VERNACULAR NAMES FOR MILLETS AND OTHER MINOR CEREALS IN EAST AND SOUTHEAST ASIA AND THEIR CORRELATION WITH CENTRES OF DOMESTICATION AND SPREAD

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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

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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 (Online)
DEDR	Dravidian Etymological Dictionary (Online version)
MC	Middle Chinese
MKED	Mon-Khmer Etymological Dictionary (Online)
OC(M)	Old Chinese (Main)
PAA	Proto-Austroasiatic
PAN	Proto-Austronesian
PHM	Proto-Hmong-Mien
PMP	Proto-Malayo-Polynesian
PST	Proto-Sino-Tibetan
STEDT	Sino-Tibetan Etymological Dictionary (Online)

1. Introduction

The correlation of vernacular names with results from archaeobotany and genetics in the reconstruction of crop history has been treated with widely varying significance in different intellectual traditions. In Oceania, this has been given considerable weight in reconstructing the migrations of the Austronesians (e.g. Ross et al. 2008). Our understanding of prehistoric subsistence systems in Africa has been much enhanced by this type of interdisciplinary approach (see examples in Blench 2006; also Bostoen 2007). Although there has been a recent expansion in archaeological and biomolecular evidence for the domestication and spread of Asian millets, the consideration of linguistic and cultural evidence has lagged far behind. The basic tool available to linguists is the compilation of vernacular names, both to establish what terms are likely to reconstruct to significant time-depths and what has been borrowed between one language phylum and another. Southworth (2005) is an overview of crop reconstructions for the Indian subcontinent which covers the millets briefly, although it relies heavily on reconstructions in older sources. Revel (1988) which is a remarkable synthesis of terms for rice and rice-related lexicon, has almost nothing to say about the interpretation of the data in terms of the origin and spread of rice. Bradley (1997b) is a pioneering work on SE Asian cereal names, recently expanded (Bradley 2011).

This paper[1] examines the vernacular names for millets and other minor cereals grown in East and Southeast Asia, and their historical interpretation. The species considered here are;

Foxtail millet	*Setaria italica*
Broomcorn millet	*Panicum miliaceum*
Finger-millet	*Eleusine coracana*
Buckwheat	*Fagopyrum esculentum, F. tartaricum*
Job's tears	*Coix lacryma-jobi*

Other minor cereals are too poorly represented in the linguistic literature to make this type of correlation useful. Pearl millet, finger-millet and sorghum are covered in separate papers.

The seven language phyla that dominate South and Southeast Asia are;

Sino-Tibetan	
Hmong-Mien	[=Miao-Yao]
Austroasiatic	[partly = Mon-Khmer]
Austronesian	
Daic	[=Tai-Kadai, Kra-Dai]
Dravidian	
Indo-European	
Also	
Japonic	? part of Altaic
Altaic	Korean, Mongolic

The data in the tables is colour-coded according to this system to make clear the affiliation of a particular language.

Among these, Hmong-Mien and Austronesian are uncontroversial (cf. Ratliff 2010; Blust 2009). Membership of Austroasiatic is generally undisputed, but the internal structure of the phylum is highly controversial, with 'flat-array' models competing with a complex internal nesting structure (cf. Sidwell & Blench 2011). Some scholars now argue the Daic phylum is a branch of Austronesian (e.g. Ostapirat 2005; Sagart 2004; Blench 2011). Most problematic is Sino-Tibetan, which not only has disputed membership, but major disagreements concerning its internal structure (e.g. Bradley 1997a; Handel 2008; Van Driem 2008). Blench & Post (in press) argue that the ascription or various languages of Arunachal Pradesh to Sino-

[1] This paper was first presented 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.

Tibetan (the so-called 'North Assam' group) is erroneous and these are best treated as isolates. The Dravidian languages are spoken in South India, with outliers in Pakistan and Nepal. Indo-European languages are represented by Indo-Aryan, the dominant language group in India. Japanese is often treated as an isolate, although Starostin et al. (2003) consider it is part of Altaic, as is Korean, a view which is more widely accepted.

Despite a considerable expansion of research in recent years, models for the dates, homelands and engines of expansion of these phyla are markedly absent from the literature, as are convincing correlations with archaeological and genetic research. It is frequently assumed that language phylum expansion are driven by agriculture and corresponding demographic growth (e.g. Bellwood 2005), although there is little hard evidence to support this model. Blench (2011) argues that patterns of domestication were essential in driving expansions of the language phyla in mainland SE Asia. By contrast, Blench (2012), evaluating the data for crop domestication and language phylum expansion in the Americas, concludes that in some cases the process is reversed, that demographic expansion drives domestication.

The value of compiling vernacular names for key staples is to establish whether and what terms can be shown to reconstruct to the proto-language of individual phyla. The tables accompanying the discussion of individual crop species are arranged by putative linguistic root, with names that do not seem to fit any pattern are also separately compiled, in case their significance becomes clear in future. The linguistic literature is plagued by poorly identified crop names; it is often not possible to establish which species is being referred to except by inference. Nonetheless, there is sufficient data for most species to begin to establish links with the findings of archaeobotany, or in the case of African millets, the historical literature. Linguistic evidence for the barnyard millets (*Echinochloa* spp.) and low frequency crops such as *Panicum sumatrense* and *Paspalum scrobiculatum* is too sparse to be effectively analysed. Pearl millet (*Pennisetum glaucum*) and finger-millet (*Eleusine coracana*) which originate in Africa but which spread to Asia in prehistory, are discussed in separate papers.

Given the extent to which cereal names are borrowed between language families and the way they shift from one cereal to another, claiming true reconstructions (denoted by *, 'starred forms' in historical linguistics) is a hostage to fortune. This paper uses the convention of quasi reconstructions or working forms, to refer to roots that are identified as widespread. This makes no presumption about their reconstructibility or their origin in a particular language phylum.

