Wari-Bateshwar and Vikrampura: Successful Case Studies in Bangladesh Archaeobotany

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Abstract

Archaeological research in Bangladesh is a relatively new discipline with archaeological excavations beginning in the late 20th century. The first Archaeology Department in Bangladesh was established at Jahangirnagar University in 1992. As in other tropical areas, palaeo-environmental research has been slow to be adopted and carried out in Bangladesh. This article uses the excavations of Wari-Bateshwar and Vikrampura as successful case studies of the first systematic environmental archaeological recovery undertaken by a joint Anglo-Bangladesh team led by Mizanur Rahman from the Department of Archaeology, Jahangirnagar University (JU) with collaboration from University College London (UCL), Institute of Archaeology. Despite long-held assumptions regarding the poor preservation and recovery of archaeobotanical remains in tropical conditions flotation results from Wari-Bateshwar and Vikrampura were successful. The recovered archaeobotanical remains suggest that the inhabitants at these sites likely practised rice and millet agriculture in permanent settlements and importantly demonstrate that environmental sampling is worthwhile even in the tropical conditions found in Bangladesh.

Keywords: Bangladesh, Archaeobotany, Flotation, Wari-Bateshwar, Vikrampura, Environmental Science, Agriculture, Rice

Introduction

Archaeological research has been conducted in Bangladesh since the late 19th century (Alam&Salles2001). Despite growing interest in Bangladeshi archaeology and an increasing number of excavations being carried out (Smith 2000), archaeobotanical data collection and analysis have not yet been systematically employed. While a variety of plant remains have been recovered from Neolithic and Chalcolithic archaeological sites in the Ganga Valley in Central India (Sharma et al. 1980; Sharma 1991; Sharma 1983; Sharma 1980, 1985; Savithri1976; Dixit 1987; Vishnu-Mittre 1961, Visnu-Mittre et al. 1984;Kajale 1975, 1977, 1979) there is a paucity of archaeobotanical data to date from West Bengal and Bangladesh, areas situated in the eastern part of the Lower Ganga Valley (Datta 1990, 2005; Ghosh et al. 2005,2006; Ghosh 1984). Therefore, one of the authors (MR), has taken the initiative to conduct archaeobotanical research in Bangladesh in collaboration with Prof. Dorian Q Fuller, and colleagues at the Institute of Archaeology, University College London (UCL). This paper presents the results of some of the first systematically collected archaeobotanical remains from Bangladesh as well as new AMS radiocarbon dates from the archaeological sites of Wari-Bateshwar and Vikrampura and demonstrates the usefulness of carrying out small-scale flotation even under sub-optimal, tropical conditions.

Bangladesh Archaeology

The Department of Archaeology, Government of the Peoples Republic of Bangladesh, as of July 2015, stated that there were 451 archaeological sites under its care (Gov. Dept. Arch. Bangladesh 2015). However, this definition of an archaeological site is based solely on the criteria of the archaeological site(s) having structural remains or features present (i.e. Monasteries, Vihara, Temple, Mosque, Tomb) rather than habitation sites (Household/domestic areas)(Chakrabarti 1992). Indeed, Bangladeshi archaeology has largely

