

Tracing the origins of plants in West African cuisine

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Excavating Nok terracotta pottery vessel at Ifana 3 site. Credit: Peter Breunig

A team of scientists, led by the University of Bristol, in co-operation with colleagues from Goethe University, Frankfurt, has uncovered the first insights into the origins of West African plant-based cuisine, locked



inside pottery fragments dating back some 3,500 years ago.

West African cuisine has long been known for its distinct ingredients and flavors, often enhanced by the addition of a large and diverse range of plant foods.

A traditional meal comprises a starchy staple cooked in a pot, served with a sauce prepared from vegetables, fish and/or meat, often accompanied by pulses.

These starchy staples include root crops such as yams, cassava, sorghum, pearl millet and maize. In the northern Sahel and savanna zones, pearl millet is mainly prepared as porridge, while in the southern forest zone, a pounded mash from tuber crops such as yam, called fufu, is the major starch-rich element.

Indigenous vegetables, eaten at almost every West African meal, include eggplant, pumpkin and watermelon, okra (used as a thickener for soups and stews), as well as a staggering variety of both farmed and foraged <u>green leafy vegetables</u>, little known or used outside of the African continent.

These include leaves from the amaranth, roselle and baobab tree. However, investigating the origin of vegetables and leafy greens is difficult as they do not generally survive over archaeological timescales.

The Bristol team carried out <u>chemical analysis</u> of more than 450 prehistoric potsherds from the Central Nigerian Nok culture to investigate what foods they were cooking in their pots. The Nok people are known for their remarkable large-scale terracotta figurines and early iron production in West Africa, around the first millennium BC.

Acidic soils at Nok archaeological sites meant that organic remains such



as animal bones and plant remains did not survive very well so what Nok people were eating was somewhat of a mystery. "Charred plant remains like seeds and nutshells preserved in the archaeological sediments reflect only one part of what people consumed in the past," stated Professor Katharina Neumann from Goethe University, who directed archaeobotanical research on the Nok Project. "We hoped that chemical analyses would provide additional insights into food preparation."

The researchers used lipid biomarker and stable isotope analyses to show that the largest group of lipid profiles extracted from the ancient pots, over one third, comprised a range of highly diverse and complex distributions denoting the processing of various plant types.

Dr. Julie Dunne, from the University of Bristol's Organic Geochemistry Unit, led the research published in the journal *Archaeological and Anthropological Sciences*. She said: "These unusual and highly complex plant lipid profiles are the most varied seen (globally) in archaeological pottery to date.

"There appears to be at least seven distinctive lipid profiles within the vessels, providing strong evidence for specialized processing of several plant types (and/or plant organs) in these vessels, likely including leafy plants, grasses, pulses and, possibly, underground storage organs (USOs), confirming, for the first time, the importance of such plants in the Nok diet."

The team's results tie in well with ancient plant remains from the site which mainly comprise pearl millet but also cowpea and African peach. Dr. Alexa Höhn, a member of the Nok project's archaeobotanical team in Frankfurt, points out: "The combined evidence of visible and invisible remains of <u>food preparation</u> allows us to gain a much more complete picture of past foodways and the evidence from the Nok culture hints at a considerable time depth for West African cuisine."



Whilst there are few unique lipid biomarkers for leafy plants and cereals and, as such, specific plants consumed by the Nok people, or processed for medicinal purposes, cannot be identified, the results suggest that much of Nok plant consumption included leafy vegetables or 'greens,' mirroring that of groups living in West Africa today, where these play a significant role in people's diet.

It seems likely that Nok people consumed 'greens' or leaves from plants such as jute mallow, African eggplant, okra, cowpea and bombax, widely used today. These provide cheap but quality nutrition and add taste and flavor to the otherwise monotonous starch-based staples consumed and can be kept dried and stored for use throughout the year, affording a buffer in periods of food shortage.





Image of a 'slimy' or mucilaginous sauce made with plant leaves. Credit: Katja Heubach

One of the most important leaf-providing species is the baobab, which, together with species such as okra (Abelmoschus esculentus), false sesame, jute mallow and black sesame are today cooked in soups with a little potash (potassium carbonate) to give a high mucilage content or what is known as a 'slimy' consistency.

This soup is common in high yam producing areas, likely because pounded yam is known to be complemented by sauces of 'slimy' consistency (see image), as are other local cereal and tuber dishes.

Evidence for the use of leafy plants can also be found in ethnographic accounts. One of the earliest known mentions of baobab was by Al Bakri in Ghana, writing in 1068, in his great work "Kitāb al-Masālik wa-al-Mamālik' (Book of Highways and of Kingdoms).

Jute mallow is mentioned by the Arab historian al-Umarī (1300–1349) and later, in the 19th century, Nachtigal, the German explorer, notes that it is used to prepare sauces to add to farinaceous foods in Chad and Mali. Nachtigal also writes of sauces made from leaves of herbs or trees, mentioning baobab leaves, added with fresh or dried meat, to porridges.

The possible preparation of tubers such as yam, in Nok pots also suggests a long history of use, in good agreement with evidence which suggests a domestication of yams in West Africa at around 2500 BC.

Dr. Dunne added: "In summary, our results demonstrate that prehistoric plant processing and consumption in West Africa involved much more than the cooking of starchy food.



"It has allowed us to go beyond the identification of meals thought to consist mainly of meat and starchy plants. We can now confirm, based on the highly diverse range of lipid profiles presented here, the preparation of ancient meals combining vegetables, pulses, USOs and, possibly, herbs/spices."

More information: Julie Dunne et al, Making the invisible visible: tracing the origins of plants in West African cuisine through archaeobotanical and organic residue analysis, *Archaeological and Anthropological Sciences* (2022). DOI: 10.1007/s12520-021-01476-0

Provided by University of Bristol

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