2. Individual species

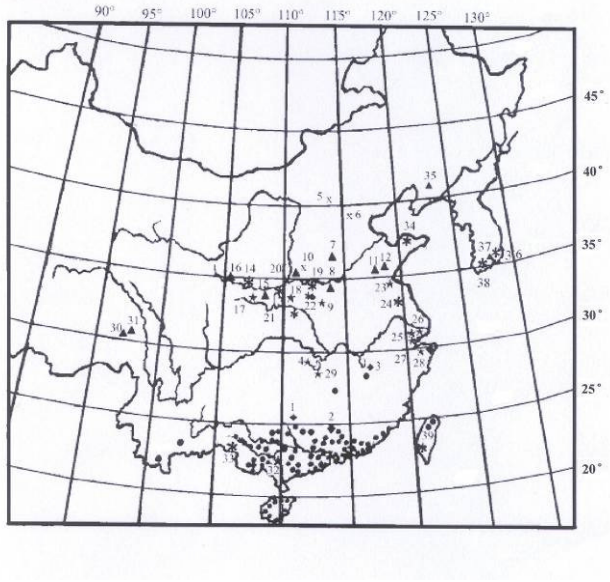
2.1 Foxtail millet (*Setaria italica*)

'All we have is guns and millet.'
Chinese Vice Premier Deng Xiaoping to Henry Kissinger
American Secretary of State, Dec. 1974

Foxtail millet is one of the most established crops in the East Asian region (Photo 1). Although the genus *Setaria* is widespread, true domesticated foxtail millet derives from wild green foxtail (*Setaria viridis*), native to temperate Eurasia (Peaasada Rao et al. 1987)). Genetic studies (e.g. Fukunaga et al. 2002, 2006; Hu et al. 2008) and archaeobotany both point to a domestication (or domestications) in the loess plateau region of northern China. The oldest directly dated remains of foxtail millet may be at Chengtoushan in Central China at 5800 cal BC (Hiroo et al. 2007; Nasu et al. 2007). Table 2 in Liu, Hunt & Jones (2009) compiles all the recent dates for China and these point to a period 6500-5800 cal BC for the initial domestication. They argue the original domestication sites of both foxtail and broomcorn millet would be more credibly situated in the foothills of the Taihang and Funiu mountains east of the Yellow River. Lu (2005) refers to domesticated foxtail millet in the Beixing assemblage, between the Yangzi and Yellow rivers, ca. 7000 BP, and in Guangxi, South China, foxtail millet and rice have been found together before 3000 BC at Gantouyan (Lu 2009). Figure 1 shows a composite map of finds of rice and millet in China up to 2004.

Photo 1. Foxtail millet (*Setaria italica*)

Figure 1. Sites with early rice and millet in China



Source: Lu (2005)

Foxtail millet is first recorded in Japan during the early Jomon period (D'Andrea et al. 1995; Crawford 2011). Lee (2011) opens up the possibility that foxtail millet had reached Korea by the early Chulmun (7500 BP) although this could also be a weed; however, by the Middle Chulmun it is certainly present as a cultigen. In India, seeds gathered from wild plants occur in archaeological sites dating from about 2800 cal BC in Karnataka and Andhra Pradesh (Fuller et al. 2004) and in the Harappan area of northern India and Pakistan, where they date to 2400 BC (Weber 1998). Hunt et al. (2008) summarise the evidence for foxtail millet in Eurasian contexts. The earliest definite evidence for its cultivation in the Near East is at the Iron Age levels at Tille Hoyuk in Turkey, with an uncorrected radiocarbon date of about 600 BC (Zohary & Hopf 2000: 86). Carbonised seeds of foxtail millet first appear in the second millennium BC in central Europe.

Sagart (2003, 2008) has claimed that the cultivation of foxtail millet was crucial in the genesis of SE Asian language phyla, but the actual data laid out to support this are somewhat limited. Linguistically, there appear to be three major roots in the languages of the region, here given the working forms of #*tʃɔk*, #*səŋkɔɔy* and #*sapiʔ*. Table 1 shows an extremely widespread root which can be reconstructed as #*tʃɔk*, which resembles Old Chinese **sok* closely. Matisoff (2003) claims has a form something like #*tsap* or #*tsat* for Proto-Tibeto-Burman, but this does not seem to emerge from the citations. As the table makes clear there is disagreement about the form of the Old Chinese term and thus also whether the modern terms for 'grain' are its true descendants. The term appears as an early borrowing into proto-Mienic (**tsyəi*^{A}), with the loss of the final velar. The conservation of the initial affricate /ts/ points to this as a feature of the Old Chinese form.

Table 1. Reflexes of #*tʃɔk* for 'foxtail millet' in SE Asian languages

Phylum	Branch	Language	Attestation	Gloss	Source
Sino-Tibetan	Sinitic	Chinese	sù (粟)	foxtail millet	Schuessler (2007)
Sino-Tibetan	Sinitic	Chinese	jì (稷)	*Panicum* millet	Schuessler (2007)
Sino-Tibetan	Sinitic	Chinese	shǔ (黍)	glutinous *Panicum* millet	
Sino-Tibetan	Sinitic	Chinese	shú (**秫**)	foxtail millet	Schuessler (2007)
Sino-Tibetan	Sinitic	Old Chinese	st^{h}aʔ	glutinous *Panicum* millet	Baxter & Sagart
Sino-Tibetan	Sinitic	MC	syowk	millet	Schuessler (2007)

Phylum	Branch	Language	Attestation	Gloss	Source
Sino-Tibetan	Sinitic	OCM	*m-lut	foxtail millet	Schuessler (2007)
Sino-Tibetan	Sinitic	OCM	*sok	millet	Schuessler (2007)
Sino-Tibetan	Sinitic	OCM	*tsats	millet	Schuessler (2007)
Sino-Tibetan	Sinitic	OC	*tsək (稷)	*Setaria* millet	Baxter & Sagart
Sino-Tibetan	Tujia	Tujia	wu^{1} suo^{1}		Brassett & Brassett (2004)
Sino-Tibetan	Nungish	T'rung	tɕaʔ^{55}	millet	Sagart (1999)
Sino-Tibetan	Loloish	Lisu	tʃøʔ^{21}	millet	Bradley (1997b)
Sino-Tibetan	Loloish	Sani	tʃɤ̲^{21}	millet	Bradley (1997b)
Sino-Tibetan	Loloish	Nosu	tʃi^{55}	millet	Bradley (1997b)
Sino-Tibetan	Loloish	Akha	ɕa^{55} do̲^{33}	millet	Bradley (1997b)
Sino-Tibetan	Burmic	Burmese	ʃaʔ^{42}	millet	Bradley (1997b)
Sino-Tibetan	Bodish	Lhokpu	cək	millet	Van Driem (p.c.)
Sino-Tibetan	Bodish	Tshangla	jaŋ^{55}ra^{13}	millet	Andvik (1999)
Sino-Tibetan	Bodish	Balti	cha	millet	Sprigg (2002)
Sino-Tibetan	Kuki-Chin	P-Tangkhul	*ʔa.tsat	rice	Mortensen (2003)
Sino-Tibetan	Luish	Cak	jwari	millet	Bernot (1968)
Sino-Tibetan	Tani	Proto-Tani	*ta-jak	foxtail millet	Post (p.c.)
Hmong-Mien	Mien	P-Mienic	tsyəi^{A}	millet	Ratliff (2010)
Hmong-Mien	Mien	Mun (Hainan)	t'juu^{11}	grain	Shintani & Yang (1990)
Hmong-Mien	Mien	Mun(Funing)	tsu^{53}	*Setaria italica*	Shintani (2008)
Austronesian		PAN Blust	baCaj	k.o. millet	ACD online
Austronesian		PAN Wolff	batág	k.o. millet	Wolff (2010)
Austronesian	Formosan	Atayal	basag	millet	
Austronesian	Philippines	Bontok	sabog	*Setaria italica*	Madulid (2001)
Austronesian	Philippines	Ifugao	habug	*Setaria italica*	Madulid (2001)
Austronesian	Philippines	Igorot	sabug	*Setaria italica*	Madulid (2001)
also;					
Austronesian	Formosan	Bunun	batal	*Panicum crus galli*	
Austronesian	Philippines	Cebuano	batád	sorghum	Wolff (2010)
Austronesian	Malayic	Malay	batari	sorghum	

