FINGER-MILLET: THE CONTRIBUTION OF VERNACULAR NAMES TOWARDS ITS PREHISTORY

Paper prepared for the RIHN Symposium 'Small millets in Africa and Asia' Tokyo September 19-20th, 2010, and now submitted for a special issue of the journal *Archaeological & Anthropological Sciences*

Circulation Draft only; Please don't quote without permission

Roger Blench
Kay Williamson Educational Foundation
8, Guest Road
Cambridge CB1 2AL
United Kingdom
Voice/ Fax. 0044-(0)1223-560687
Mobile worldwide (00-44)-(0)7967-696804
E-mail rogerblench@yahoo.co.uk
http://www.rogerblench.info/RBOP.htm

This printout: February 11, 2012

TABLE OF CONTENTS

ACRONYMS ..... **i**
1. Introduction **1**
2. Africa **2**
3. India and beyond **5**
4. Synthesis and conclusions **8**
References **9**

TABLES

Table 1. Major roots for finger-millet in Africa 2
Table 2. The finger-millet root #-*gimbi* in Bantu 3
Table 3. Finger-millet terms in Bantu languages 3
Table 4. Finger-millet names in Nilotic languages 4
Table 5. Ethiopian terms for finger-millet 5
Table 6. West African terms for finger-millet 5
Table 7. Indian and East Asian names for finger-millet 7
Table 8. Taiwanese names for finger-millet 8

MAPS

Map 1. Finger millet roots in the Bantu-speaking area 4
Map 2. Finger-millet in India 6
Map 3. Distribution of finger-millet in ISEA 8
Map 4. Hypothetical diffusion routes of finger-millet 9

PHOTOS

Photo 1. Finger-millet *Eleusine coracana* 1

ACRONYMS

*	regular reconstruction
#	quasi-reconstruction based on rapid inspection of forms
AD	Anno Domini
BC	Before Christ
BP	Before present
DDSA	Digital Dictionaries of South Asia
OC(M)	Old Chinese (Main)
STEDT	Sino-Tibetan Etymological Dictionary and Thesaurus

1. Introduction

Finger-millet, *Eleusine coracana* (Linn.) Gaertn. (Photo 1) gains its name from the head of the plant, which bears some resemblance to a splayed hand. Finger-millet is cultivated throughout Eastern and Southern Africa, and in parts of Central Africa, as far west as Nigeria[1]. In Asia, it is widespread in India, Nepal and the Himalayan region, across parts of China and into Taiwan. In Island SE Asia it is known from Sumatra and Java and as far as Lombok, as well as an isolated record in Ambon (Map 3). It is also recorded in the USDA database from South Carolina, which may reflect a transfer from the era of the slave trade, like okra and cowpeas.

Photo 1. Finger-millet *Eleusine coracana*

Its exact area of domestication has remained controversial. Because it shows the greatest varietal diversity in India, earlier sources suggested that as its homeland and in 1926 Vavilov (1951) proposed a source in the grassy uplands. Portères (1951) inclined to an African origin on the basis of African vernacular names, a view supported by Mehra (1962, 1963) on botanical grounds. Portères (1976:417) later changed his mind and reverted to the hypothesis of Indian origin. However, Harlan *et al.* (1976, footnote, p. 417) point out that this was to ignore the existence of *Eleusine africana*, a wild tetraploid that crosses freely with cultivated finger-millet. This assertion of an African origin for eleusine appears to have been generally accepted (Hilu & De Wet 1976a,b; Hilu et al. 1979). Philips (1972) has plotted out the range of the potential wild ancestors, which cover most of semi-arid and subhumid Africa.

Finger-millet was apparently carried from Africa to India in prehistory, since there are a number of reports of grains at around the 4000 BP mark, although not all those cited in earlier literature can be confirmed (Blench 2003; Fuller 2003, 2011). It is of considerable importance in Nepal, and adjacent parts of the Himalayas, although by what route it was transmitted is unknown, in the absence of archaeobotanical material. Hilu & De Wet (1976) plot out the distribution of Indian races (Map 2) and distinguish a lowland race in the west and south, more similar to those in Africa, and a highland race in the north and northeast. Although China is a major producer of finger millet, there is a similar lacuna in the archaeobotany. Yet it must have spread from the mainland to Taiwan in prehistory, as it is well-established there among the Austronesian-speaking peoples. Similarly, its absence in the Malaysian Peninsula, and presence in Western Indonesia points to a maritime introduction; but again there are no dates or historical records. Schwarz (1939) first reported finger-millet in the Arabian Peninsula and a survey of Oman by Hammer et al. (2009) also recorded its presence.

