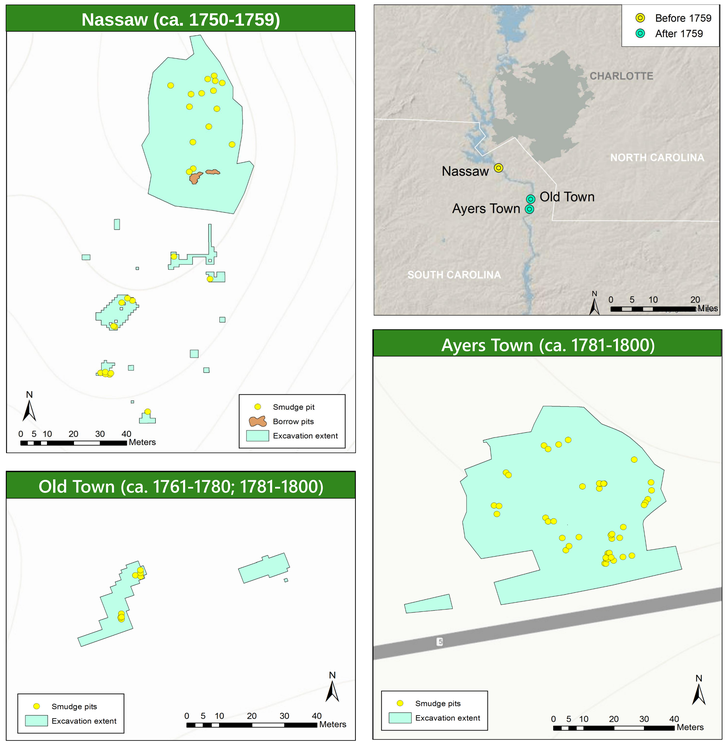
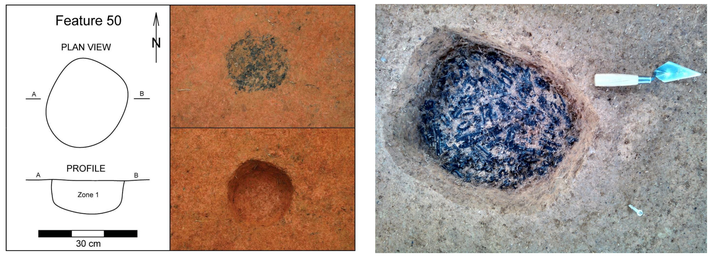
Introduction

By the end of the colonial period, members of the Catawba Indian Nation had succeeded in negotiating a variety of challenges that threatened their political autonomy. Having served as auxiliaries for the British colonies since 1708, they had arranged their towns in close proximity to each other for the purpose of efficient coordination and mobilization. This strategy made them a target for enemy raids and also vulnerable to being surrounded by expanding colonial settlements. These circumstances put a strain on Catawba hunting and foraging practices, a situation compounded by a regional drought from 1755 to 1759. In the years that followed, the Catawba made the difficult decision to evacuate their towns in response to a high-mortality smallpox epidemic (1759) and Cornwallis's March during the Revolutionary War (1780). After each of these incidents, members of the Nation returned to re-build their communities.

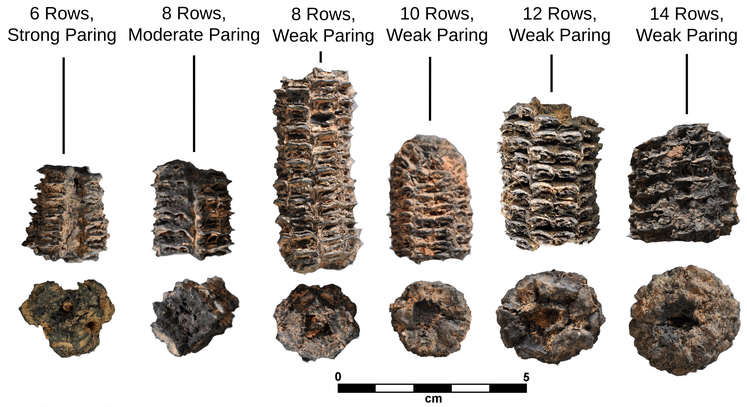
During the difficult years of the 1750s, it appears that Catawba women maintained their maize farming activities instead of turning to mast or spring-ripening grains for additional carbohydrates (Fitts forthcoming, 2017). This study examines whether their focus on maize production was accompanied by the maintenance of multiple cultivars. It also assesses change in Catawba maize variability through time.