Tangkhul appears to have adapted the term for 'millet' to apply to 'rice'. The Austronesian term for Japanese barnyard millet on Taiwan is applied to sorghum in the Philippines and beyond. It seems this is a separate root, but the PAN forms look as if they are trying to account for both roots. Austronesian forms such as Atayal *basag* are sufficiently similar to the Sino-Tibetan terms to suppose borrowing with the addition of a characteristic *ba-* prefix. Although both Blust and Wolff cite a reconstructed form, the correspondences are irregular, arguing this is multiply borrowed. This is consistent with an early domestication in the region of North-Central China and an eastward spread into the Austronesian world. Fogg (1983) emphasises the continuities in agronomic practice between Taiwan and China. Atayal *basag* surfaces in various Philippines languages[2] metathesised. Sagart (2008) argues that foxtail millet is 'coterminous' with his Sino-Tibetan-Austronesian macrophylum rather than a borrowing, the explanation adopted here.

Table 2 shows additional terms for foxtail millet recorded in Madulid (2001). Although they show some local similarities, they are clearly extremely diverse.

[2] Blust (n.d.) rather strangely gives its cognates as *batad 'sorghum-like grass' rather than the more obvious reflexes and generating a spurious PAn form, *baCaŋ.

Table 2. Other terms for foxtail millet in Philippines languages

Language	Citation
Bontok	sammaŋ
Dumagat	kulasan
Egongot	bulakot
Ilokano	bikakaw, bukakaw
Itawis	nanna
Ivatan	rautnokara
Kankaney	sammaŋ
Kapampangan	borona, balantakan
Maranao	tikap
Tagalog	kulasan
Tagalog	tigbi
Tau't Bato	atoray
Tausug	turay

Wolff (2010: 766) cites what he considers to be a separate root under the confused gloss **betéŋ* foxtail millet, *Panicum italicum* (Table 3). In fact, as his glosses show, this is likely to be either *Setaria* or perhaps sorghum in some cases (cf. Table 1).

Table 3. The root **beteŋ* for *Setaria italica*

Language	Attestation	Gloss
PAN Blust	*beCeŋ	foxtail millet
Sar	ə́vəcəngə	millet
Rukai	bəcɛngə	millet
Bugis	weteng	millet
Mk	battang	millet
Malay	boton	name for a millet
Buru	fete-n	foxtail millet
Leti	vetma	millet
Roti	bete(k)	millet

Source: Wolff (2010: 766)

Photo 2. Harvesting millet, Tripitaka Library, Wat Xieng Kouang, Laos

Source: Author photo

Austroasiatic languages have a quite distinct root, *#səŋkɔɔy*, spread across the phylum and not borrowed from Sino-Tibetan (Table 4). This argues either for a second domestication in the Austroasiatic area, or else a very early borrowing of the crop without a transfer of the name. This word is later borrowed into Austronesian languages, such as Malay, which had ceased growing foxtail millet deriving from Taiwan. Although Burmese maintains a distinction with *Panicum* millet (see Table 7) most languages now use the same word for both crops.

Table 4. Reflexes of #*s*[*əŋ*]*kɔɔy*, 'foxtail millet'

Phylum	Branch	Language	Attestation	Gloss	Source
Austroasiatic	Monic	Nyah Kur S.	phəyóok	millet	Theraphan (1984)
Austroasiatic	Khmeric	Khmer	skuəy ស្គួយ	'Job's tears'	Headley (1997)
Austroasiatic	Vietic	PV	*s-kɔ:j	millet	Ferlus (ined.)
Austroasiatic	Vietic	Vietnamese	kê	millet	MKED (online)
Austroasiatic	Vietic	Malieng	səkɔ:j	millet	Ferlus
Austroasiatic	Vietic	Tho	ke:¹	millet	MKED (online)
Austroasiatic	Pearic	Pear (KT)	skaay	millet	Baradat (1941)
Austroasiatic	Palaungic	Rianglang	ˉkhuay	millet	Shorto (2006)
Austroasiatic	Katuic	Pacoh	ʔayuəʔ	millet	Watson (n.d.)
Austroasiatic	Khmuic	Kammu Yuan	həŋkɔ:y	millet	Shorto (2006)
Austroasiatic	Khmuic	Khmu [Cuang]	hŋkɔ:j	millet	Suwilai (2002)
Austroasiatic	Khasian	Khasi	kra:y	millet	Singh (1906)
Austronesian	Malayic	Malay	sĕkoï	< Vietic	Shorto (2006)
Austronesian	Chamic	Cham	hako:y	< Khmuic	Shorto (2006)
Austronesian	Chamic	Jarai	həku:ai	< Khmuic	Shorto (2006)
Daic	Tai	Shan	k^haw^3 $kɔy^1$ ၶဝ်ႈၵွႆ	millet	Moeng (1995)
Dravidian		Tamil	kural	Italian millet	DEDR
Dravidian		Kota	koyḷ	*Setaria italica*	DEDR
Dravidian		Kannada	koṟale, korle	*Panicum italicum*	DEDR
Dravidian		Telugu	koṟṟal	*Panicum italicum*	DEDR
Dravidian		Parji	koyla	*Panicum italicum*	DEDR
Dravidian		Gond	kōhalā	*Panicum italicum*	DEDR
Dravidian		Kui	kueri	*Panicum italicum*	DEDR

This is borrowed into Austronesian several times, as the different Austroasiatic sources can be identified. The Nyah Kur name is here identified as cognate, with the second element metathesised. The Dravidian terms also look extremely similar to the Austroasiatic names once the prefix is deleted. This suggests that foxtail millet may have been brought to South India from mainland SE Asia, presumably in the Early Neolithic when agriculture was being initiated in the South Dravidian area.

