RECONSTRUCTING AFRICAN AGRARIAN PREHISTORY BY COMBINING DIFFERENT SOURCES OF EVIDENCE: METHODOLOGICAL CONSIDERATIONS AND EXAMPLES FOR WEST AFRICAN ECONOMIC PLANTS

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ACRONYMS

The following table shows the abbreviations used in the data tables, the reference and the language they cover.

Acronym	Expansion	Language treated
Ab49	Abrahams (1949)	Hausa
Ab58	Abrahams (1958)	Yoruba
Ag86	Agheyisi (1986)	Ẹdo
ALKCI	Hérault (1983)	Kwa
ALKrCI	Marchese (1983)	Kru
Ba14	Banfield (1914)	Nupe
BC	Bruce Connell (p.c.)	Mambiloid
BCa	Bernard Caron (p.c.)	Zaar
Co98	Connell (1998)	Lower Cross
Cy94	Cyffer (1994)	Kanuri
Ey10	Eyoh (2010)	Ngwo
G	Guthrie (1967-1971)	Bantu
Ga80	Gardner (1980)	Abuan
Kr99	Kropp-Dakubu (1999)	Ga
KW	Kay Williamson (p.c.)	Ijoid
Lo08	Longtau (2008)	Tarok
Ma75	Manessy (1975)	Oti-Volta
Mo88	Moñino (1988)	Ubangian
MR	Mike Rueck (p.c.)	Nigerian languages
RMB	Author's fieldwork	West Africa
Ro08	Roulon-Doko (2008)	Gbaya
RS	Russel Schuh (p.c.)	Chadic
SM	Stuart McGill (p.c.)	Cicipu
Sn89	Snider (1989)	Guan
Wi07	Wilson (2007)	Atlantic

ABSTRACT

The paper is an overview of the application of historical linguistics to the reconstruction of African agrarian history, and in particular the potential to develop hypotheses about species which have no archaeobotanical record.. It opens with a broad overview of the development of African crop repertoires and the methods of

applying the tabulation of vernacular names to establishing the period of introduction and spread of particular species. It gives the examples of three species, the locust tree, *Parkia biglobosa*, the aerial yam, *Dioscorea bulbifera*, and pearl millet, *Pennisetum glaucum*. The overall synthesis underlines the importance of evidence-based approaches, making available the data which support arguments concerning individual species.

1. Introduction

Archaeobotany can sometimes be treated as if it were an isolated discipline, disconnected from its broader place in the narrative of prehistory. But it is one element in the reconstruction of African agrarian and environmental history, which, more broadly conceived, is the linking of the present with the past. A credible narrative must account for the agricultural systems, crops and useful plants in the current ethnographic record. This in turn has three elements;

Process	Explaining the processes which led to the adoption of agriculture and its change over the millennia
Chronology	Assigning credible dates to these processes
Species	Identifying the actual species involved in these processes

No one discipline can achieve this in isolation. Evidence needs to be combined from the following disciplines;

Archaeobotany
Linguistics
Palaeoclimatology
Genetics
Historical records

to tell a convincing story. The years since 2000 have seen a major expansion in archaeobotanical records for Africa, as well as a parallel growth in linguistic data. It has not been matched by a corresponding expansion of analytic results, narratives showing how individual datapoints can be linked together. The goal of this paper[1] is to lay out some methodological principles for working towards these goals, and to take some examples of African economic trees, cereal crops and tubers to explore how such an interdisciplinary approach would work in practice.

2. Background to African agrarian history

This section sketches the broad outlines of the history of plant use in Africa and in particular the chronological stratification of particular types of crops. Plants have presumably been exploited throughout human evolution, but a key step must have been the manipulation of ‘wild’ plants to make them more accessible or useful to humans. Ethnographic accounts show that yams were managed in the rainforest by foragers to improve yield (Dounias 1993; Bahuchet 1993), and tree seeds were carried on migratory routes, leading to anthropic distributions, just as the baobab marks the routes of Fulɓe pastoralists today, as they discard fruits after eating its pulp. Vines such as jumblebeads (*Abrus precatorius*) (for decoration) and edible *Gnetum* spp. (Lowe 1984; Mialoundama 1993) associated with human settlement, occur virtually throughout the world, and may well have spread following primary human movement out of Africa. Even if the analysis of starch grains and phytoliths becomes more advanced, distinguishing managed tubers from truly domestic species will remain problematic. West Africa is still home to a variety of marginally edible *Dioscorea* species, whose domestication status remains disputed (Hladik & Dounias 1993).

In the light of this, our image of African plant domestication has become focused on two broad areas, the Ethiopian Plateau and the West African region (both Sahel and forest). The Ethiopian Plateau was first identified by Vavilov (1992) while Murdock (1959) may well be the first to draw attention to the importance of West Africa. Agriculture was previously thought of as very ancient in Africa, aided by some rogue

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radiocarbon dates, but more intensive archaeobotany treats agriculture as relatively recent (ca. 4500~3000 BP) with older dates being discounted (Neumann 2003; Kahlheber & Neumann 2007). This is of considerable significance for archaeolinguistics, as in most cases, the major language families seem to be older than this (Blench 2006). As a consequence, it may well be that major domesticates *cannot* be properly reconstructed to proto-languages, which conflicts with many existing claims in the literature. However, if there has been a transfer of names for wild plants to the domestic types, as is certainly the case for yams, then a reconstruction cannot guarantee the antiquity of the farmed type (see discussion in Connell 1998).