Above, maps showing the location of smudge pits excavated by the RLA as part of the Catawba Project (Davis and Riggs 2004, Fitts et al. 2007, Davis et al. 2015). Smudge pits are most frequently associated with exterior work spaces near houses; the circular pattern observed at Ayers Town can be attributed in large part to the distribution of buildings. The Old Town smudge pits likely date to the occupation that post-dates Cornwallis's March (ca. 1781-1800).

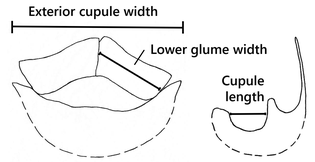


Above, examples of excavated smudge pits. Left, Feature 50 from Nassaw. Right, Feature 49 from Old Town. While wood was sometimes used, most smudge pits were filled primarily with maize cobs. This study included cobs from 13 smudge pits.



Methods

Previous quantitative studies of maize variability (King 1994, Scarry 1994) have identified row number, exterior cupule width, lower glume width, cupule length, and maximum cob diameter as attributes useful for discriminating among maize cultivars. Measurements were taken for 171 cob sections from 13 smudge pits using calipers with digital input. Each measurement was taken three times, and the average of these three scores was used for analysis. Cob portion, strength of row pairing, and cupules/cm (rounded to the nearest cupule) were also recorded for each cob section.

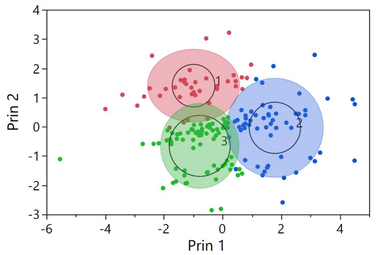


Above, maize cupule in elevation (left) and section (right), showing location of measurements. Below, table of measurements and attributes taken and range of values obtained.

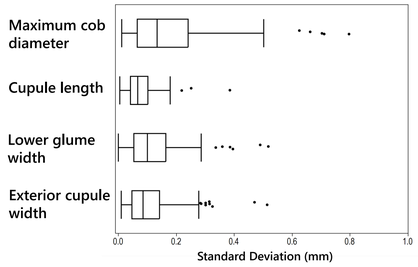
Measurement	Values
Portion	Tip, Midsection, Butt
Row number	6, 8, 10, 12, 14
Row pairing	Strong, Moderate, Weak
Cupules/cm	2, 3, 4, 5
Exterior cupule width	4.8 – 14.6 mm
Lower glume width	2.8 – 8.2 mm
Cupule length	0.5 – 1.4 mm
Maximum cob diameter	8.5 – 28.6 mm

Analysis

Exploratory data analysis indicates that cupule width, lower glume width, and cob diameter are positively correlated. In order to determine whether cultivars could be identified as clusters, K-means analyses were run using JMP. Solutions were obtained for 0 through 17 clusters. While the data are generally continuous, the 3-cluster solution provided archaeologically-interpretable groups. In order to test the robustness of the 3-cluster solution, two randomly-generated subsets of the data (n=85) were also subjected to K-means analysis. Comparable groups and mean attribute measurements were obtained from these two trials.