Another term in Austroasiatic for applied to a variety of cereals is #*sapiʔ*. Table 5 shows the reflexes of #*sapiʔ*, 'millet' [?] in SE Asian languages. It could well be the original meaning was Job's tears, which was transferred first to foxtail millet and later to sorghum and maize.

Table 5. Reflexes of #*sapiʔ*, 'millet' [?] in SE Asian languages

Phylum	Branch	Language	Attestation	Gloss	Source
Sino-Tibetan	Sinitic	Chinese	pī 秠	millet	
Sino-Tibetan	Qiangic	Qiang	ʂpɑ	sorghum	LaPolla (2003)
Sino-Tibetan	Bugun	Bugun	spõ	maize	Dondrup (1990)
Austroasiatic	Monic	Khmer	spò: ស្ពោ	sorghum	Shorto (2006)
Austroasiatic	Katuic	Bru	sapùa	Job's tears	Thongkum (1980)
Austroasiatic	Palaungic	Rianglang	sᵊbæʔ¹	Job's tears	Luce (1964)
Austroasiatic	Palaungic	Lawa Bo Luang	sapiʔ	millet	
Austroasiatic	Palaungic	Proto-Plang	*səpèʔ¹	millet	Paulsen (1989)
Austroasiatic	Palaungic	proto Waic	*spiʔ	millet	Diffloth (1980)
Austroasiatic	Pearic	Chong	p^hli: lát	millet	Nop2003
Austroasiatic	Aslian	Semai	pei	millet	Dentan (2003)

Modern Burmese ends in a glottal stop -ʔ (Table 1) but Old Burmese is reconstructed as *tɕʰap*, which is suspiciously similar to some of the Palaungic forms with which Burmese is in contact. So its resemblance to the *tsat root may be fortuitous and it may in fact be a borrowing from an old Austroasiatic root for Job's tears.

Table 6 shows some other low frequency terms for millet;

Table 6. Other names for 'millet' in SE Asian languages

Phylum	Branch	Language	Attestation	Gloss	Source
Sino-Tibetan	Sinitic	Chinese	jù 秬	black millet	
Sino-Tibetan	Sinitic	Chinese	bài 稗	barnyard millet	
Sino-Tibetan	Loloish	Lahu	lɔ[53]	foxtail millet	Bradley (1997b)
Sino-Tibetan	Loloish	Marma	prɔ́ŋ	foxtail millet	
Sino-Tibetan	Burmic	Burmese	lu[42]	foxtail millet	Bradley (1997b)
Sino-Tibetan	Tibetic	Memba	temi	millet	Badu (2002)
Sino-Tibetan	Bodish	Kurtöp	ran	millet (gen.)	Hyslop (p.c.)
Sino-Tibetan	Bodish	Chantyal	rāre	millet	Noonan (1999)
Sino-Tibetan	Magaric	Magar	raŋkwa	millet	Grunow-Hårsta (2008)
Sino-Tibetan	Tani	Puroik	tamayi	millet	Tayeng (1990)
Sino-Tibetan	Tani	Aashing	tami	millet	Megu (2003)
Sino-Tibetan	Garo-Bodo	Garo	misi(mi)	millet	Burling (2003)
Sino-Tibetan	Mishmic	Taraon	du	millet	Pulu (1991)
Sino-Tibetan	Mishmic	Idu	yamba	millet	Pulu (2002)
Austroasiatic	Monic	Nyah Kur N.	təlúŋ	millet	The1984
Austroasiatic	Katuic	Proto-Katuic	*-riim	millet	Sidwell (2005)
Austroasiatic	Katuic	Kuy	kriim~ʔakriim	millet	T & G (1978)
Austroasiatic	Katuic	Bru	tri̤am	sorghum, millet	The (1980)
Austroasiatic	Munda	Mundari	ŋundli	millet	Stampe ined.
Austroasiatic	Munda	Mundari	iṟi	k.o. millet	Stampe ined.
Daic	Hlaic	Hlai	ha:p[55]	unhusked millet	Burusphat et al. (2003)
Daic	Tai	Shan	kʰaw[3] ŋuk[4] ခဝ်ႈငုၵ်း	*Holcus* millet i.e. sorghum	Moeng (1995)
Austronesian	Formosan	Amis	havay	millet	
Korean			조	Italian millet	
Dravidian	South	Tamil	kavalai கவலை	Italian millet	DEDR
Dravidian	South	Tamil	iṟaṭi	*Setaria italica*	DEDR
Dravidian	South	Kuwi	ārgu *pl.* ārka	species of millet	DEDR
Dravidian	South	Kannada	ārike	*Panicum italicum*	DEDR
Dravidian	South	Telugu	ārike	*Paspalum scrobiculatum*	DEDR
Dravidian	South	Kui	ārka	species of millet	DEDR
Dravidian	South	Pengo	ārku	species of millet	DEDR
Dravidian	South	Gond	ārk	*Setaria italica*	DEDR
Dravidian	South	Telugu	korra కొర్ర	*Panicum italicum*	DEDR
Indo-European	Indo-Aryan	Nepali	kaguno, sama	*Setaria italica*	DDSA
Indo-European	Indo-Aryan	Tharu	sawan	*Setaria italica*	Manandhar (2002)
Indo-European	Indo-Aryan	Musasa	kauni	*Setaria italica*	Manandhar (2002)
Indo-European	Indo-Aryan	Hindi	kangní, kā̃k	*Panicum italicum*	DDSA
Indo-European	Indo-Aryan	Oriya	kaṅgu	*Panicum italicum*	DDSA
Indo-European	Indo-Aryan	Gujarati	kā̃g	kind of grain	DDSA

Setaria italica was also known in Ancient Europe and is referred to in Xenophon (2,4,13) under the name μελίνη (*melínē*). It is usually thought that both foxtail and broomcorn millet were brought to Europe from Central Asia in the Bronze Age. Fuller & Edwards (2001) also report foxtail millet from medieval Nubia, at the site of Nauri, mixed together with the weedy *Setaria sphacelata*. This clearly never became a successful African domesticate, and was probably a temporary introduction via the Indian Ocean trade. There is apparently an old South Dravidian root, something like #-*raki*, which turns up metathesised in Telugu and is

probably the source of the vernacular name for 'finger-millet', *ragi*.