As a consequence, historical linguistics takes on some importance as a means of tracing the spread of finger-millet. The current paper[2] compiles vernacular names for finger-millet from both Asian and African languages. As far as can be seen, the two continents show no connection, which does support the transfer of this cereal in antiquity. More detailed discussion of the methodological aspects of the conclusions drawn from comparative linguistics are included in the companion paper on Asian millets (Blench this volume). Terms for finger-millet occur in three of Africa's four major language phyla, Afroasiatic, Nilo-Saharan and Niger-Congo, as well as most phyla of South and East Asia and India. These are colour-coded in the tables to make clear the affiliation of a language at a glance.

[1] It is worth observing how poor the data on a minor cereal such as finger-millet can be. FAO statistics aggregate all millets, making the data effectively useless. A reference volume such as NAS (1996) includes a highly inaccurate map of the areas of cultivation of finger-millet in Africa.

[2] Elements of this paper was included presentations at the RIHN Symposium 'Small millets in Africa and Asia' Tokyo September 19-20th, 2010, and I would like to thank the organisers for the invitation to attend. Thanks to Emiko Takei for permission to adapt her data on names for finger-millet in Taiwan.

2. Africa

Finger-millet is primarily grown today in Eastern and Southern Africa to make beer, as it has been displaced by maize as a staple in many regions. It is grown as far west as Central Nigeria, where it is appreciated as a crop that grows in low-fertility soils. Finger-millet is present in the archaeobotanical record, but few of the existing dates would pass modern scrutiny in terms of their reliability. Giblin & Fuller (2011) have compiled a listing of finds of finger-millet in Africa, including estimates of reliability of dating and context. The earliest record is a Kursakata, Nigeria, dated to 100 AD, followed by Ona Nagast, Ethiopia, representing the Aksumite culture. Following this, the site of Kabuye IV in Rwanda is dated at around 320 AD. All subsequent finds are in Eastern and Southern Africa, with no other records for West Africa. Boardman (1999) records a first millennium AD find of finger-millet near Axum in Ethiopia. In south-eastern Africa, there is a record of cultivated finger-millet at Inyanga, in modern-day Zimbabwe, where carbonised seeds are associated with late Iron Age pottery (Summers 1958).

The pattern of names is puzzling, to say the least. The only linguistic analysis of finger-millet terms is Philippson & Bahuchet (1996: Fig. 4) which does not provide raw data but merely maps of the distribution of roots[3]. Ehret (1998) points to the diversity of terms as evidence for a late introduction, and there are indeed a large number of low-frequency roots of limited geographical distribution. Although the East and West African cultivation zones must have been historically connected, there are virtually no attestations for languages of Southern Sudan and Chad, suggesting that although finger-millet must have diffused along a corridor north of the equatorial forest, its cultivation has largely disappeared. Alternatively, the original zone of domestication may have been in the archeologically unexplored areas between east and west. There are no records of finger-millet beer in the region of West-Central Africa, hence this use must have been displaced by the later (?) spread of sorghum. The most likely explanation for thjis linguistic diversity is that finger-millet diffused gradually from farmer to farmer and that it often took on the local name of goosegrass, *Eleusine indica*, a closely related transcontinental weed of cultivation.

Table 1 shows the distribution of major roots for finger-millet in Africa;

Table 1. Major roots for finger-millet in Africa

Root	Location
*-gimbi	Kenya to Zimbabwe
*-poko	Malaŵi, Zambia, Zimbabwe, South Africa
*-bulo	Uganda to Zambia
*-dagusa	Central Ethiopia
*-sarga	Nigeria, Chad

Philippson & Bahuchet (1996: Fig. 4) identify a series of roots, **-degɪ*, **-de* and **-do*, plotted on their map. The root, **-degɪ*, which is said to occur south and east of the Great Lakes, has been connected to the Indian name *ragi* (Philippson & Bahuchet 1996). However, *ragi* is likely to originate in a Dravidian root for 'cereal' and is thus unrelated (Southworth 2005). However, the evidence for these vernacular names is entirely lacking in the datasheets accompanying their paper and an error may thus have crept in, perhaps a transposition from another crop. These are omitted pending further evidence for the existence of these names. The Austronesian language, Malagasy, has a highly idiosyncratic term, *tsimpimpina*, but it is unknown whether this is an old cultigen or a recent introduction.