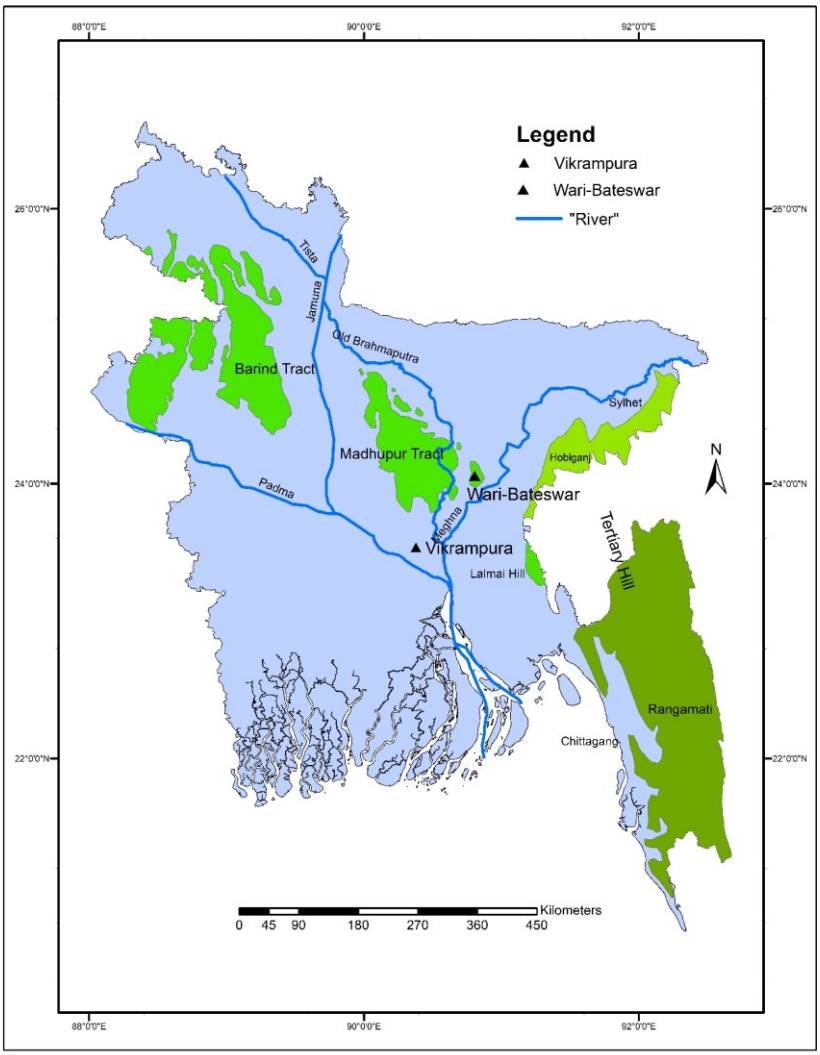
been dominated by the study of Early Historic and Medieval period remains (Chakrabarti 1982; 1992). It is likely that more archaeological sites exist in Bangladesh than have previously been reported if the definition of an archaeological site is extended beyond structural remains. It has been estimated that more than five thousand archaeological sites are located in Bangladesh (Rahman 2007; Rahman and Rahman 2013; Zakaria 2008).

The majority of prehistoric archaeological sites in what is modern day Bangladesh have been recorded in the Tertiary and Pleistocene lateritic terrace of the Lalmai Hill region in the Comilla district, Sylhet, Habiganj, Rangamati and Chittagong districts and the uplands of Narsingdidistricts (Fig. 1) (Ahmed 1979, 1981; Ahmed et al. 2000; Ahsan 2007; Khan 2017; Rahman, S.M. 2007). The Tertiary hills and Pleistocene uplands were likely flood-free and therefore possible habitable environments for humans in the past. In contrast, most of the later pre-Medieval, Medieval and Colonial sites have been found in the floodplain landscape. It is posited that the ancient people of this region used the flood-free lands near the rivers and beels (lake-like wetland with static water found in parts of South Asia) for their permanent settlements and utilized the nearby alluvial plains for crop cultivation and marine resources. In this hypothesized scenario the ancient peoples were able to avoid cyclical flooding events affecting their permanent settlements and were still able to take advantage of nearby natural resources such as aquatic resources and access to wood for fuel (Rahman and Rahman 2013; Rahman 2007, Rahman 2016).

Archaeological Case Studies

Wari-Bateshwar

Wari and Bateshwar are two adjacent modern villages in the Narsingdi district, situated on relatively elevated land with low-lying marshlands between the two villages and the nearby confluence of the Brahmaputra-Ariyal Khan Rivers (Fig. 1) (Rahman 2003; Rahman and Pathan 2012). Professor Sufi Mostafizur Rahman, of the Archaeology Department of Jahangirnagar University, has been investigating sites located in the two villages since 1994. In 2000, Professor Sufi first carried out a small-scale joint trial excavation at the village of Wari under the aegis of the International Centre for Study of Bengal Art (Haque et al. 2000: 283-315). Professor Sufi then continued with a large-scale excavation and further explored the region along with further excavations at the site of Wari from 2004 to 2017. Subsequent excavations at Wari were conducted by the Department of Archaeology, Government of the People's Republic of Bangladesh over three seasons from 2003 to 2005. The present author (MR) carried out an extensive excavation from 2014-2016 (Fig. 2).