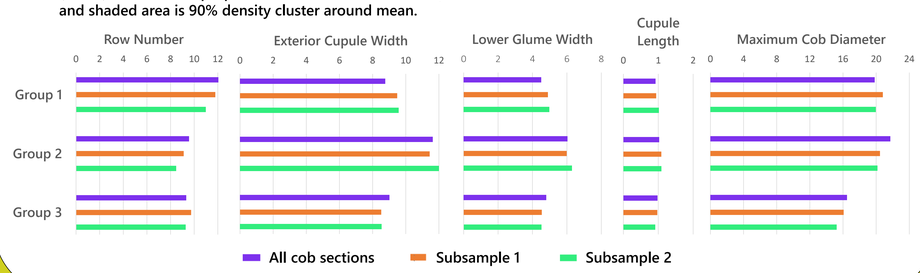


Above, the 3-cluster K-means solution for all cob sections (n=171). Circle size is proportional to count inside cluster, and shaded area is 90% density cluster around mean.



Above, standard deviation of measurements taken for four cob section attributes. Variation appears proportional to the size of the feature being measured.

Below, comparison of mean attribute values (mm) for groups identified in the 3-cluster K-means solution.



Conclusions

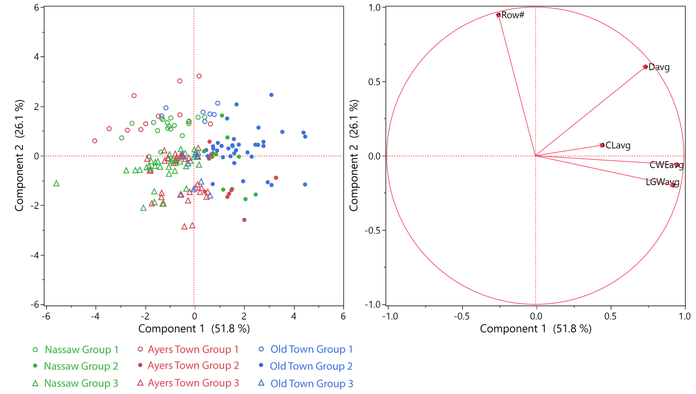
Three groups can be identified in the Nassaw, Ayers Town, and Old Town maize assemblages:

- Cobs with high row numbers (12 and 14). This group accounts for 23-28% of the Nassaw and Ayers Town assemblages, but only 14% of the Old Town assemblage.
- Cobs with row numbers ≤10 that have exterior cupule widths above 10 mm, lower glume widths greater than 6 mm, and diameters above 20 mm. This group accounts for 17-18% of the Nassaw and Ayers Town assemblages, and 67% of the Old Town assemblage.
- Cobs with row numbers ≤10 that have exterior cupule widths below 10 mm, glume widths smaller than 6 mm, and diameters below 20 mm. This group accounts for 54-60% of the Nassaw and Ayers Town assemblages, and 20% of the Old Town assemblage.

The distribution of cobs attributed to each of the three groups shows an overall similarity between Nassaw and Ayers Town. The presence of more Group 2 cobs in the Old Town assemblage (67%) suggests the acquisition of a new cultivar, or possibly a bottleneck event.

		Percent		
	N	Group 1	Group 2	Group 3
Nassaw	67	28	18	54
Ayers Town	53	23	17	60
Old Town	51	14	67	20

Above, table showing frequency of cob sections attributed to each group. Below, principal components analysis five cob section attributes. The horizontal dimension organizes cobs by exterior cupule width, lower glume width, and diameter. The vertical axis distinguishes the cobs according to row number.



It appears that during the late colonial period, Catawba women may have been growing at least two different varieties of maize. The similarity between Nassaw and Ayers Town maize indicates continuity in seed stock despite community relocation after the 1759 smallpox epidemic. The smudge pits from Old Town are attributed to the post-Cornwallis habitation (1781-1800). Additional research will be necessary to determine the source of the larger maize varietal being grown at Old Town during this period.

Acknowledgements

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