Sub-Saharan African domesticates include sorghum, millet, finger-millet, African rice, t'ef, fonio, iburu, cowpeas, Bambara nuts, Ethiopian pea, guinea-yam, Hausa potato, okra, oil-palm and a host of minor species. A puzzle arises from the apparent early export of some crops to India; sorghum, millet, finger-millet and cowpeas apparently reach India by sea, ca. 4000 bp. (Blench 2003). It has been proposed that Africa was an example of 'cultivation without domestication' (Haaland 1996) to explain this, but equally well, we simply have not yet found the earliest African examples of crops such as millet and sorghum. Whatever the explanation, the transfer of the crops and the motivations and identity of the ship-owners remains a puzzle. Other problematic transfers are early movements from the Sahel across the Sahara. Water-melon, *Citrullus lanatus*, in the form with oily seeds, probably sesame, tamarind and perhaps the ben-oil tree, *Moringa oleifera*, seem to gone this way at an early period, and pearl millet and sorghum followed by the second century AD.

Murdock (1959) pointed out the importance of vegecultural species from SE Asia, notably the Musaceae, taro and the water-yam. Exactly how these reached Africa, and at what period remains disputed. A single Musaceae phytolith in Cameroun at 2500 BP has been the source of much discussion (Mbida et al. 2000); if such crops arrived on the east coast earlier than this, then how did they cross a continent then devoid of cultivators occupying the appropriate area? Blench (2009) discusses the importance of the West African triploid plantains and other SE Asian vegetative species and the puzzle of their somatic diversity. From roughly the 6th century onwards, a more conventional suite of Asian crops arrives on the East African coast including citrus, Asian rice, probably sugar-cane, cannabis and betel. Few of these make their way far inland. Maghreb and Saharan domesticates arrive across the desert from around 2000 BP, including onions and jews' mallow. A separate suite of Near Eastern crops arrives in Ethiopia at a disputed period, including barley, wheat, lentils and fruits such as apricots and peaches, but these stay in the Ethiopian highlands.

From the sixteenth century European crops begin to arrive, most notably those from the New World, such as maize, cassava, pawpaw, guava and other species which have transformed African agriculture. The transfer was not only one way; okra, ackee, yams and oil-palm made their way across the Atlantic (Nunn & Qian 2010). In the twentieth century, modern agronomic species have displaced many traditional varieties, in a process which is still continuing. European vegetables such as tomatoes, carrots and cabbage, at first not very successful, are now making important inroads into remoter rural areas. High-input species such as these also generally require chemical fertiliser, so traditional systems of manuring are also being discarded.

Only a very small proportion of these species are recorded in the archaeobotanical record, either for reasons of preservation or evolving techniques. Systematic flotation has changed the picture, but the analysis of starch grains is still only incipient. If techniques evolved in the Pacific were in use, our image of African crop repertoires would probably be very different. The use of DNA has been applied patchily to some cereals but has yet to produce a major revelation.

3. Plant domestication and linguistic salience

Given the importance of West Africa as a centre for plant domestication and the broader role of Africa in human prehistory, surprisingly little attention has been paid to the linguistic evidence for plant use and domestication. Should we expect plant names to reconstruct? Blench (2007a) expresses a certain amount of scepticism about the possibilities of distinguishing loanwords from true reconstructions without much more reliable phonological data for each linguistic family or subgroup. Perhaps this is to be too demanding; a geographical cluster of cognate terms undoubtedly points to an interest in a particular plant; there will undoubtedly be lexical diffusion and semantic shift as well as genuine cognacy between related languages.

As our knowledge of African archaeobotany expands, it is clearly of interest to see if economic plants that are salient in the archaeological record can be matched against reconstructible linguistic roots. The key is understanding why and how plants are named. In most of Sub-Saharan Africa the biotic environment is very rich and any given ethnolinguistic group will only name a small proportion of organisms they encounter, usually reflecting a combination of use and salience. Almost all larger mammals have specific names, but smaller species, particularly rodents, may be grouped together. Many insects are not distinguished, and usually only large, edible or harmful fish are named. So with plants, they acquire names when used. However, the great majority of names are not fundamental lexemes, but epithets, poetic descriptions similar to English 'lily-of-the-valley'. These are generally of limited use in historical linguistics. For example, the dandelion (*Taraxacum* spp.) has a variety of related names in European languages. Some of these can be parsed by speakers, while others are now-cryptic borrowings (Table 1);

Table 1. Related names for *Taraxacum* spp. in European languages

Language	I	II
English	piss-a-bed	dandelion
Norwegian		løvetann
Danish	mælkebøtte	løvetand
German		Löwenzahn
French	pissenlit	dent de lion
Italian	piscialletto	dente di leone
Catalan	pixallits	dent de lleó
Spanish		diente de león
Portuguese		dente-de-leão
Welsh		dant y llew

Essentially this shows that in a restricted region, the names recognise the diuretic properties and the shape of the leaves and the idea was borrowed between various branches of Indo-European at different times. Moving further east these associations are lost, and dandelions are linked to deafness (Macedonia) or seen as the bringer of good news (Persian *qasedak* (قاصدک), 'small postman'). These are characteristic areal borrowings and calques and are of only limited historical use beyond folklore.