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2 *Figure 1: Map of Bangladesh showing the archaeological sites of Wari-Bateshwar and Vikrampura*

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The archaeological site of Wari-Bateshwar itself is an ancient fort city, measuring approximately 600m^2 with surrounding fortifications and a moat, along with evidence of over 50 satellite archaeological structures discovered in the surrounding vicinity of Wari-Bateshwar (Rahman SM 2007). Wari-Bateshwaris believed to date back to the Mauryan Dynasty (2400 uncal. BP) in Narsinghdi district of Bangladesh. The site is situated in a relatively elevated and flood-free area (Figure 1) (Ahmed 2001a; Rahman SM2007; Jahan 2010).

Artefacts from Wari-Bateshwar have been recovered from the vicinity via surface collections and excavations including stone (fossil wood) tools, thousands of punch-marked coins and semi-precious stone and glass beads, many of which are unfinished which may suggest local manufacturing taking place at or around the site (Pathan 1989; Karim 1991; Khatun 1991, 1994; Chakrabarti 1992; Basa and Rahman, 1998; Pawankar et al. 1998; Ahmed, 2001b; Rahman 2000a, 2000b; Rahman 2001; Rahman et al. 2003; Imam et al. 2006; Imam 2007; Jahan 2010; Rahman and Pathan 2012). Many of these early discoveries were made mainly by local schoolteacher HanifPathan and subsequently by his son, HabibullaPathan, from the 1930s onwards (Chakrabarti 1992).

Along with access to resources, trade also appears to have been an important strategic criteria as Wari-Bateshwar is located on the banks of an ancient course of the Brahmaputra which suggests that it may have been used as an estuarine port (Jahan 1999, 2010). Wari-Bateshwar was one of the main urban centres during the Early-Historic period and during the Early Historic period was speculated to have been a trading centre on the route from the Himalayas to the Indian Ocean and functioned as a maritime port, connecting with the Bay of Bengal

trade network between the 3rd century BC (2250 uncal. BP) and 3rd century AD (1650 uncal. BP) (Jahan 1999; 2010). It is also probable that Wari-Bateshwar engaged in trade with parts of SE Asia, China and the Mediterranean region (Gupta 1991; Jahan 1999; 2010; Basa and Rahman 1998; Rahman & Pathan 2012, 2001; Kennedy 1898).The discovery of rouletted and knobbed ware from the excavation and finds of high-tin bronze knobbed ware, sandwiched glass beads, gold-foil glass beads and Indo-Pacific monochrome glass beads appear to support this hypothesis (Rahman 2003; Rahman and Pathan 2012; Basa and Rahman 1998; Pawankar et al. 1998). Considering the geographical location of Wari-Bateshwar, Prof.Chakrabarti (1982; 1992; 2007) predicted that the region should have Southeast Asiatic and Roman contacts and believed that Wari-Bateshwar was the Sounagora emporium (a commercial city) described by Roman Historian Ptolemy in the 2nd century BCE (see Rahman (2003)).

There are two major landform units underlying the site of Wari-Bateshwar: the Madhupur Tract and Old Brahmaputra Floodplain (Akanda et al. 2005; Brammer2012). The fortified settlement of Wari-Bateshwar and the surrounding archaeological features are located within an extended zone southeast of the Madhupur Tract. It is usually accepted that the Madhupur clay or clay residuum dates to the Pleistocene period (Rashid 1968, 1991, 2007; Morgan and McIntire 1959; Alam et al.2001, 2008, 2009; Akanda et al. 2005, 2015). Rashid et al. (2013) showed that after 12,000 uncal. BP, because of heavy rainfall and the intensification of the south-west monsoon and related rise of sea level, the amplified flow of rainwater with deglaciated water caused erosion of the landform. These erosional processes created the dissected topography of the Madhupur Tract. Rashid et al. (2013) also claimed that these erosional activities were active throughout the late Pleistocene to Holocene epoch.