2.2 Broomcorn millet (*Panicum miliaceum*)

Broomcorn millet, *Panicum miliaceum*, (**Photo 3**) is often confused with foxtail millet, although it has a far more restricted distribution. The dates for its domestication are somewhat disputed. Lu et al. (2009a,b) claim a ~10,000 BP date for Cishan, significantly earlier than previous claims and notable in global terms. A wild form of *P. miliaceum* still occurs widely in the Yellow River valley although these may be early escapes from cultivation (Hu et al. 2009; Hunt et al. 2010). The earliest records of broomcorn millet in India are 2800-1200 BC at Hallur, Karnataka. Foxtail millet is first recorded in Japan during the late Jomon period (D'Andrea et al. 1995). Lee (2011) records broomcorn millet reaching Korea by the Middle Chulmun (5500 BP).

Linguistic evidence is much sparser than for foxtail millet and there is a continuing confusion in the literature between the two cultigens. Two principal roots can be identified, one corresponding to Old Chinese **tsats* and the other mainly occurring in Daic, *#faaŋ*^{3}. Table 7 shows some terms for broomcorn millet;

Table 7. 'Broomcorn millet' in SE Asian languages

Phylum	Branch	Language	Attestation	Gloss	Source
Sino-Tibetan	Sinitic	Chinese	hé 禾	standing grain	
Sino-Tibetan	Sinitic	MC	kyei^{C}	millet	Schuessler (2007)
Sino-Tibetan	Sinitic	Old Chinese	G'oj	*Panicum* millet	Baxter & Sagart
Sino-Tibetan	Tibetic	Tibetan	k^{h}re	*Setaria italica*	
Sino-Tibetan	Qiangic	Tangut [Xixia]	kwo	millet	STEDT
Sino-Tibetan	Qiangic	Tangut [Xixia]	we	millet	STEDT
Sino-Tibetan	Burmic	Nusu (Central)	tsa̲^{53}	millet	STEDT
Sino-Tibetan	Loloish	Burmese	lu^{4}	*Panicum* millet	Judson (1966:457)
Austroasiatic	Vietic	P-Vietic	*k-hiɛl > kiɛl	*Setaria* millet	MKED online
Austroasiatic	Vietic	Pong	kajiɛl^{1}, kahiɛl^{1}	*Setaria* millet	MKED online
Austroasiatic	Khasian	War	krɛ	*Hirse*	MKED online

Despite the confusion over names and reconstructions, it looks as if there is an old root # or similar applied to broomcorn millet, and this is reflected in Sinitic, Qiangic and borrowed into Vietic.

Daic languages have a highly consistent root which can be reconstructed as *#faaŋ*^{3}, which almost always applies to *Panicum* (Table 8), pointing to this crop as part of the original subsistence repertoire of the Daic speakers.

Photo 3. Broomcorn millet (Panicum miliaceum)

Table 8. Reflexes of #*faaŋ*[3] for 'millet'

Phylum	Branch	Language	Attestation	Gloss	Source
Sino-Tibetan	Kuki-Chin	Lai	fâaŋ	millet, rice paddy	VanBik (2007)
Daic	Hlaic	Hlai	fe:ŋ[11]	millet	Burusphat et al. (2003)
Daic	Be-Tai	Be	pfaŋ[3]	millet	Hashimoto (1980)
Daic	Kam-Tai	Kam	ɔu[31] pyaŋ[323]	*Panicum* millet	Burusphat et al. (2000)
Daic	Kam	Sui	ʔau[4] faŋ[1]	*Panicum* millet	Burusphat et al. (2003)
Daic	Tai	Thai	faŋ faŋ maa	dog tail straw	G & B (1996)
Daic	Tai	Thai	fâaŋ ฟ่าง	*Panicum* millet	SEAlang
Daic	Tai	Central Thai	kha:w[3] fa:ŋ[3]	millet	G & B (1996)
Daic	Tai	Lao	fā:ŋ ฝ่าๆ	millet	Kerr (1972)
Daic	Tai	Lao	kʰùa:ŋ ຂ้ວງ	cereal res. millet	Kerr (1972)

The composite nature of the Thai forms suggest that an original word for 'millet' became compounded with words for 'rice' [#*ɣau*] in some languages and then the initial consonant became eroded. The Sui name is said to also apply to *Echinochloa crus-galli*, barnyard millet.

Broomcorn millet is also known in Northern India and in adjacent parts of Pakistan. Table 9 shows a selection of Indo-European languages in the region with a recorded word for *Panicum miliaceum*. None of these bear any resemblance to the names in South and East Asia, and point either to a separate domestication or an introduction by an unknown route.

Table 9. Indo-European names for broomcorn millet

Phylum	Branch	Language	Attestation	Script	Gloss
Indo-European	Indo-Aryan	Punjabi	chíN̲á	ਚੀਣਾ	millet
Indo-European	Indo-Aryan	Marathi	baraga	बरग	*Panicum miliaceum*
Indo-European	Indo-Aryan	Shughnī	pinǰ		millet, prob. *P. miliaceum*
Indo-European	Indo-Aryan	Ḍumāki	péreṅ		millet
Indo-European	Indo-Aryan	Kashmiri	pinga		*Panicum miliaceum*
Indo-European	Dardic	Shina	ṣiṅ		millet

Broomcorn millet also spread to Classical Era Europe. Hesiod (scut. 398-399) refers to it as κέγχρος/*kénchros* and it is alos described in Theophrastos (*Historia plantarum* 8,7,3; 8,11,6) and Columella (2,9,17-19). According to Aristotle (*Historia animalium* 595a 26-29) broomcorn millet was used as animal feed.

Photo 4. The variety of Taiwanese millets

Source: Courtesy Emiko Takei

2.3 Other and unspecified millets

Not all the literature is very specific as to the type of millet grown and dictionaries often misidentify the species. Some cultures grow a wide variety of millets. Photo 4 shows the variety of millets grown by the Taiwanese Rukai.