Table 2 shows a stem that occurs in Eastern Africa[4]. The original shape of the root seems to have been something like #*-gimbi*, with the class prefix 3 *(u)mu-* for the plant and Class 14 *(u)wu-* for the grain. It is reconstructed in BLR3 as **gɪmbɪ* with the meaning 'millet-beer';

[3] However, Gerard Philippson has kindly provided copies of the datasheets, and some material form these is quoted in the tables.

[4] This is more widespread than indicated in Bahuchet & Philippson (1996: Fig. 4)

Table 2. The finger-millet root #-*gimbi* in Bantu

Language	Attestation	Gloss
Swahili	(m)wimbi	
Embu	ugimbi	
Tharaka	ugimbi	
Kamba	oembe	
Gweno	mɣimbí, βuɣimbí	
Dawida	βuɣimbi	
Kikuyu	oɣembe	
Chonyi	wimbi	
Sangu	uwugimbi	beer
Sena	mulimbi	
Shona	mbimbimbi	bumper crop of finger-millet

Sources: adapted from Maundu (1999), FAO (1988), Blench (2006) & Philippson (ined)

The Nilo-Saharan language Maa (i.e. Maasai) *oloikimbi* is transparently borrowed from Bantu.

Table 3 shows other low-frequency terms for finger-millet in Eastern and Southern African languages;

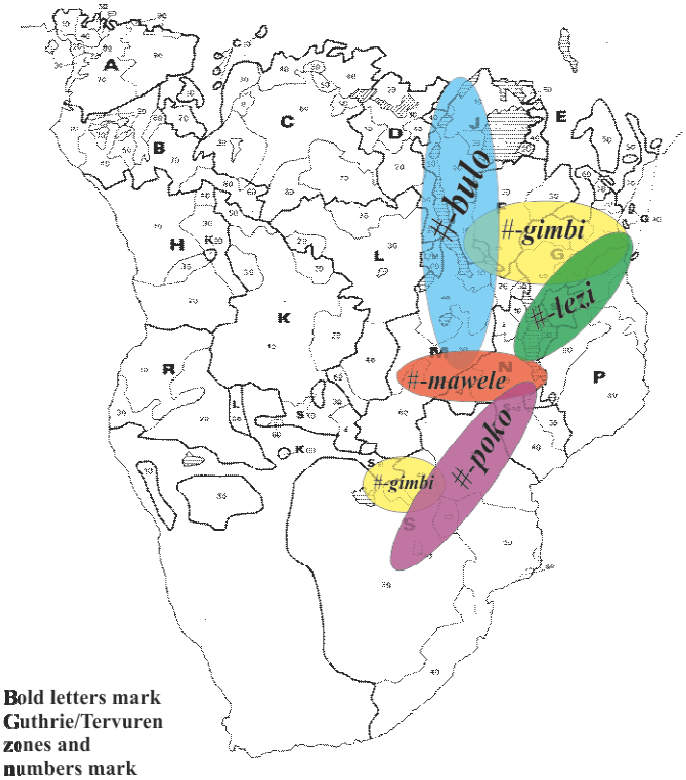
Table 3. Finger-millet terms in Bantu languages

Language	#-bulo	#mawele	#-lezi	#-poko	Others
Kisii	obori				
Luhya	obure				
Kinyarwanda	uburo				
Luganda	òbùlô				
Nande	obúlo				
Hunde	buló				
Shi	óóbúló!ó				
Tembo	búlo				
Rwanda	uburó				
Rundi	uburó				
Kerebe	buro				
Ganda	obulô				
Soga	bulo				
Masaaba	βulo				
Hanga	oβule				
Bemba	bule	amale			
Tonga		mawe			
Pogoro			ulesi		
Hehe			ulezi		
Swahili			ulezi		
Nkonde			malesi		
Chewa		mawere		lipoko	
Tumbuka			malezi	lupoko	
Shona				rapoko	zviyo, njera, rukweza
Ndebele				uphoko	mazhovole
Hlengwe				poho	
Nyanja		mawele		lupoko	kambale, majolothi
Venda				mufhoho	
Yao					usanje
Ngoni					khakwe
Lunda					masaaŋu ?
Mwenyi					(a)máuŋgú ?