Figure 2: Excavation Trench of Wari-Bateshwar ((Photo taken by Mizanur Rahman 2013-2014).

Vikrampura

The archaeological site of Raghurampura (RV) situated within the Vikrampura region, is located in the Munshiganj district and is believed to have been a major Buddhist centre with a monastery (Vihara) dating to the Pre/Early-Medieval period (780-950 AD, 1170-1000 cal. BP) along with small, surrounding satellite settlements (Rahman et al 2013, 2018;Yunzhou 2018). Vikrampura is a vast area measuring approximately 50 square kilometre where hundreds of archaeological sites are situated. Due to heavy river erosion many ancient settlements were abandoned on the mighty Ganges (locally called Padma) while other significant archaeological sites survive. It is believed that the famous Buddhists scholar of the 8th century Atisa Dipankar (982-1054 AD, 968-896 uncal. BP) was born in Vikrampura

(Fazun 1995; Tsong-kha-pa, trans. 2000). Vikrampura is regarded as an ancient city centre or capital city of ancient Bengal (Majumdar 2003;251). Within this area found a significant number of Buddhistand Hindu sculptures as well as many copper plates of the Sena dynasty dating to the 12th century AD (1,050 uncal. BP) have been recovered (Bhattasali 1929; Bhandarkar 1965; Dikshit 1938).

Excavations began in 2010 by the AgrasharVikrampura Foundation under the supervision of Professor Sufi Mostafizur Rahman of the Department of Archaeology, (JU) at Raghurampura (within the region of Vikrampura) and later the Institute of Cultural Relics and Archaeology of Hunan Provice, China were involved in the excavations and represent the first joint Chinese-Bangladesh archaeological research venture from 2013 onwards. This combined excavation took place within a 344m^2 area in the modern village of Nateshwarwithin the limits of the ancient city of Vikrampura (Rahman et al 2018; Yunzhou 2018). During the excavation a stupa complex with a temple and monastic residencewasuncoveredwithin the Nateshwar village and confirms the presence of a vast Buddhist settlement in this area during the Pre-Mediaeval period (Rahman et al. 2018).

The Vikrampura region was under the Sena rule after the decline of the Buddhist settlement until the start of the Muslim rule during the 13th century AD (~~11,50~~650 uncal. BP). Vikrampura is believed to have been the capital of South and Southeast Bengal from the beginning of the 8th century AD (1,150 uncal. BP) to the 13th century AD (6~~0~~50 uncal. BP) (Majumdar 2003). During which time it is thought to have carried on trade relations with neighbouring regions. Due to its proximity to the river and sea, it may have had long-distance maritime connections which have yet to be confirmed.

During the excavation of Raghurampura (a site within the Vikrampura region), a mound within the vicinity of the site of Vikrampura, which later became a Buddhist Vihara, soil samples were collected for archaeobotanical investigation.This sampling was part of an experimental pilot project to recovery environmental remains from Bangladeshi archaeological contexts.Today, the site is an abandoned mound and local people collect bricks from the site for domestic use as the site is surrounded by a modern village houses on the west and south andagricultural landsto the east and north sides of the site. The Vihara of Raghurampura measured 38 meters long on the north-south axis and 14 meters long on east-west direction. The Vihara possessed seven rooms each measuring 3.5 square meter. The soil samples were collected from the floors in the identified excavated rooms and from abandonment contexts from the mound (Fig. 3& 4).

Figure 3: Archaeological excavation of Vikrampura, Raghurampura monastery (Vihara). (Photo courtesy by SM Rahman 2013-2014).

Figure 4: Archaeological excavation of Vikrampura, Raghurampura monastery (Vihara) (Photo courtesy by SM Rahman 2013-2014).