A surprising recent discovery is the existence of a previously unreported cereal crop among the Austronesian-speaking mountain peoples of Taiwan. This is *Spodiopogon formosanus*, which has previously been misidentified in various sources, including confusion with Japanese barnyard millet (*Echinochloa crus-galli*). This crop has no common name and is named 'Taiwan millet' by default. There is no evidence it was carried to other islands. Table 10 shows the names for 'Taiwan millet' in Taiwanese Austronesian languages;

Table 10. 'Taiwan millet' in Austronesian languages

Phylum	Branch	Language	Attestation
Austronesian	Formosan	Ami (?)	samuk
Austronesian	Formosan	Bunun	diirh
Austronesian	Formosan	Tsou	ihalumay, hrome
Austronesian	Formosan	Rukai	lhaomai
Austronesian	Formosan	Paiwan	rumay

Source: Emiko Takei (p.c.)

Apart from the Ami form, which is anyway doubtful, the names in other languages appear to be cognate, which suggests that this crop should be treated as part of the original Austronesian cultigen repertoire.

An example of the frustrating lack of detail is a word for 'millet' in some Austroasiatic languages, which suggests an old form #*tbau* or similar (Table 11).

Table 11. 'Millet' in some Austroasiatic languages

Phylum	Branch	Language	Attestation	Gloss	Source
Austroasiatic	Khmeric	Old Khmer	tvau	millet	Shorto (2006)
Austroasiatic	Khmeric	Khmer	thpɤ̀u ផ្លែ	millet	Shorto (2006)
Austroasiatic	Bahnaric	Stieng	bɔu	millet	Shorto (2006)
Austroasiatic	Bahnaric	East Bahnar	tʰbɤ:u	millet	Shorto (2006)

This is strikingly similar to the widespread Austronesian root **təbuS* for 'sugar-cane' (Mahdi 1998).

A root which has travelled in a complicated way is #*dawa*, which is applied to a variety of cereals. It looks like it may have originally meant 'millet' in Austronesian and was borrowed into Indic languages and thence spread westwards to Greece. Table 12 shows the reflexes of this root;

Table 12. Reflexes of #*dawa* 'cereal'

Phylum	Branch	Language	Attestation	Gloss	Source
Austroasiatic	Aslian	Temiar	ɟawaʔ	? < Malay 'sorghum'	Means (1999)
Austronesian	Formosan	Puyuma	dawa ~ ɗawa	*Setaria italica*	
Austronesian	Formosan	Ami	dawa	germinating millet seeds	
Austronesian	Philippines	Tagalog	dawa	*Setaria italica*	Madulid (2001)
Austronesian	Philippines	Visayan	dawa	*Setaria italica*	Madulid (2001)
Japonic		Japanese	awa	*Setaria italica*	
Indo-European	Indo-Aryan	Sanskrit	yavḥ यव	barley	CDIAL
Indo-European	Indo-Aryan	Hindi	jau जौ	barley	CDIAL
Indo-European	Indo-Aryan	Dhivehi	zuvaari	maize, *Zea mays*	CDIAL
Indo-European	Indo-Aryan	Farsi	jav	barley	CDIAL
Indo-European	Baltic	Lithuanian	java	cereal (generic)	
Indo-European	Hellenic	Greek	zea ~ zeía	???	

2.4 'Sweet' and 'bitter' buckwheat (*Fagopyrum esculentum* and *F. tartaricum*)

There are two species of domestic buckwheat, 'bitter' buckwheat (*Fagopyrum tartaricum*) which is tolerant of cold and high altitudes and occurs wild throughout the Tibetan plateau and 'sweet' buckwheat (*F. esculentum*) (Photo 5), restricted to the eastern Plateau and some hills in Yunnan and Sichuan. These two species may have quite different names in individual languages. Buckwheat is the most important crop of the mountain regions above 1600 m both for grain and greens and occupies about 90% of the cultivated land in the higher Himalayas. As buckwheat is a high-altitude crop, etyma often disappear when populations migrate to lowland areas. The domestication of buckwheat is described in Joshi & Rana (1995) and Ohnishi (1998). The linguistic evidence is somewhat exiguous but points to two widespread roots, one apparently originating in China, something like Burmish #*khjau*. The other root is #*bramt-*, deriving from an unknown source language in the Himalayas. Table 13 shows the distribution of the #*khjau* term for buckwheat;

Photo 5. 'Sweet' buckwheat (*Fagopyrum esculentum*)

Table 13. 'Buckwheat' in SE Asian languages

Phylum	Branch	Language	Attestation	Comment	Source
Sino-Tibetan	Sinitic	Chinese	qiáo mài (蕎麥)		
Sino-Tibetan	Sinitic	Chinese	ku qiao		
Sino-Tibetan	Sinitic	Chinese	tian qiao		
Sino-Tibetan	Sinitic	SW Chinese	tɕiau^{31}		Chen (1996)
Sino-Tibetan	Tujia	Tujia	khu^{21}tɕhiau^{21}		B & B (2004)
Sino-Tibetan	Qiangic	Jinghua	tãu tʃə^{13}		Matisoff (2003)
Sino-Tibetan	Qiangic	Taoba	tõ^{35} tɕi^{35}		Matisoff (2003)
Sino-Tibetan	Qiangic	Caodeng	ʃɔ		STEDT
Sino-Tibetan	Qiangic	Queyu (Yajiang)	ʐõ^{35}qa^{55}	sweet	STEDT
Sino-Tibetan	Qiangic	Queyu (Yajiang)	ʐõ^{35}tʂa^{53}	bitter	STEDT
Sino-Tibetan	Qiangic	Ersu	ndzɪ^{33}	sweet	STEDT
Sino-Tibetan	Qiangic	Muya	ŋɛ^{35}ndʑyɯ^{53}	sweet	STEDT
Sino-Tibetan	Qiangic	Qiang (Mawo)	dzə	sweet	STEDT
Sino-Tibetan	Qiangic	Qiang (Mawo)	dzəʂ	bitter	STEDT
Sino-Tibetan	rGyalrongic	rGyalrong	ʃok		STEDT
Sino-Tibetan	Burmish	Jinuo	tɕhɔ^{31}tsi^{44}		STEDT
Sino-Tibetan	Burmish	Achang (Longchuan)	tɕhau?^{55}		STEDT
Sino-Tibetan	Burmish	Atsi [Zaiwa]	khjau^{55}		STEDT
Sino-Tibetan	Burmish	Bola (Luxi)	khjau^{31}		STEDT
Sino-Tibetan	Tibetic	Tibetan (Lhasa)	tʂhau^{15}		STEDT
Sino-Tibetan	Tibetic	Amdo Tibetan	tʂu		STEDT
Sino-Tibetan	Miju	Kaman	tɕi^{31}kɑ^{55}	bitter	STEDT
Sino-Tibetan	Mishmi	Taraon	tɯ^{31}kɑ^{53}		STEDT
Hmong-Mien		PHM	*jæu	? < Chinese	Ratliff (2010)
Hmong-Mien	Hmong	White Hmong	cey		Ratliff (2010)
Daic	Tai	Dehong	ɕiau^{42}	? < Chinese	Chen (1996)

The importance of buckwheat among the Qiangic peoples and the phonological diversity of the names, does suggest its possible origin in this region. The reconstruction of this root to proto-Hmong-Mien suggests an early borrowing probably from a Sinitic language.