The #*mawele* root is widely found applied to 'pearl millet' and has probably been sporadically borrowed as a

term for Eleusine. Map 1 shows the approximate locations of the roots identified in Table 3;

Map 1. Finger millet roots in the Bantu-speaking area



Names for finger-millet in Nilotic languages show little consistency (Table 4);

Table 4. Finger-millet names in Nilotic languages

Language	Attestation
Teso	akima
Pokot	mataighio
Nandi	bek
Dholuo	kal
Kumam	kal

suggesting that the term has been borrowed independently from wild plant names.

The cultivation of finger-millet in the Ethiopian highlands is connected with the genesis of seed agriculture, usually associated with Cushitic and Semitic speakers. The most common root, something like *#dagus*, appears to originate with Agaw speakers, since it can be reconstructed to proto-Agaw (Appleyard 2006). Ehret (1979: 172) noted that the Amharic is borrowed from Agaw as is the Kafa form. Table 5 shows the main terms recorded for finger-millet in Ethiopia.

Table 5. Ethiopian terms for finger-millet

Phylum	Family	Branch	Language	Attestation
Afroasiatic	Semitic	Ethiosemitic	Amharic	dagussa ዳጉሳ
Afroasiatic	Cushitic	Agaw	Bilin	dagus
Afroasiatic	Cushitic	Agaw	Xamtanga	dəwsa
Afroasiatic	Cushitic	Agaw	Kemant	dəwʃa
Afroasiatic	Cushitic	Agaw	Künfal	dəgusi
Afroasiatic	Cushitic	East	Afar	asɛdɛro
Afroasiatic	Cushitic	East	Haddiya	joko
Afroasiatic	Cushitic	East	Borana	barankiya
Afroasiatic	Omotic	Gonga	Kafa	dauʧo

The cultivation of finger-millet in West Africa is something of a puzzle, since there is very little evidence for its importance in Southern Sudan and Chad. Almost no vernacular names are recorded for these countries. Nonetheless, there is no other obvious root for its diffusion. Most of the vernacular names are unconnected, but the Kanuri term is clearly the source for the related nexus of terms in Tarokoid (Tarok, Pe, Sur Yangkam). Since these languages are now not contiguous to Kanuri, it is almost certain that the intermediate language was one of the Chadic languages such as Ngamo, which also probably borrows Kanuri *sarga*. Table 6 illustrates the diversity of terms in West African languages, which must indicate a relatively old introduction of finger-millet, as the archaeobotany suggests.

Table 6. West African terms for finger-millet

Phylum	Family	Branch	Language	Attestation
Afroasiatic	Chadic	Masa	Marba	adana
Afroasiatic	Chadic	West	Hausa	tambà
Afroasiatic	Chadic	West	Mwaghavul	kùtùŋ
Afroasiatic	Chadic	West	Ngamo	ʃàrkà
Afroasiatic	Chadic	West	Karakare	dààmàsù
Afroasiatic	Chadic	West	Bole	sèrèèdî
Niger-Congo	Benue-Congo	Plateau	Berom	kpáná
Niger-Congo	Benue-Congo	Plateau	Tarok	ìzàŋzɨŋ
Niger-Congo	Benue-Congo	Plateau	Pe	ì-zaŋdi
Niger-Congo	Benue-Congo	Plateau	Sur	sargi
Niger-Congo	Benue-Congo	Plateau	Yangkam	saraŋa
Nilo-Saharan	Central Sudanic	Sara	Ngambay	nduru
Nilo-Saharan	Central Sudanic	Sara	Sar	dūɽ
Nilo-Saharan	Saharan	West	Kanuri	sarga
Nilo-Saharan	Songhay	South	Dendi	hèènì

Sources: Burkill (1994); Author's fieldwork

The pattern of finger-millet terms in Africa is consistent with botanical hypotheses concerning its origin (although these are not very geographically specific). The lack of any widespread term probably indicates widespread borrowing or interchange with terms for goosegrass, and also the isolation of patches where the crop is still grown. Like other millets, Eleusine has been fragmented by the expansion of sorghum and pearl millet.