Results

Preliminary archaeobotanical results are presented in Table 1 for Wari-Bateshar and Vikrampura. Note the presence of both native South Asian taxa such as mungbean (*Vigna radiata*)and horsegram (*Macrotyloma uniflorum*) and Near Eastern crops such as lentil (*Lens culinaris*) at both sites.

Table 1: Archaeobotanical Remains Recovered

Charred Archaeobotanical Remains	**Wari-Bateshar**	**Vikrampura**
Taxa		

Cereals		
Rice (*Oryza sativa)* grains	X	X
Rice (*Oryza sativa*) spikelet bases	X	X
Barley (*Hordeum vulgare*)	X	-
Oat (*Avena sativa*)	-	X
Millets		
Browntop Millet (*Brachiaria ramosa*)	X	X
Foxtail Millet (*Setaria italica*)	X	X
Kodo Millet (*Paspalum* cf. *scobiculatum*) (wild?)	X	X
Pearl Millet (*Pennisetum glaucum*)	X	-
Echinochloa(wild?)	X	X
Pulses		
Mungbean (*Vigna radiata*)	X	X
Moth Bean (*Vigna aconitifolia*)	X	X
Rice Bean (*Vigna umbellata*)	-	X
Black gram (*Vigna mungo*)	X	X
Horsegram (*Macrotyloma uniflorum*)	X	X
Jungle Mat Bean (*Vigna trilobata*)	X	X
Grass pea (*Lathyrus sativus*)	X	X
Lentil (*Lens culinaris*)	X	X
Broad Bean (*Vicia faba*)	X	X
Oilseeds/fibre crops		
Tree Cotton (*Gossypium*)	X	X

Sesame (*Sesamum indicum*)	X	X
Other		
Brown Mustard (*Brassica* cf. *juncea*)	X	-
Coconut Husk (*Cocos nucifera*)	X	-

Several new AMS radiocarbon dates were run at Beta Analytic from both Wari-Bateshwar and Vikrampura on recovered ancient carbonised rice (*Oryza*) grains (Table 2, Fig. 5). Thus, the two dates undertaken on Wari-Bateshwar firmly place the site in the historic period. While Vikrampura is much later dating to the Medieval period. These radiocarbon dates on carbonised rice grains add to the small but growing dataset of absolute dates for Bangladesh Archaeology, providing a firmer chronological framework from which to situate other archaeological sites in the region.

*Table 2: Radiocarbon dates from recovered carbonised rice grains from Wari-Bateshwar and Vikrampura. *All radiocarbon dates were carried out at Beta Analytics and underwent standard pre-treatment. OxCal 4.2 and Intcal14 Bayesian sequence model used to calibrate dates (BronkRamsey 2009; https://c14.arch.ox.ac.uk/embed.php?File=oxcal.html).*

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Site	**Beta Lab Number***	**Material**	**Radiocarbon Age**	**Calendar Age (95.4% probability)**	**d13C**
Wari-Bateshwar	Beta-399412	rice grain	2280 +/-30BP	Cal. BP 2350 to 2305 and Cal BP 2235 to 2180	-24.7

Wari-Bateshwar	Beta-401552	rice grain	2290 +/- 30BP	Cal BP 2350 to 2305 and Cal BP 2225 to 2205	-24.2
Vikrampura	Beta-401554	rice grain	& 380 +/- 30BP	Cal BP 505 to 425 and Cal BP 395 to 320	NA
Vikrampura	Beta-401553	rice grain	520 +/- 30BP	Cal BP 620 to 610 and Cal BP 555 to 510	-24

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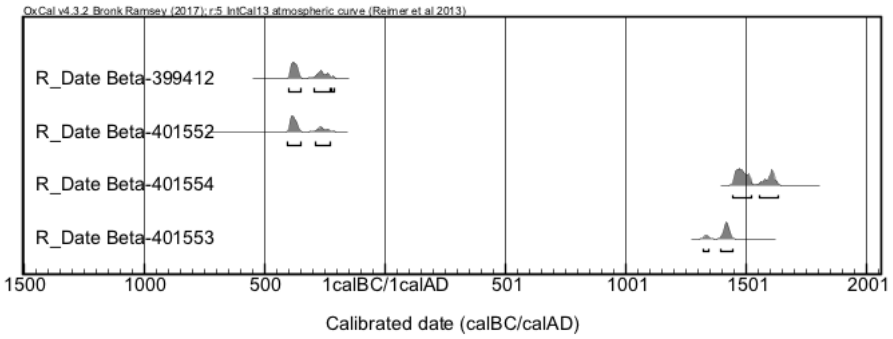