Table 14 shows the distribution of the #*bram*- term for buckwheat;

Table 14. The #*bram*- root for 'buckwheat' in Sino-Tibetan languages

Phylum	Branch	Language	Attestation	Comment	Source
Sino-Tibetan	Qiangic	Horpa	brɛ və		STEDT
Sino-Tibetan	Qiangic	Tshona (Wenlang)	bre^{35}mo^{55}	bitter	STEDT
Sino-Tibetan	Nungish	Dulong	ɟɑm^{55}bɹɑi^{55}		STEDT
Sino-Tibetan	Tibetic	Written Tibetan	bra bo		STEDT
Sino-Tibetan	Kham-Magar	Bahing	bramt-		STEDT
Sino-Tibetan	Kiranti	Kulung	bham_		STEDT
Sino-Tibetan	Mishmi	Idu	ɑ^{55}bɹɑ^{55}	bitter	STEDT
Sino-Tibetan	Mishmi	Darang	xɑ^{31}bɹɑ^{55}		STEDT
Sino-Tibetan	Tani	Damu	*pra-ɦu		STEDT

Table 15 shows miscellaneous terms and low-frequency terms for 'buckwheat' in SE Asian languages;

Table 15. Miscellaneous terms for 'buckwheat' in SE Asian languages

Phylum	Branch	Language	Attestation	Comment	Source
Sino-Tibetan	Bai	Bai	ku^{21}		Allen (2007)
Sino-Tibetan	Bai	Dali	khu^{33}kv^{21}		STEDT
Sino-Tibetan	Qiangic	Namuyi	ji^{31}qha^{53}		STEDT
Sino-Tibetan	Qiangic	Ersu	ndzɿ^{33}	sweet	STEDT
Sino-Tibetan	Qiangic	Muya	ɳɛ^{35}ndʑyɯ^{53}	sweet	STEDT
Sino-Tibetan	Qiangic	Queyu (Yajiang)	ʐõ^{35}qa^{55}	sweet	STEDT
Sino-Tibetan	Qiangic	Queyu (Yajiang)	ʐõ^{35}tʂa^{53}	bitter	STEDT
Sino-Tibetan	Qiangic	Tangut [Xixia]	ɣow		STEDT
Sino-Tibetan	Qiangic	Pumi (Taoba)	mu^{35}tɕi^{35}		STEDT
Sino-Tibetan	Nungish	Anong	guɑ^{31}khɑ^{55}	bitter	STEDT
Sino-Tibetan	Nungish	Anong	phu^{31}uɑ^{55}	sweet	STEDT
Sino-Tibetan	Naxi	Lijiang	ə^{55}gə^{31}	sweet	STEDT
Sino-Tibetan	Naxi	Lijiang	ə^{55}khɑ^{33}	bitter	STEDT
Sino-Tibetan	Burmish	Achang (Xiandao)	jɔ^{55}mʐaŋ^{31}		STEDT
Sino-Tibetan	Burmish	Axi	go^{21}		STEDT
Sino-Tibetan	Loloish	Lisu	gwa^{21}		Bradley (1997b)
Sino-Tibetan	Loloish	Sani	qɒ^{21}		Bradley (1997b)
Sino-Tibetan	Loloish	Lahu	ɣa^{53}		Bradley (1997b)
Sino-Tibetan	Loloish	Nosu	ŋgɯ^{33}		Bradley (1997b)
Sino-Tibetan	Loloish	Nusu (Northern)	ɣɑ^{31}khɑ^{55}		Bradley (1997b)
Sino-Tibetan	Loloish	Akha	ɣa^{21}		Bradley (1997b)
Sino-Tibetan	Loloish	Hani	ɣa^{31}tɕhu^{55}	sweet	STEDT
Sino-Tibetan	Loloish	Yi	ɣɑ^{21}		STEDT
Sino-Tibetan	Jingpho	Jingpho	ʃã^{55}ʒiʔ^{55}mam^{33}		STEDT
Sino-Tibetan	Tibetic	Cuona Menba	prɛ:^{35}mo^{53}		STEDT
Sino-Tibetan	Tibetic	Motuo Menba	gun tsuŋ		STEDT
Sino-Tibetan	Tibetic	Tsangla (Motuo)	guntsuŋ	sweet	STEDT
Sino-Tibetan	Tibetic	Tsangla (Motuo)	khala	bitter	STEDT
Sino-Tibetan	Bodish	Kurtöp	cara		Hyslop (p.c.)
Sino-Tibetan	Kiranti	Limbu	kya:bo		STEDT
Sino-Tibetan	Kiranti	Bantawa	phaphara		STEDT
Sino-Tibetan	Tamangic	Thakali	'kɔru		STEDT
Sino-Tibetan	Tani	Bokar	to po:		STEDT
Sino-Tibetan	Tani	Bengni	mɯr-mi:		STEDT

Phylum	Branch	Language	Attestation	Comment	Source
Hmong-Mien	Mien	Mun of Funing	hao^{53} ga^{53}		Shintani (2008)
Austroasiatic	Pakanic	Bugan	thuŋ^{31} go^{31}		Li (1996)
Daic	Kam	Sui	ʔau^{4} ʔboŋ^{5}	rice + ?	Burusphat et al. (2003)
Daic	Tai	Kam	əu^{31} ɕoŋ^{453}		Burusphat et al. (2000)

Low-frequency roots, such as Niish **ŋga*^{2} show regular correspondences (Bradley 1997:164) and Sun (1991: 560) observed cognates in Qiang as well as Ersu, Naxi and Bai. Among the Nuosu Yi, buckwheat carries an important ritual freight and is mentioned in oral traditions of migration. Anderson (2008) quotes an epic, which says;

> When the sky god Ngetit Gunzy's daughter descends to earth to marry the mortal, Jjutmu Vuxmu, she secretly takes horses, as well as the seeds of hemp, …, and the bitter and sweet buckwheats (*mgep nuo* and *mgep qy* respectively).

