WET RICE/DRY RICE. IDENTIFYING RICE CULTIVATION SYSTEMS IN SOUTH ASIA.

Eleanor Kingwell-Banham

UCL Institute of Archaeology

ABSTRACT Macrobotanical and phytolith data in the search for irrigated rice

Domestic rice agriculture spread across the Indian Subcontinent into **20 µm** South India and Sri Lanka c.500 BC. The spread of rice into these dry regions is largely supposed to have relied on irrigation, as suggested by early historical data. However, new archaeobotanical evidence from Kodumanal, Perur (Tamil Nadu) and Mantai (Sri Lanka), dated to c.400 BC-800 AD, suggests otherwise. Macrobotanical and phytolith evidence from six sites across India and Sri Lanka have been analysed in order to examine the type of rice cultivation system employed at each site. This suggests that early rice agriculture in South India and Sri Lanka was not supported by irrigated paddy fields but may instead have relied upon seasonal rainfall. This poster also presents new data from Tokwa (c.1600-931 BC) (Uttar Pradesh), Golbai Sasan and Gopalpur (c.1500-910 BC) (Odisha), which provide a framework from which to understand the broad history of the evolution of rice cultivation systems (broadly divided into irrigated, rainfed and dry/upland) within the subcontinent.

Macroremains to examine crop systems

In many parts of the South Asian subcontinent it is possible to grow two seasons of crops per year due to the presence of both summer and winter monsoon rains. These are traditionally divided into summer crops, or *kharif*, (rice, millets, pulses) [southwest monsoon] and winter crops, or *rabi*, (wheat, barley, pea) [northeast monsoon] crops, although variations occur. Macrobotanical remains were analysed in

Phytoliths to asses water availability

Phytolith samples which contained rice-type phytoliths were analysed in order to examine water availability.

Several categories were defined to highlight water availability and cultivation systems.
'*Fixed*' vs '*Sensitive*' - fixed phytoliths are produced by plants regardless of water levels, sensitive phytoliths are produced by plants when water is freely available. A lower number of sensitive cells thus indicates water stress.
'*Hydrophilic*' - specific phytoliths produced by water loving species e.g. reeds.



Tokwa

order to identify seasonal cropping systems.

	Summer crops			Winter crops		
	RIce	Pulses (<i>Vigna</i> , <i>Macrotyloma)</i>	Millets (<i>Setaria,</i> Brachiaria)	Wheat	Barley	Pea
Tokwa	х	X	X	X	X	x
Golbai Sasan	х	x	x			
Perur (Cooke <i>et al</i> 2006)	x	X	X			
Kodumanal (Cooke <i>et al</i> 2006)	x	X	X			
Mantai	х	x	X	x	127.	

The inhabitants of Tokwa would have used a double cropping system, however only kharif crops were recovered from Golbai Sasan, Kodumanal and Perur. Kharif crops were found at Mantai, alongside wheat. The lack of wheat chaff in the samples indicates that the wheat was imported, therefore Mantai also only produced a kharif crop (although due to monsoon rainfall patterns this equates to the *maha* (*Sinhalese* [northeast monsoon]) crop).

Cooke *et al* (2006) In Franke-Vogt & Weisshaar (eds.) SAA 2003. Linden Soft: Aachen.

 'Dicotyledon' - dicotyledonous weeds are more common in rainfed cultivation systems.

Correspondence analysis of the results (below) differentiates samples from wet East India (top left) and dry South India (far right). This reflects natural rainfall levels and not artificial irrigation.



Irrigated rice fields of lowland Odisha (East India) These fields are broadcast sown and water levels are increased using seasonal stream water.





CONCLUSION

No evidence for irrigation in South India - The myth of intensification in the Early Historic period?

The development of irrigated rice has been linked to the introduction of rice into arid South India, the development of Early Historic urbanism, the spread of Buddhism and the success of early polities. This preliminary study suggests that irrigated rice cultivation systems were not wide spread in South India, and challenges the link between irrigation and rice cultivation in the region. Other factors casual to the rise of Early Historic urban polities thus become preeminent, such as the growth in national and international trade (e.g. of semi-precious stone beads and spices). Additionally changes to the rice crop may have occurred to allow its cultivation in arid zones, e.g. cross breeding with wild (drought adapted) species, or there may have been more extensive cultivation of vertisols.