3. India and beyond

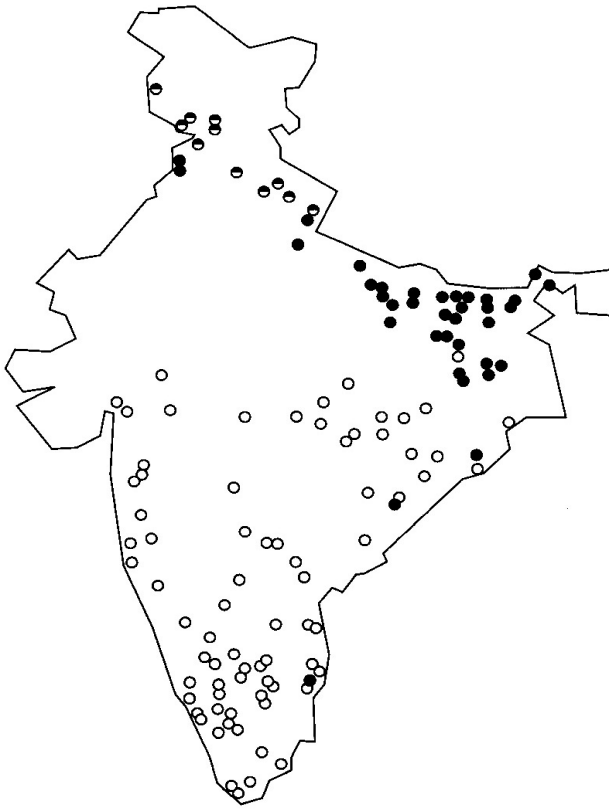
When and by what routes finger-millet spread to India and on to China is not unclear. It is generally agreed that the arrival of crops suitable for monsoonal season regimes made a significant impact in Indian prehistory (Possehl 1986; Weber 1998). Finger-millet has been recorded from numerous Indian sites but it appears that many reports are misidentifications of foxtail millet (*Setaria*) caryopses or even *Echinochloa*. Giblin & Fuller (2011:262) summarise the current state of knowledge as follows;

> The date for the arrival of finger millet in India provides a minimal age for the start of cultivation in

its African homeland, but in the absence of better documentation, larger quantities and direct AMS-dating, this minimum age could be anywhere from 2500 to 500 B.C. By early historic times in India, from 300 B.C., finds are more numerous. The earliest finds from India, once probable misidentifications are removed, consist of only a few sites as old as 1000 cal B.C.

Fuller (2003: 258-9) gives a table of all claimed finds in India with assessments of their reliability. Finger-millet is both extremely widespread and diverse in India today as shown in Map 2. The open circles mark the 'lowland' race they identify and the black circles the 'highland' types. Finger-millet thus probably travelled in the same ships as sorghum and pearl millet.

Map 2. Finger-millet in India



Source: Redrawn by Fuller from Hilu & De Wet (1976)

The Indian names of finger-millet are discussed in Southworth (2005:198). He cites **maḍaka* as 'Old Indo-Aryan' which is somewhat misleading, since the evidence is derived from three closely related languages, Nepali, Kumaon and Pahari. The form **ragi* is attributed to proto-South Dravidian, for which the evidence is again somewhat sparse (two languages). Finally, Kherwarian Munda **ḍeray* is not a true proto-form, but a rather general term meaning 'grain'. This makes the linguistic case for the antiquity of finger-millet in South Asia less than convincing. The names that can be garnered from the linguistic literature are given in Table 7. The table also shows the East Asian names for finger-millet, none of which can be related to one another. Recent texts on the archaeobotany of Korea and Japan provide no evidence for the dates of introduction of finger-millet (e.g. Lee 2011 on Korea; Crawford 2011 on Japan).

Table 7. Indian and East Asian names for finger-millet

Phylum	Family	Language	Attestation	Script form
Indo-Aryan		Nepali	kodo	कोदो
		Nepali	maṛuwā [beer]	
		Kumaon	maṛuwā	
		Danuwar	maduwa	
		Majhi	maramʧo	
		Tharu	kodo	< Nepali
		Oriya	mandia	ମାଣ୍ଡିଆ
		Punjabi	muṇḍal	ਮੁੰਡਲ
		Marathi	nachani	नाचणी
		Rajasthani	nachani	नाचणी
		Konkani	nachne/nathno	नासणे/नाचणे
		Dhivehi	binbi	ވިމް
Dravidian		Kannada	ragi	ರಾಗಿ
		Tamil	kezhvaragu	கேழ்வரகு
		Tamil	kay.pai	கேப்பை
		Tamil	aariyam	ஆரியம்
		Malayalam	muthary	
		Telugu	ragi	రాగి
Austroasiatic		Munda	ḍeray [grain]	
Sino-Tibetan	Sinitic	Chinese	cǎnzi	穇子
Sino-Tibetan	Tibetic	Gurung	naraw, nare	
Sino-Tibetan	Tibetic	Sherpa	gyar	
Sino-Tibetan	Tibetic	Tamang	saŋna	
Sino-Tibetan	Bodish	Kurtöp	thre	<Tibetan khre
Sino-Tibetan	Mahakiranti	Chepang	kədəw	< Nepali
Sino-Tibetan	Mahakiranti	Sunwar	ʧirs	
Sino-Tibetan	Kiranti	Bahing	tsarnyky	
Sino-Tibetan	Kiranti	Bantawa	sampica	
Sino-Tibetan	Kiranti	Dumi	lidzə(m)	
Sino-Tibetan	Kiranti	Hayu	dʊ	
Sino-Tibetan	Kiranti	Kulung	lis_	
Sino-Tibetan	Kiranti	Limbu	pɛː na, kakrik na, tsikjak na, sɛrɛ na	
Sino-Tibetan	Kiranti	Limbu	maŋdok	
Sino-Tibetan	Kiranti	Thulung	liser	
Sino-Tibetan	Lepcha	Lepcha	moŋ	
Sino-Tibetan	Magaric	Magar	pandare, rankuwa	
Sino-Tibetan	Newaric	Newar	dusi	
Altaic		Korean	susu	수수
Japonic		Japanese	shikokubie	四国稗 シコクビエ