Buckwheat has clearly been historically unimportant to Daic and Austroasiatic peoples.

2.5 Job's tears (*Coix lacryma-jobi*)

Photo 6. Job's tears (*Coix lacryma-jobi*)

Job's tears is an important pseudo-grain originating in SE Asia; it has two subtypes, one cooked as a grain, the other used for beads to make jewellery (Photo 6). The grain forms are also distilled into alcoholic drinks in East Asia. It has often also been cultivated as an ornamental and carried around the world in the era of post-European contact (e.g. Watt 1904; Vallaeys 1948; Venkateswarlu & Chaganti 1973; Jain & Banerjee 1974). It is only glossed in some lexical sources and has yet to be reported from an archaeological site which makes determining its antiquity and exact zone of origin problematic. According to tradition, Job's tears were introduced into China in the first century AD by a Chinese general who conquered Tonkin, where the grains were widely used as a cereal. The 17th century naturalist Georg Rumphius stated that Job's tears were planted in Java and Celebes on the margins of rice fields. A lack of archaeological evidence has made pinpointing the domestication of Job's tears so far impossible.

Photo 7. Job's tears interplanted with sorghum in Eastern Arunachal Pradesh

Source: Author photo

Old Chinese **khəʔ* may be cognate with Lolo-Burmese but Assamese Sino-Tibetan languages have unrelated names. Austroasiatic has *#sapiʔ* in some languages, which may be an old root, which later shifts to millet. Table 16 shows a variety of terms for Job's tears;

Table 16. 'Job's tears' in SE Asian languages

Phylum	Branch	Language	Attestation	Source
Sino-Tibetan	Sinitic	Chinese	qǐ (芑)	Schuessler (2007)
Sino-Tibetan	Sinitic	Chinese	chuān gǔ (川谷)	
Sino-Tibetan	Sinitic	Chinese	yì mì (薏米)	eFlora of china
Sino-Tibetan	Sinitic	Chinese	yì yǐ (薏苡)	eFlora of china
Sino-Tibetan	Sinitic	MC	k^hji^B	Schuessler (2007)
Sino-Tibetan	Sinitic	OCM	*khəʔ	Schuessler (2007)
Sino-Tibetan	Loloish	Sani	le^{21} ku^{33} sz^{21}	Bradley (1997)
Sino-Tibetan	Loloish	Lahu	$dʑu^{21}$ pi^{35} $ɕi^{11}$	Bradley (1997)
Sino-Tibetan	Loloish	Akha	a^{21} $ts\underline{ɤ}^{21}$	Bradley (1997)
Sino-Tibetan	Burmic	Burmese	$dʑei^{5}$	Bradley (1997)
Sino-Tibetan	Bodish	Kurtöp	brama	Hyslop (p.c.)
Sino-Tibetan	Naga	Lotha Naga	omuŋ	STEDT
Sino-Tibetan	Naga	Tangkhul	ŋum	STEDT
Sino-Tibetan	Naga	Bengni	ta-ɲit	STEDT
Sino-Tibetan	Naga	Padam-Mising	a-ɲat	STEDT
Sino-Tibetan	Tani	*Tani	ɲat¹	STEDT
Sino-Tibetan	Garo-Bodo	Garo	me-ga-ru	STEDT
Altaic	Koreanic	Korean	yulmu 율무	
Japonic		Japanese	juzudama (数珠玉 ~ ジュズダマ)	
Japonic		Japanese	hatomugi (鳩麦 ~ ハトムギ)	
Hmong-Mien	Mien	Mun of Funing	gu^{31} me^{53}	Shintani (2008)
Austroasiatic		PMK	*[t_2]ɓe[e]ʔ	Shorto (2006)
Austroasiatic	Monic	Proto-Monic	*mbaak	Diffloth (1984)
Austroasiatic	Monic	Nyah Kur	phạak	Diffloth (1984)
Austroasiatic	Khmuic	Khmu [Cuang]	pleʔ hmbeʔ	Suwilai (2002)
Austroasiatic	Nicobarese	Nancowry	kəbeeh	Man (1889)
Austronesian	Malayic	Malay	jəlay	
Daic	Be-Tai	Be	i^2 vi^1	Hashimoto (1980)
Daic	Tai	Shan	$maak^2$ loy^1 မၢၵ်ႈလွၵ်ၵ်	Moeng (1995)
Daic	Tai	Thai	luk dueai ลูกเดือย	

Job's tears is widespread in Austroasiatic although no Muṇḍā terms are available. Old Chinese may well be related, although, as so often the modern forms appear quite different on the surface. However, Sino-Tibetan terms seem to be both unrelated to Austroasiatic and to each other, suggesting a relatively recent introduction from an unknown source. Austronesian terms appear to be unrelated and indeed highly diverse, and Job's tears is probably not of any great antiquity in ISEA (Arnaud et al. 1997:111).

Photo 8. Making millet cakes for offerings in Rupa

Source: Author photo

3. Millets in the ritual cycle

The use of almost all species of millet as food is in broad decline, as rice, maize and wheat gradually spread, actively promoted by both governments and development agencies. In regions as far apart as Arunachal Pradesh and Taiwan, the spread of rice is gradually pushing millet into the background. However, in both areas, millets are essential to the ritual cycle (cf. Arnaud 1974). For example, among the Mey [=Sherdukpen] people in western Arunachal Pradesh, rice and maize predominate in the diet today. However, the most important festival of the annual ritual cycle, the Khiksaba, which takes

place in December, is marked by a recapitulation of traditional items of diet. Although domestic livestock is the main source of protein today, the ceremonial meals for Khiksaba are accompanied by dried fish, the former basis of subsistence. Similarly, the staple dishes at this festival consist of various types of cooked millet. Photo 8 shows the preparation of unusual pyramidal millet-cakes which are used as offerings during Khiksaba in Rupa town in Arunachal Pradesh.

4. Conclusions

Linguistic evidence for small millets is highly variable, both in quantity and quality. Only more precise elicitation of terminology, especially for species such as proso millet 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.

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[N.B. The references do not so far include all those for individual language citations]

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