The first author to consider these issues for African crops was Portères (1958) but his access to well-transcribed data in the 1950s made it problematic to reach any well-formed hypotheses. The comprehensive study by Blakney (1963) on names for banana was the first to try and link results with linguistic classification and archaeological data. Philippson & Bahuchet (1996) began the process of compiling and mapping Bantu names for major crop plants. Bostoen (2005, 2007a) has analysed the evidence for the reconstructed forms for economic trees such as the oil-palm, *Elaeis guineensis* in Bantu. Along similar lines, Blench (1996, 2003, 2006, 2007b,c, 2009) and Blench et al. (1997) have put forward a number of proposals for reconstructions of African economic plants. Connell (1998) has explored the reconstructions for yams and oil-palms in a rather more limited area, the Cross River languages.

The primary tool of paleobiolinguistics (to use a felicitous term adopted by Cecil Brown) is the compilation of comparative names of plants and animals which may in principle have reconstructibility. This should be across as many phyla and language families as possible, in order to ensure that loanwords are detected. From this it should be possible to develop hypotheses as to which roots are related. Take the case of okra, an indigenous West African domesticate (Photo 1). Table 2 shows the variety of names for 'okra' in the Niger Delta of Nigeria. Sometimes okra has two distinct names, but all of them fall into three related roots. This shows clearly that 'okra' cannot be reconstructed for proto-Ịjọ, but only for regional subgroupings, which is line with the hypothesis that the Ịjọ reached the Niger Delta as a nomadic fishing people and only later adopted agriculture through contact with farmers and traders such as the Igbo (Williamson 1988).

Photo 1. Okra, ***Abelmoschus esculentus*** **(Linn.) Moench**

Table 2. Names for okra in the Niger Delta

Lect	I	II	III
Defaka	ɔ́kʊrʊ		
Nkọrọ	ɔ́kuru		
Berbice Dutch			
Ịḅanị	ɔ́kʊrʊ́ʊ		
Kalaḅarị	ɔ́kʊrʊ		
Ḅile			
Kịrịkẹ	ɔ́kʊru		
Nembe	ɔ́kʊrʊ́		
Akaha	ɔ́kurɔ		
Ḅụmọ		ıkıapʊ́	
Oporomọ		ɛkiyápú	
Oyakiri	,	ıkıyabʊ́	akɛnɛtá
East Tarakiri			akinãdá
East Olodiama		ıkíyabʊ́	
Basan		ıkíábʊ́	
Koluama			
Apọị		ıkíábʊ́	
Iduwinĩ́	ɔ́kʊrʊ	ikıabʊ	
Ogulagha		ıkıabʊ	
Gbaramatu		ıkıabɔ	
Egbema			
West Olodiama			
Fụrụpagha		ıkıabʊ	
Arogbo		ıkıabʊ	
Ogbe Ịjọ		ikıabʊ	
Oboro Town			
Operemọ	ɔ́kʊrʊ		
Mein	ɔ́kurʊ		
Kunbo			akınıtɛ́
Kabou			akınıtí
West Tarakiri			akɛnıtí
Ogboin		ekiapú	akinĩ́tá
Ikiḅiri			akinĩ́tá

Lect	I	II	III
Ekpetiama	ɔ́kʊrʊ		ɛkɛnɛtɛ́
Kolokuma	ɔkʊ́rʊ		ɛkɛnɛtɛ́
Gbaraịn	ɔ́kʊrʊ		
Oruma	ɔ́kʊrʊ		
Akịta	ɔ́kʊrʊ		
Biseni	ɔ́kʊrʊ dʊ́ʊ		

Photo 2. Shea-fruit

Crops become salient when they are domesticated, and thus categorically distinct from their wild relatives. In the case of trees the situation is more complex. With very few exceptions in recent times, trees are not truly domesticated and they are not generally exotics. The discovery of their uses is a long process, and often goes with technologies such as oil extraction. As a result, the name for a tree often spreads across a restricted zone within its broader natural distribution. For example, the shea tree, *Vitellaria paradoxa*, is an important oil tree in savannah regions of West-Central Africa (Hall *et al.* 1996 and Photo 2). Two subspecies are distinguished, subsp. *paradoxa*, which occurs from Senegambia to eastern RCA, and subsp. *nilotica*, eastwards into Uganda. Map 1 shows its approximate distribution across the continent. Despite this, hard evidence for its importance and use in prehistory are slight. There is only one archaeobotanical record for shea, a 14th century testa from the medieval village of Saouga in Burkina Faso while shea-butter production in the Sahel was recorded by Ibn Baṭṭuṭa in the 14th century (Neumann *et al.* 1998:60).

