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# **Introduction of African Crops into South Asia**

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## Evidence of Rice and *Ragi* at Harappa in the Context of South Asian Prehistory

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Since the excavation of Mohenjodaro and Harappa, the archaeobotanical data has been collected from a good number of sites of the third and second millennia B.C. in Pakistan and India. At present, there are six Early, twenty-two Mature, and fifty Late Harappan occupations (of 60 sites) from where plant remains of ninety different species have been found in South Asia (Weber 1991). The rice (*Oryza sativa*) and *Ragi* or finger millet (*Eleusine coracana*) were equally important in the Harappan food economy like wheat and barley. Although in the principal areas including Gujarat, the rice and millet were used during the third millennium B.C., in the Core Area of Indus Civilization represented by Harappa and Ganweriwala, Mohenjodaro, no evidence of these two crops was reported until very recently.

In 1989 a joint team consisting of the present writer and three Japanese researchers carried out investigations at Harappa and collected samples of pottery, bricks, ash and soil from the archaeologically known contexts (Fig. 1). The results obtained by plant opal analysis have indicated the presence of rice (*Oryza sativa*) and *ragi* (*Eleusine coracana*) particularly in most of the samples taken from the Late Harappan (Cemetery H) deposits at the citadel Mound AB at Harappa. The studies were extended to the collections of Harappan sites of Cholistan. An initial identification has confirmed the presence of rice even during the Mature Harappan period. Further studies were postponed until sufficient time was available for detailed investigations. A joint report on the preliminary results was prepared and submitted to the Department of Archaeology which contains all technical details on the size of samples and the plant species detected in the materials (Fujiwara *et al.* n.d.). This short paper considers the new evidence from Harappa to assess its archaeological significance in the context of late protohistoric sites in Pakistan and India.

In South Asia, the earliest presence of rice has been reported in the handmade Neolithic pottery at Koldihwa in Uttar Pradesh which is dated

between 6375-5645/5410-5010 B.C. (All dates are calibrated). In the Core Area of the Indus Civilization, domesticated or wild rices were not reported before it was detected by means of opal analysis of the materials from Harappa recently. Vishnu-Mittre (1977: 576) is of the opinion that whether wild or domesticated, rice was "known to the Rajasthan Harappans and those living in the area of Kutch-Gujarat (Lothal and Rangpur)". At Lothal, the levels assigned to Period IIA (or Phase II) and dated approximately to 2100/2000 B.C., have yielded evidence of rice husks, straw and one grain impression on clay lumps (Rao and Lal 1985: 682 and 684). Lothal Period IIA equates with Rangpur Period IIA in which rice husk from the lumps of "burnt or half burnt mud" has been found (Ghosh and Lal 1963:168). In addition to Western India, rice has been reported amongst the cereal crops at other sites in Rajasthan, Uttar Pradesh, Maharashtra, Bihar, Kashmir and elsewhere mostly in the second millennium B.C. contexts (Chowdhury 1983; Glover 1979; Kajale 1977, 1982 & 1988; and Vishnu-Mittre 1969 and 1977; Vishnu-Mittre and Savithri 1975-76). Some of the sites are listed below:

Sites	Remarks
1. Atranjikhera (Uttar Pradesh)	Associated with O.C.P. Period prior to the PGW, the earliest date of which is 1265-1000 B.C.
2. Ahar (Rajasthan)	Period IB: 2175-1715 B.C. Period IC: 1885-1645 B.C. 1575-1280 B.C.
3. Inamgaon (Maharashtra)	Period II between Early and Late Jorwe Late Jorwe: 1910-1555/1565-1265 B.C. and 1755-1530/930-800 B.C.
4. Daimabad (Maharashtra)	In Jorwe levels Period V. 1685-1400/1370-1035 B.C.
5. Navdatoli-Maheshwar Madhya Pradesh)	In Phase II, probably 2120±167 B.C. (The earliest date is 2890-2640 B.C.)
6. Chirand (Bihar)	Neolithic Period I 2195-1750/1575-1280 B.C. and later. (Also reported at Singhbhum and Oriyup in Bihar).
7. Gufkral (Kashmir)	Late Neolithic Period Ic 2145-1760/1115-815 B.C.

In Pakistan, cultivated rice (*Oryza sativa*) has so far been reported from several sites in the Swat Valley and at Pirak in the Kachi plain on the northwestern border of Sindh (Costantini 1979 a & b and 1987). At Pirak, the rice together with other cereal crops was found in Period I (1950-1570 B.C.), Period II (1670-1255/910-755 B.C.) and Period III 915-790-890 770 B.C.

In the Swat Valley, Leobnar 3, Aligrama, Ghalegay I & II and Bir-Kot-Ghanwadi have given evidence of rice from the contexts dated to the second millennia B.C.