Nepali *kodo* seems to have been borrowed into some Tibeto-Burman languages, for example Chepang *kədəw*. Other languages have borrowed the quite distinct term for finger-millet beer. Finger-millet is grown extensively in the Himalayas, and ritual beer brewed from it plays a part in many shamanic rituals. Puzzlingly, there are no records for Yunnan and South China, although it is hard to imagine that finger-millet either is or was not formerly cultivated there, since it spread to Taiwan. Highland populations all seem to cultivate finger-millet along with Asian millets. Bradley (1997, 2011) makes no mention of finger-millet. Table 8 shows the Taiwanese names recorded for finger-millet, which are extremely diverse.

Table 8. Taiwanese names for finger-millet

Language	Names
Atayal	kamui, kamuku
Bunun	salaaz, saraal
Tsou	carana, takalaia, chayana, echayana
Rukai	saalal
Babuza	tappatkyat

Source: Emiko Takei (p.c.)

Finger-millet is found in parts of Indonesia, notably Sumatra and Java. Ochse & Van den Brink (1980) provide some basic information on processing in Sumatra but no further data on the likely history of the crop. They record Sundanese vernacular names which are identical to wiregrass, *Eleusine indica*. The distribution of finger-millet in Island SE Asia is shown in Map 3;

Map 3. Distribution of finger-millet in ISEA

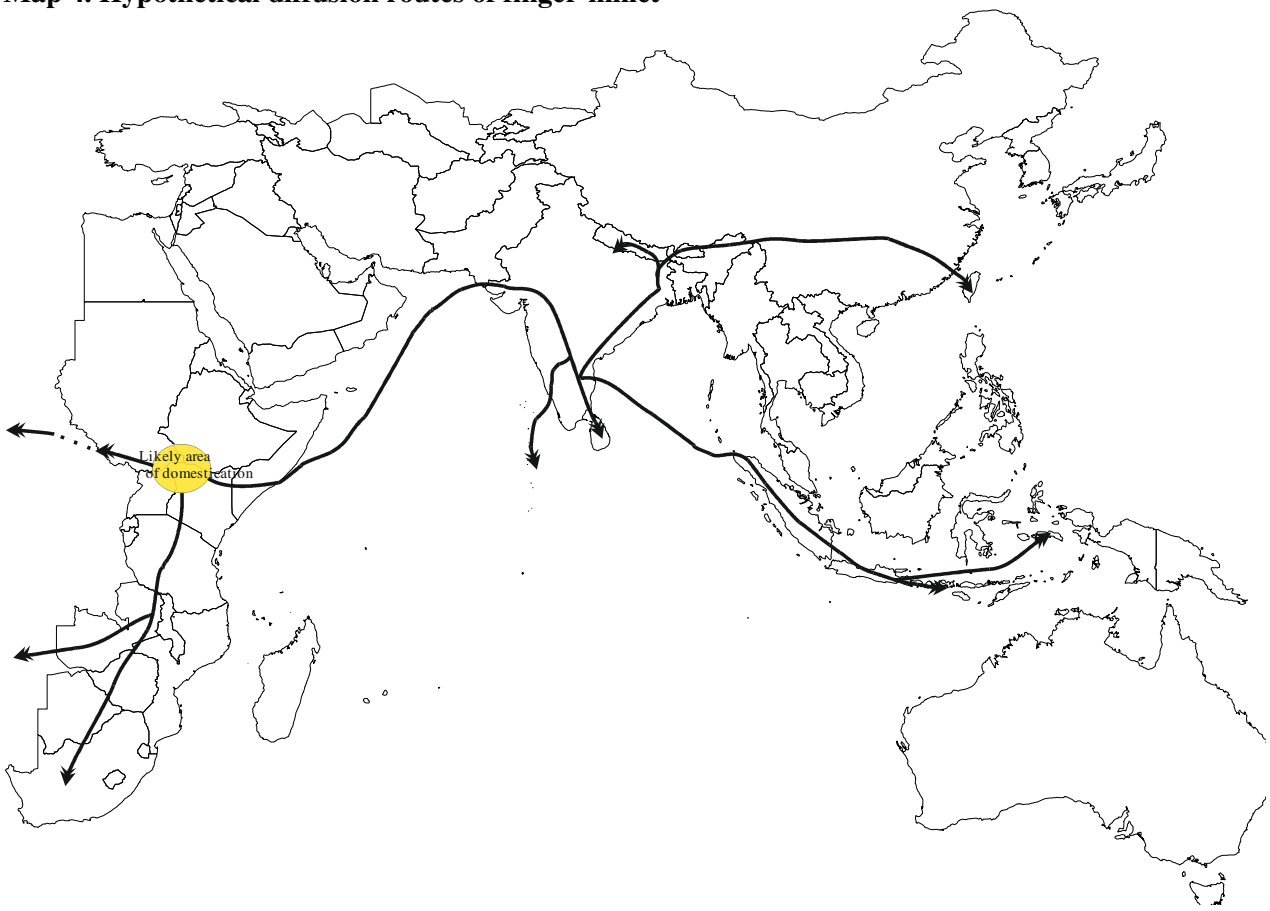
Source: Emiko Takei (p.c.)