Map 1. Distribution of shea, *Vitellaria paradoxa*, **in Africa**

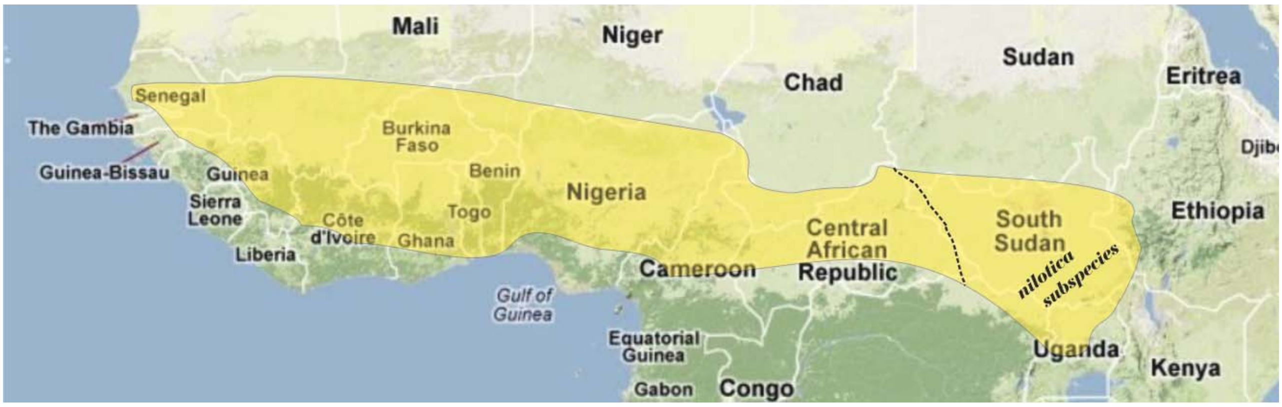


Table 3 shows the linguistic evidence for a widespread Niger-Congo root for 'oil, fat' which has shifted to the specific meaning of the shea tree, *Vitellaria paradoxa*, and its oil in some areas.

Table 3. Reflexes of ***ŋ-kpunu*** **'oil'→shea tree,** *Vitellaria paradoxa*

Family	Subgroup	Language	Attestation	Gloss	Source
Kru		Bete G	kpʉ́	*huile*	ALKrCI
Kru		Aizi	kpu	*huile*	ALKrCI
Atlantic	North	Mankanya	o-kərəʔ	oil	Wi07
Gur	Oti-Volta	Moba	kpàm	*graisse*	Ma75
Gbaya		Ɓodoe	kɔ̂l	shea	Ro08
Ubangian		Kpatiri	kpɔ	*graisse, huile*	Mo88

Family	Subgroup	Language	Attestation	Gloss	Source
Kwa		Gonja	ŋ̀-kú	shea	Sn89
Kwa		Ga	ŋ̀kú	shea-butter	Kr99
Bijogo		Bijogo	ŋ-kiḍi	oil	Wi07
WBC	Igboid	Igbo	òkwùma	shea-butter	KW
WBC	Nupoid	Nupe	èkó	shea-butter nut	Ba14
EBC	Plateau	Obiro	òkʷô	shea tree	RMB
EBC	Plateau	Tinor	kɔ̃̀ɲɔ̃̀	shea tree	RMB
EBC	Plateau	Ake	kìkyɔ̃̀	shea tree	RMB
EBC	Plateau	Tarok	ìkíní	shea tree	RMB
Bantoid	Buru	Buru	ŋ̀ko	oil	RK
Bantoid	Momo	Ngwo	ŋ̄gúd	oil	Ey10
Bantu		CB	-gʊ́tà, -kʊ́tà	oil	G
Bantu	Jarawan	Doori	kólá	shea tree	MR

In western Niger-Congo languages this root seems to be a generic term for 'oil, fat'. However, with its occurrence in Kwa languages, it becomes specifically applied to the shea. In the Bantoid and early Bantu areas, which are outside the ecological range of the shea, a savanna species, the word shifted back to its more general meaning of 'oil, fat'. Map 1 shows the distribution of this root superimposed on the 'natural' distribution of the shea. At its western and southeastern distributions, this root simply means 'oil' but wherever the shea became a central oil-production species, the meaning 'shea' predominates.

The extraction of trees for timber or new products by Europeans caused the spread of common names from the sixteenth century onwards. A product that came to be valued in the colonial era was rubber. Forestry officers were constantly on the lookout for species to compete with commercial rubber from the New World, *Hevea brasiliensis*, and numerous vines and trees were tried out during this period. One group was the *Funtumia* spp. or bush-rubber trees, which came to have considerable commercial importance in Ghana (Burkill 1985:151). Table 4 shows the names of the bush rubber tree in the Volta Region:

Table 4. Ghanaian names for the bush rubber tree, *Funtumia elastica*

Branch/subgroup	Language	sg.	pl.
Tano	Twi	ɔ-fruntum	
	Nzema	ofuntum	
Gbe	Ewe	funtum	
Northern Guang	Gikyode	òfúntún	ìfúntún
Ka-Togo	Tuwuli	òfruntum	tùfruntum
Gur	Ntrubo	òfúrúntún	

Source: Irvine (1961)

Again, such a uniform common name would not be expected across different Niger-Congo branches and these terms probably only spread outwards from the coast from the 1880s onwards when the rubber was first exploited.

With this in mind, it seems useful to present some examples of sets of related names for useful plants in West Africa, and compare it with whatever archaeobotanical evidence exists. The paper compiles a series of tables of related reflexes of what appear to be common roots, but makes no assumptions as to whether these are true phonological reconstructions or a mosaic of loanwords. In many cases, a mixture of the two is the most likely. Many established economic plants have so far not been recorded in any excavations; but their linguistic saliency hints for species to seek when sieving at a site. In some cases, there is also historical data to explore.