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3 *Figure 5: OxCal calibration of AMS radiocarbon dates from Wari-Bateshwar and Vikrampura. All radiocarbon dates were*
4 *sent to Beta Analtyic, UK. Standard pre-treatment methods were used (acid/alkaline washes). OxCal. v.4.3.2 and IntCal13*
5 *Bayesian sequence model used (BronkRamsey 2009; https://c14.arch.ox.ac.uk/embed.php?File=oxcal.html).*

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Archaeobotanical Recovery

The first systematic collection, processing and recovery of archaeobotanical remains from flotation from Bangladesh were undertaken at the site of Wari-Bateshwar in 2008. Due to the lack of a flotation machine archaeobotanical remains were recovered by washover bucket flotation, using mesh sizes of 2cm, 1cm, 250 micron and 500 micron (Renfrew 1973; Vishnu-Mittre et al. 1984) (Fig. 6 & 7). Environmental samples were collected and processed from Wari-Bateshwar again during the 2008-2009 field season. During the 2013 field season fifteen samples were collected and processed using the same washover bucket flotation method from the site of Vikrampura (Table 3). Soil samples were also collected from both sites for future micro-environmental analysis, particularly phytolith analysis, which has proven successful in West Bengal (Ghosh et al. 2005; 2006).

Figure 6: Close-up of sieved material recovered from washover bucket flotation. (Photo taken by Mizanur. Rahman, 2016)

Figure 7: Flotation being carried out in the field in Bangladesh in 2016(Photo taken by L. Champion, 2016).

*Table 3: Flotation recovery from Wari-Bateshwar and Vikrampura. *From each archaeological context 50L of archaeological matrix was sampled and floated for the recovery of archaeobotanical remains*

Sites	**Time Period**	**2x2m^2 units**	**Contexts examined***	**Flotation Volume (L)**
Wari-Bateshwar	Early-Historic	10	25	1250
Vikrampura	Pre-Medieval	10	15	750

The identification and analysis of the recovered macrobotanical remains from Wari-Bateshwar and Vikrampura are currently in progress (Fig. 8) and preliminary

archaeobotanical results are presented in Table 2 and forthcoming in Rahman et al. (*In Review*). These early results suggest an interesting assemblage of important indigenous South Asian domesticates, including native millets such as browntop millet (*Brachia raramosa*), kodo millet (*Paspalum* cf. *scorbiculatum*), native South Asian pulses such as mung bean (*Vigna radiata*), black gram (*Vigna mungo*), horsegram (*Macrotyloma uniflorum*) and native cash crops like tree cotton (*Gossypium arboreum*), were being used alongside imported crops from Southwest Asia, such as cereals like barley (*Hordeum vulgare*), oat (*Avena sativa)*. Phytolith processing of several samples from Wari-Bateshwar has successfully yielded identifiable phytoliths (Weisskopf pers. comm.). Other organic artefacts were recovered such as timber sculptures from Vikrampura (c. 900-1200 BP) (Fig. 9), betel-nut or Areca nut (*Areca catechu*), and impressions of rice husks in the fabric of potsherds and bricks (Fig. 10). Thus, from the range of organic artefacts recovered, despite issues of poorpreservation, resources from the environment can be discerned and analysed to reconstruction past environmental conditions and resource use in the past.

Figure 8: Preliminary Archaeobotanical Analysis done in the field. (Photo taken by Manirul Hasan Mukul, 2016)

Figure 9: Figurative Wood Sculpture recovered from Bangladesh. (Photo courtesy by SM Rahman)

Figure 10: Excavated tile from Wari-Bateshwar with rice husks impressions embedded (Photo by Mizanur Rahman).