I have been unable to track down any vernacular terms, and none are recorded in standard sources, such as Blust's Austronesian Comparative Dictionary. However, this map strongly suggests that Taiwan and Sumatra-Java locales are unconnected and that finger-millet is likely to have been brought to Sumatra by sea from India, and then diffused eastwards. However, there is no solid evidence for this from either linguistics or archaeobotany.

4. Synthesis and conclusions

Finger-millet is apparently an early African domesticate, which was carried to India and diffused from there to China and SE Asia. Vernacular names are extremely diverse (very much in contrast with other important millets such as foxtail millet) and only form highly local patterns. This may reflect the modern fragmentation of cultivation, due to the subsequent expansion of other high-yielding crops. Map 4 shows the hypothetical diffusion routes of finger-millet across the Old World, drawing on the limited archaeological evidence and the ethnographic and agronomic data for current cultivation.

Map 4. Hypothetical diffusion routes of finger-millet



Linguistic evidence for finger-millet is extremely scattered, both in quantity and quality. Only more precise elicitation will make it possible to carry this analysis further. In some cases the nucleus of common roots seems to run counter to the sparse archaeological evidence. Further work in both disciplines may improve the 'fit' between the two datasets.

References

Appleyard, D.L. 2006. *A comparative dictionary of the Agaw languages*. Köln: Rüdiger Köppe.

Blench, Roger M. 2003. The movement of cultivated plants between Africa and India in prehistory. In: K. Neumann, A. Butler & S. Kahlhaber (eds.) *Food, fuel and fields: progress in African Archaeobotany*. 273-292. Köln: Heinrich-Barth-Institut.

Blench, R.M. 2006. *Archaeology, Language and the African Past*. Lanham: Altamira Press.

Boardman, S. 1999. The Agricultural Foundation of the Aksumite Empire, Ethiopia: An Interim Report, in: van der Veen, M. (ed.) *The exploitation of ancient plant resources in ancient Africa*. Kluwer Academic, London. pp 137- 148.

Bradley, David 1997. What did they eat? Grain crops of the Burmic peoples. *Mon-Khmer Studies*, 27:161-170.

Bradley, David 2011. *Proto-Tibeto-Burman Grain Crops*. Circulated Version of talk given at Cornell University, 2011.

Burkill, H.M. 1994. *The Useful Plants of West Tropical Africa, Families E-I*. Kew: Royal Botanic Gardens.

Ehret, Christopher 1979. On the antiquity of agriculture in Ethiopia. *Journal of African History*, 20: 161-177.

Ehret, Christopher 1998. *An African classical age: eastern and southern Africa in world history, 1000 B.C. to A.D. 400*. University Press of Virginia, Charlottesville.