4. Case studies

4.1 Data presentation

Collating data from a large number of sources and presenting it in tables requires a considerable amount of compression to ensure the data is accurate and can be traced to the original. Each of the tables presents the phylum for the language, abbreviated as follows;

AA	Afroasiatic
NC	Niger-Congo
NS	Nilo-Saharan

Two further columns present the family (Chadic, Kwa etc.) and the subgroup (West, Oti-Volta). Two names call for comment; Volta-Niger (a proposed grouping of old Eastern Kwa, Yoruba, Nupe etc. with the Gbe languages) and EBC standing for Eastern Benue-Congo (the old Benue-Congo of Williamson (1971). The language name is the common name of a language. The attestation gives the original form cited in the source. The Gloss column is the definition as given in the source, given in the original language. This is done to avoid problems with overly convenient translations. The Source column gives the source in abbreviated form and the reader should refer to the table in the front matter to find the expansion.

Photo 3. Locust bean flower

4.2 Species

4.2.1 Locust-bean tree, *Parkia biglobosa*

The locust-bean tree, *Parkia biglobosa*, is presently one of the most important trees of the West African savanna (Hall *et al.* 1997). The seeds, flour and pods are all eaten or used in construction (Photo 3). Yet it barely features in the archaeobotanical record. A common root, something like #-*rona*, has developed in languages spread between Burkina Faso and Central Nigeria, which may point to an expansion of usage of locust bean products, after the major language families are established perhaps 2-3000 years ago[2]. Table 5 shows the reflexes of a root for the locust tree, *Parkia biglobosa*;

Table 5. The #*lona* root for locust-bean tree, *Parkia biglobosa*

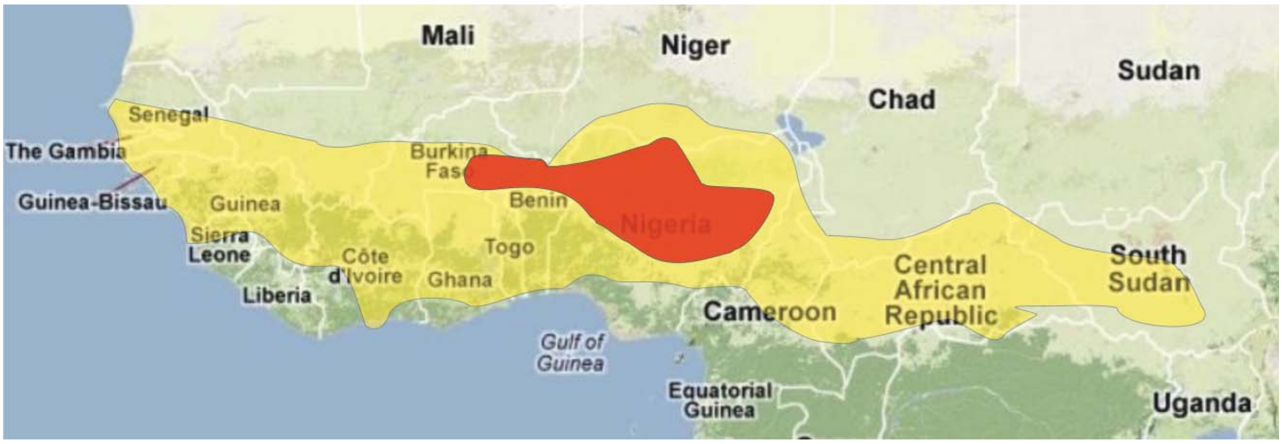
Ph	Family	Subgroup	Language	Attestation	Gloss	Source
AA	Chadic	West	Hausa	ɗòòrowàà	locust tree	Ab49
AA	Chadic	Central	Bura	nônà	locust tree	RMB
NS	Saharan		Kanuri	runo	locust tree	Cy94
NC	Gur	Oti-Volta	Tamari	nuã	*néré*	Ma75
NC	Adamawa		Ɓəna [=Yungur]	rwoo	locust tree	RMB
NC	Volta-Niger	Yoruboid	Yoruba	iru	seed of ~	Ab58
NC	Volta-Niger	Nupoid	Nupe	elo	locust fruit	Ba14
NC	Volta-Niger	Nupoid	Gbagyi	olo	locust tree	RMB
NC	EBC	Kainji	Reshe	u-lo /tsu-	locust tree	RMB
NC	EBC	Kainji	Rin [Pongu]	ùɾò	locust tree	RMB
NC	EBC	Kainji	Basa-Gumna	ulolo	locust tree	RMB
NC	EBC	Kainji	Cicipu	lɔ́ɔ *pl.* llɔ́ɔ	locust tree	SM
NC	EBC	Plateau	Iten	ɛ̀lool	locust tree	RMB
NC	EBC	Plateau	Cara	lɔl	locust tree	RMB
NC	EBC	Plateau	Ningye	urò	locust tree	RMB
NC	EBC	Plateau	Ashe	ì-rũ	locust tree	RMB

[2] Lists of vernacular names are to be found in Burkill (1995) and Hall et al. (1997)

Ph	Family	Subgroup	Language	Attestation	Gloss	Source
NC	EBC	Plateau	Idũ	ìrũ̀wã̀	locust tree	RMB
NC	EBC	Plateau	Tinor	ì-rũ̀	locust tree	RMB
NC	EBC	Plateau	Hasha	ì-nɔn	locust tree	RMB
NC	EBC	Plateau	Ake	ìrɔ̃	locust tree	RMB
NC	Bantoid	Dakoid	Samba Daka	loom	locust tree	RMB
NC	Bantoid	Tivoid	Tiv	nune	locust tree	Ab40

Map 2 plots the geographical distribution of *#lona* root for *Parkia biglobosa* (marked in red) against the natural distribution of the tree, suggesting that the processing of the seeds, and thus its salience, began in the central zone.