The Late Harappan levels represented by the Cemetery H materials at Harappa, have now given positive evidence of rice (*Oryza sativa*) along with Ragi (*Eleusine coracana*) both of which are summer or *Kharif* crops. The best evidence came from an exposed section at Mound AB, east of the excavated area and along the passage made for the visitors (Fig. 1.). Eight samples of pottery ash, and soil from the upper layers which all contained Cemetery H materials revealed plant opals of rice and Ragi or finger millet and some species of wild grasses. The presence of Ragi at Harappa should be no surprise to us because the cultivated *Eleusine coracana* is already known from the peripheral region such as Saurashtra.

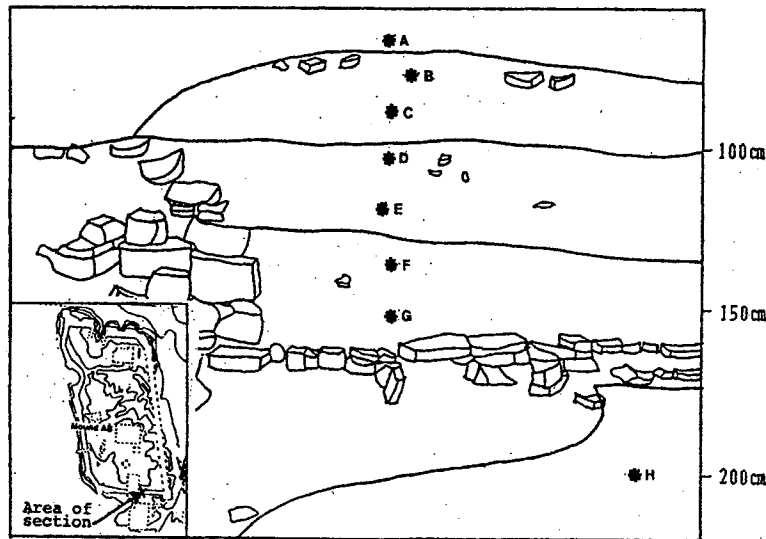


Fig. 1: A section of the Late Harappan levels on the citadel Mound AB at Harappa showing places from where samples for plant opal analysis were collected in 1989 (based on Fujiwara *et al.* n.d.)

*Ragi* has been found in all levels of Rojdi (Posseshl and Raval 1989: 12) and Surkotada IC dated between 2190-1880 and 2000-1700 B.C. The cultivated *Ragi* is also reported from the second millennium B.C. contexts of several sites in Maharashtra (Inamgaon, Daimabad, Nevasa and Sonagaon), Karnataka (Hallur) and Tamil Nadu (Paiyampalli). The occurrence of *Ragi* at Harappa along with rice would indicate the existence of double cropping a year because it is cultivated in *kharif* season.

A total of at least five samples of pottery and baked brick belonging to Mature Harappan period were also found to contain evidence of rice. It became evident that further examination of a large sample was necessary with reference to stratigraphical contexts, to determine at what point in time, rice was introduced or used in the Mature period at Harappa. The opal analysis for the detection of botanical remains from additional samples is now being expanded to include other Harappan sites especially those in Cholistan where the largest number of Early, Mature and Late Harappan sites are concentrated (Mughal 1980, 1982). From Cholistan, the study of hundreds of terracotta cakes and baked clay pieces are expected to yield important information on the introduction and distribution of rice and *Ragi* within the core region of Indus Civilization.

It is, however, pointed out that as compared to the evidence of the Late Harappan period, the present evidence on rice and *Ragi* of the Mature Harappan period at the type-site was limited during an initial investigation in 1989. The sample size, as pointed out above, was very small. Already, the evidence does exist at Harappa and, therefore, the presence of rice and *Ragi* in the Mature Period should not be ruled out because these crops have been reported from the contemporary sites in India. For this reason also, the archaeobotanical research started in 1989 at Harappa is now being extended to include Early, Mature and Late Harappan sites in Pakistan.

The cultivation of rice and *Ragi* in Pakistan by the second millennium B.C. was well established. Considered with the winter or *rabi* crops of wheat and barley, the cultivation of rice also would indicate two cropping seasons a year. The recent evidence from the Late Harappan contexts at Harappa would suggest intensification of cereal production for food by double cropping by the people of Indus Valley Civilization in the Core Area as well, at least by the later half of third millennium B.C., as already suggested by Marcia Fentress (1985: 367). The most significant is the emerging evidence of the presence of rice and *Ragi* during the Mature Harappan period (circa 2500-2000 B.C.) in the Core Area. Further

investigations of the Mature Harappan botanical remains aimed at detection of rice and *Ragi* at other sites in Pakistan would certainly revise the old paradigm of single cropping pattern of the Harappans.

In summary, rice and *ragi* have been detected by plant opal analysis in pottery, bricks and soil belonging to the Late and Mature Harappan periods at Harappa. This evidence from the Core Area of the Indus Civilization and its implication is discussed in the light of similar data from the other South Asian sites.

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