FAO 1988. *Traditional food plants*. Rome: FAO.

Fuller, Dorian Q. 2003. African crops in prehistoric South Asia: a critical review. In: In: K. Neumann, A. Butler & S. Kahlhaber (eds.) *Food, fuel and fields: progress in African Archaeobotany*. 239-271. Köln:

Heinrich-Barth-Institut.
Fuller, Dorian Q. 2011. Finding Plant Domestication in the Indian Subcontinent. *Current Anthropology*, 52, No. S4:347-362, The Origins of Agriculture: New Data, New Ideas (October 2011).
Giblin, John D. & Dorian Q. Fuller 2011. First and second millennium A.D. agriculture in Rwanda: archaeobotanical finds and radiocarbon dates from seven sites. *Vegetation History and Archaeobotany*, 20:253–265.
Hammer, K., J. Gebauer, S., Al Khanjari & A. Buerkert 2009. Oman at the cross-roads of inter-regional exchange of cultivated plants. *Genetic Resources & Crop Evolution*, 56:547–560
Hilu, K.W. & J.M.J. De Wet 1976a. Domestication of *Eleusine coracana* (L.) Gaertner. *Economic Botany* 30, :199-208.
Hilu, K.W. & J.M.J. De Wet 1976b. Racial evolution in *Eleusine coracana* ssp. coracana (finger millet). *American Journal of Botany* 63:1311-1318.
Hilu, K.W., J.M.J. De Wet & J.R. Harlan 1979. Archaeobotanical studies of *Eleusine coracana* ssp. *coracana* (Finger millet). *American Journal of Botany* 66:330-333.
Manandhar, N.P. 2002. *Plants and people in Nepal.* Oregon: Timber Press.
Maundu, Patrick M. 1999. *Traditional food plants of Kenya*. Nairobi: National Museums of Kenya.
Mehra, K.L. 1962. Natural hybridization between *Eleusine coracana* and *E. africana* in Uganda. *Journal of the Indian Botanical Society* 41, 1962:531-539.
Mehra, K.L. 1963. Considerations on the African origin of *Eleusine coracana*. *Current Science* 32, 1963:300-301.
Ochse, J.J. & Van den Brink, R.C.B. 1980. *Vegetables of the Dutch East Indies.* Amsterdam: Asher.
Phillips, S.M. 1972. A survey of the genus Eleusine Gaertn. (Gramineae) in Africa. *Kew Bulletin*, 27(2): 251-270.
Philippson, Gérard & Serge Bahuchet 1996. Cultivated Crops and Bantu Migrations in Central and Eastern Africa: a linguistic Approach. *Azania*, 29/30: 103-120.
Portères, R. 1951. *Eleusine coracana* Gaertn. Céréale des humanités pauvres des pays tropicaux. *Bulletin de l'Institut Français de l'Afrique Noire* 13, 1951:1-78.
Portères, R. 1976. African cereals: eleusine, fonio, black fonio, teff, Brachiaria, Paspalum, Pennisetum and African rice. In: Harlan J.R., De Wet J.M.J. & Stemler A.B.L. (eds.) *Origins of African plant domestication*. (Mouton) The Hague 1976:409-452.
Possehl, Gregory L. 1986. African millets in South Asian protohistory. In: J. Jacobson. (ed.) *Studies in the archaeology of India and Pakistan*. 237-256. New Delhi: Oxford & IBH.
Schwartz, O. 1939. Flora des tropischen Arabien. *Mitteilungen Institut Allgemeinen Botanischen Hamburg*, 10:1–393.
Southworth, Franklin C. 2005. *Linguistic archaeology of South Asia*. London/New York: RoutledgeCurzon.
Summers, R. 1958. *Inyanga*. Cambridge: Cambridge University Press.
Vavilov, N.I. 1951. The origin, variation immunity and breeding of cultivated plants. *Chronica Botanica,* 13, 1951:1-366.
Weber, S.A. 1998. Out of Africa: the initial impact of millets in South Asia. *Current Anthropology,* 39(2), 1998:267-274.
Zide, A.R.K. and Zide, N.H. 1976. Proto-Munda cultural vocabulary: evidence for early agriculture. In: *International Conference on Austroasiatic Linguistics, lst, Honolulu, 1973. Austroasiatic studies.* Edited by Philip N. Jenner, Laurence C. Thompson, Stanley Starosta, pp. 1295-1334. Hawaii: University Press of Hawaii.