Map 2. Distribution of *#lona* **root for** *Parkia biglobosa*



The term seems to originate in Gur and be borrowed into Volta-Niger and Benue-Congo and then probably back into Chadic several times.

4.2.2 Aerial yam, *Dioscorea bulbifera*

Photo 4. Aerial yam, *Dioscorea bulbifera*

The aerial yam, *Dioscorea bulbifera*, known in Nigerian English, as the 'up-yam' is cultivated for the bulbils that develop at the leaf axils (Photo 4). In Africa, aerial yams are spread from Senegambia to Kefa in Southwest Ethiopia (Martin 1974; Westphal 1975:161; Burkill 1985:657 ff.). There are wild forms in both Africa and India, and Chevalier (1936) argued that the tuber was domesticated independently on both continents. The major morphological distinction between the quadrangular African forms and the ovoidal Indian types strongly suggest this. Chevalier claims that the Indian subspecies, *D. bulbifera* var. *birmanica*, were brought to the East African coast by the Arabs and to the West African coast by the Portuguese.

There is a widespread root, *#dom-*, applied to the indigenous aerial yam in Nigeria and adjacent regions of Cameroun. Williamson (1993) was the first to identify this root as widespread. The species is not always well identified in the sources, so it may well be more widespread than this distribution suggests. The spread of the *#-tom* root seems to be coincident with Benue-Congo, while the attested forms in Volta-Niger languages tend to have a nasalised vowel. The Ijoid form is probably a borrowing, although the bilabial nasal marks it as a borrowing from Benue-Congo. There is no archaeological evidence for the aerial yam, but it is reasonable to suppose that the linguistic evidence marks it as being brought into domestication some 3-4000 years ago. Table 6 shows the #-*dom*- root for the aerial yam;

Table 6. #-*dom*-, a root for aerial yam *Dioscorea bulbifera*

Family	Subgroup	Language	Attestation	Gloss	Source
Ijoid		P-Ịjọ	*ɔtʊmʊ̃	aerial yam	KW
WBC	Edoid	Bini	udin	aerial yam	Ag86
Volta-Niger	Nupoid	Nupe	èdu	aerial yam	RMB
Volta-Niger	Igboid	P-Igboid	*-dʊ̃̌	aerial yam	KW
EBC	Kainji	tHun	rodiŋ tom	aerial yam	RMB
EBC	Kainji	ɛBoze	ri-don/a-	aerial yam	RMB
EBC	Plateau	Aten	ìtôm	aerial yam	RMB
EBC	Plateau	Berom	tòm	aerial yam	RMB
EBC	Plateau	Cara	i-tɔ	aerial yam	RMB
EBC	Plateau	Hyam	kpodom	aerial yam	RMB
EBC	Plateau	Izere	a-dom	aerial yam	RMB
EBC	Plateau	Idũ	ìdɛ̀m	aerial yam	RMB
EBC	Plateau	Ashe	ú-dũ̀	wild yam	RMB
EBC	Plateau	Nyankpa	ɛ̀dɔ̀m	aerial yam	RMB
EBC	Plateau	Hasha	ì-tum	aerial yam	RMB
EBC	Plateau	Sambe	ìntɔ́	aerial yam	RMB
EBC	Plateau	Horom	dùn	aerial yam	RMB
EBC	Plateau	Eggon	àdom	aerial yam	RMB
EBC	Plateau	Pe	atom	aerial yam	RMB
EBC	Lower Cross	Efik	édòmò	aerial yam	Co98
EBC	Central Delta	Abuan	ediom	aerial yam	Ga80
Bantoid	Mambiloid	Gembu	tũār	aerial yam	BC
Bantoid	Grassfields	Yamba	ntə́ntóŋ	*k.o. small yam*	RMB
Bantoid	Grassfields	Bafut	nɨ̀tū'ù	aerial yam	RMB
Bantoid	Grassfields	Ngomba	nɛtú'	aerial yam	RMB
Bantoid	Grassfields	Chufie'	tɔ́'ù	aerial yam	RMB
Bantu	C10	Aka	tombo	aerial yam	

It is striking that the western languages, predominantly Volta-Niger, have a high nasalised vowel in the stem and while the Benue-Congo languages usually have a mid-vowel plus a bilabial. This might be evidence that the plant was already known to speakers at the higher node before these subgroups split apart. Map 3 shows the distribution of #*tom*- root for *Dioscorea bulbifera*;

Map 3. Distribution of *#tom***- root for** *Dioscorea bulbifera*

This suggests that the aerial yam first became salient for speakers of the language ancestral to Volta-Niger and Benue-Congo, which points to a date of >5000 BP.