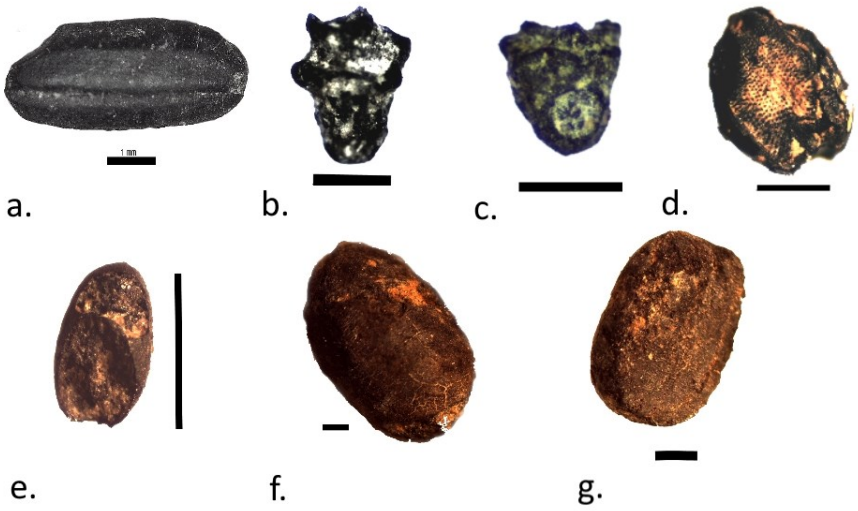

Figure 11: Recovered and identified carbonised archaeobotanical remains from Wari-Bateshwar a. Rice caryopsis (Oryza sativa) b. Domesticated rice spikelet base c. wild rice spikelet base d. Setaria cf. verticillata e. Ischaemum sp. f. horsegram (Macrotyloma uniflorum) g. mung bean (Vigna radiata). All scale bars are 1mm.

Challenges

With its tropical monsoon climate characterized by heavy seasonal rainfall (Rashid 1991) the preservation of archaeobotanical remains in Bangladesh is variable. Recovery of archaeobotanical remains at the archaeological site of Khao Sam Kaeo in tropical southern Thailand suggest that environmental remains are present in much lower densities than when encountered in drier or more temperate environments (Castillo 2013; Castillo and Fuller 2010). Castillo and Fuller (2010) argue that larger archaeological sediment volumes need to be processed to recover archaeobotanical materials making the process more time-consuming and difficult under these conditions but not insurmountable. Due to these limitations in archaeobotanical recovery Castillo and Fuller (2010) suggest the collection of other microenvironmental samples to compliment archaeobotanical recovery especially phytoliths, but potentially also pollen, diatoms, and starch from secure artefactual contexts. These suggestions were adopted in the recovery strategy at both Wari-Bateshwar and Vikrampura with both larger volumes of archaeological matrix floated (Table 3) and collection of soil samples for future micro-environmental analysis.

The difficulty in accessing secure funding has hindered archaeological research in Bangladesh. Logistical and technological difficulties are also real limitations to environmental research in any region. Currently, there is no expert in archaeobotany in Bangladesh to guide the discipline. However, based on the successful recovery of environmental remains so far there are plans within the Department of Archaeology, JU, for future environmental sampling and processing at other archaeological sites in Bangladesh. In addition, JU has begun a program in Archaeobotany, established by the first author of this

paper, with the construction of a new Archaeobotany Laboratory at the Department of Archaeology, JU.

Conclusions

Thus, the preliminary archaeobotanical results from two new excavations, Wari-Bateshwar and Vikrampura (Raghurampura), affirm that environmental sampling is worthwhile even in the tropical conditions found in Bangladesh. The Department of Archaeology's, JU continued commitment to training undergraduate students in Environmental Archaeology, including carrying out archaeobotanical collection, processing and research suggests that the future of environmental research in Bangladesh is promising. These early archaeobotanical results will not only add to our understanding of local resource use but will situate our understanding of Bangladesh Archaeology and how it fits within the wider sphere of South Asian Archaeology and the spread of domesticated crops into this important region, at the intersection between the Subcontinent and Asia.

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