4.2.3 Pearl millet, *Pennisetum glaucum*

Pearl millet is an important and ancient West African domesticate, and the first authors to claim an African origin were Koernicke & Werner (1885). Its wild relatives are found on the southern edge of the Sahara and it is usually considered that this was its locale of domestication (Chevalier 1932: 888-890; Brunken *et al.* 1977). Archaeobotanical evidence for pearl millet in Africa is sparse, but gradually improving (Nixon et al. 2011). Recent proposals situate this event in the third millennium BC in the far western Sahel, perhaps in Mauritania and/or northeast Mali (Tostain 1998; D'Andrea et al. 2001; Fuller et al. 2007). Currently the earliest *Pennisetum glaucum* is that recorded the Malian Neolithic sites of Karkarichinkat from 2500-2000 BC (Manning et al. 2010). Through much of subhumid West Africa, two significant subtypes are recognised, the tall, long-season semi-arid types (Hausa *maiwa*) and the short-season, humidity-tolerant types more characteristic of the Middle Belt (Hausa *gero*).

One of the emblematic sites of Nigeria, the Nok region, has produced a very large amount of millet dated to 800-450 cal BC (or earlier?) (Kahlheber et al. 2009). Perhaps even more surprising is the fact that millet was also cultivated in areas much further in regions that are now rainforest (Höhn et al. 2007). It is adopted early by the Berber and appears in Saharan oases by around the 2nd century AD (after wheat) (Thanheiser et al. in press) and makes some impression on Southern Europe at the end of the Roman era and into the Middle Ages (Brunken et al. 1977). It also spreads from the Horn of Africa to India and Nepal some 4000 years ago.

Millet is still grown as a ritual crop in the sandy, semi-arid areas of the eastern parts of coastal Ghana though it has been completely displaced by maize as a staple. The polysemy of 'millet' and 'food' in a coastal language like Ga (in SE Ghana) is a striking indication of the former importance of millet in this region since it has now almost entirely switched to growing maize as a staple.

Blench (under review) has tabulated the global evidence for vernacular terms applied to pearl millet. At least three major roots for pearl millet in Africa have been identified, one in the Bantu area, studied by Koen Bostoen (2007b), one in Central Nigeria (Longtau 2008) and one in the Central Chadic-speaking region in

Northern Cameroun (Gravina p.c.). However, pearl millet appears also to have been transmitted to the Berber at an early period, since a single root appears all across Berber (Kossmann p.c.; Blench under review). However, in the proposed area of the western Sahel where domestication took place there is a striking absence of common roots. This suggests that domestication may have been a slow and tentative process.

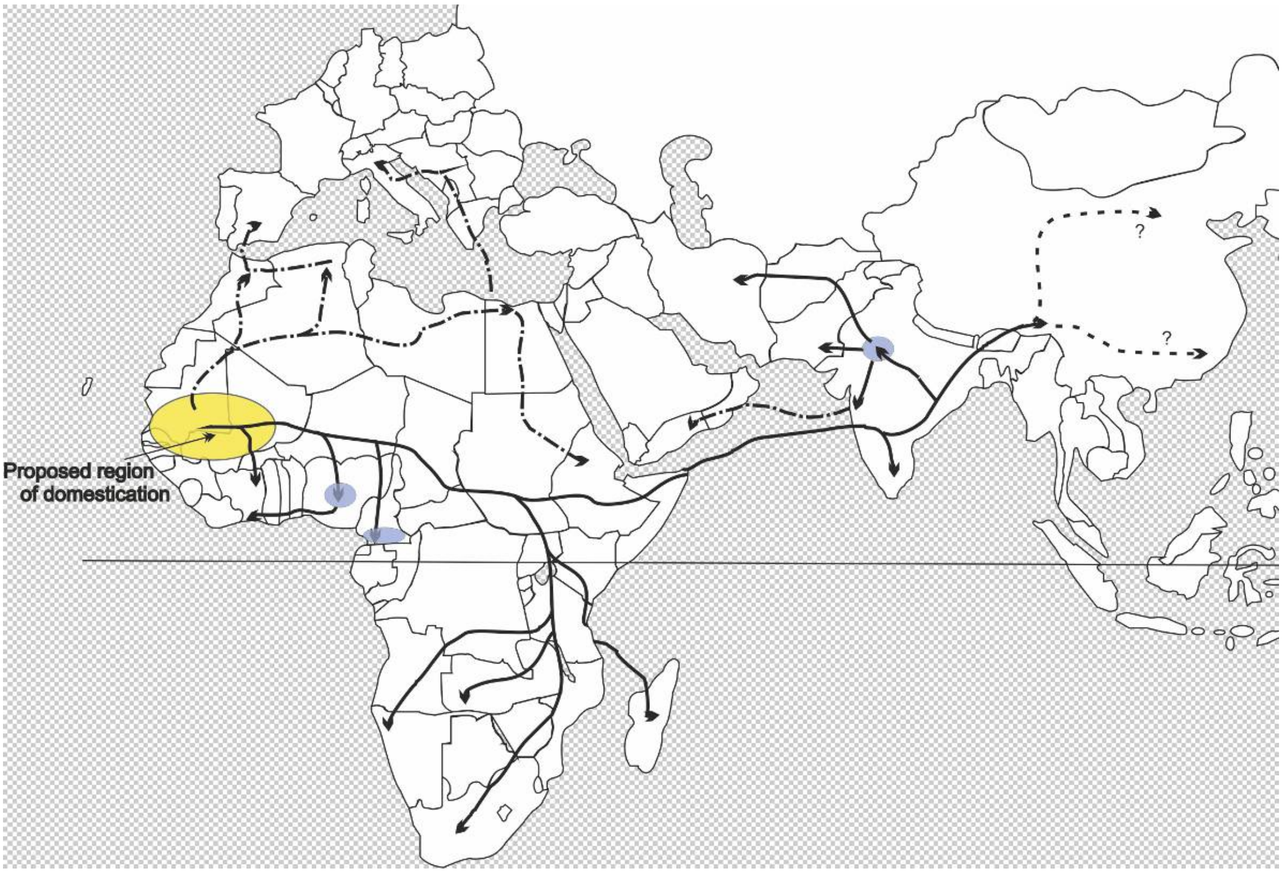
Table 7 shows a root for pearl millet, something like *#mar(d)-,* found across Central Nigeria, which is widely attested in both Chadic and Plateau. The Chadic forms, such as Karekare *màrɗo*, look as if they contain the older form and that Hausa *maiwa* is probably a weakening of the consonants. Zaar *màrwá* illustrates a transitional form in the weakening process. However, the Hausa name has subsequently been borrowed into other languages, such as Miya, which looks suspiciously similar. The Plateau names are all shorter and lack the *-rd-* sequence; hence it is most likely they were borrowed from Chadic at some point (which is also likely from an ecological point of view). It seems likely that the diffusion of this root records the increasing importance of millet which led to it being a ritual crop at Nok, perhaps 3000 years ago.

Table 7. ***#mar(d)a*****, a root for pearl millet,** *Pennisetum glaucum*

Ph	Family	Subgroup	Language	Attestation	Gloss	Source
AA	Chadic	West	Hausa	maiwa	millet	Ab49
AA	Chadic	West	Bole	mòrɗo	pearl millet	RS
AA	Chadic	West	Ngamo	mòrɗò	millet	RS
AA	Chadic	West	Geji	marɗa	millet	RMB
AA	Chadic	West	Ngizim	mar̃ɗû	millet	RS
AA	Chadic	West	Karekare	màrɗo	millet	RS
AA	Chadic	West	Kushi	mooɗo	millet	RMB
AA	Chadic	West	Miya	màywá	millet	RS
AA	Chadic	West	Mwaghavul	mààr	millet	RMB
AA	Chadic	West	Fyer	mar	millet	RMB
AA	Chadic	West	Sirzakwai	marɗay	millet	RMB
AA	Chadic	West	Zaar	màrwá	millet	BCa
NC	Adamawa	Yandang	Yoti	múri	millet	MR
NC	Kwa	Ga-Dangme	Ga	ŋmȁȁ	millet, food	Kr99
NC	Kwa		Adyukru	máy`	*mil*	ALKwCI
NC	Volta-Niger	Nupoid	Nupe	mȁyì	millet	Ba14
NC	EBC	Plateau	Ninzo	amar	millet	RMB
NC	EBC	Plateau	Ningye	mwan	millet	RMB
NC	EBC	Plateau	Anib	àmɛ̂n	millet	RMB
NC	EBC	Plateau	Nyankpa	imala	millet	RMB
NC	EBC	Plateau	Ashe	i-ma	millet	RMB
NC	EBC	Plateau	Idũ	imara	millet	RMB
NC	EBC	Plateau	Shang	mara	millet	RMB
NC	EBC	Plateau	Jili	amo	millet	RMB
NC	EBC	Plateau	Sambe	tìk àmâr	millet	RMB
NC	EBC	Plateau	Kwaŋ	mɛr	millet	RMB
NC	EBC	Plateau	Yaŋkam	marak	millet	RMB
NC	EBC	Plateau	Tarok	imar	millet	Lo08
NC	EBC	Plateau	Sur	mər	millet	RMB
NC	EBC	Plateau	Pe	ime	millet	RMB
NC	Bantu	Jarawan	Mbula	mara	millet	MR
NC	Bantu	Jarawan	Mbat	máár	millet	MR

Map 4, from Blench (under review), illustrates the worldwide diffusion of pearl millet;

Map 4. Worldwide diffusion of pearl millet



5. Conclusions

This paper has given some examples of the use of linguistics in developing hypotheses concerning the prehistory of African useful plants. Typically, vernacular names for domesticated plants in Africa *do not* reconstruct to deep-level proto-languages, only more recent subgroupings such as Bantu. Rather, they are regional or areal and tend to jump across language family and phylum boundaries. This is actually what we should expect, since archaeobotany, where it exists, underlines a relatively late and sporadic, opportunistic agriculture in Sub-Saharan Africa. Even trees and 'natural' vegetation tend to obey this rule as geographically based roots reflect not the initial domestication of introduction of a plant but rather its transition into salience. This may reflect either a move towards becoming a dominant staple or the introduction of a new cultivar or technology (such as oil extraction). Patterns of lexical roots may also reflect palaeoclimate where they are discontinuous (Bostoen, this volume). Where forest disappears and then returns, names for trees may occur in fragmented patterns.

Linguistics has the potential to create hypotheses and to make suggestions for many species to fill the gaps but it should be in harmony with known archaeobotany. Hypotheses must be evidence-based, in other words, linguistic reconstructions should be supported by tables of evidence, not by assertions about starred forms. Archaeobotany in Africa is making slow progress, particularly in the area of vegetatively reproduced plants. Linguistics can contribute to this when combined with a sensible reading of the ethnographic data on agronomic practice.

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CAPTIONS

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