KAUNDINYAPUR PLANT ECONOMY IN PROTOHISTORIC AND HISTORIC TIMES

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ABSTRACT

The paper describes carbonized food grains and their impressions from Kaundinyapur a site in Madhya Pradesh. The remains include cereals (rice and ? maize), legumes (peas) and the fruit remains (jujube) and a crushed fragment of a bamboo. The various strata from which the material has been recovered range in age from 500 B.C. to 1400 A.D. representing slightly earlier Mauryan to the Muslim Period.

INTRODUCTION

THE carbonized food grains or their impressions from Kaundinyapur comprising cereals (rice, maize), legumes (peas) and the fruit remains (jujube) and a crushed fragment of a bamboo are recovered from various strata ranging in age from 500 B.C. to 1400 A.D. from slightly earlier Mauryan to the Muslim Period. The material was kindly sent to me by Dr. Moreshwar G. Dikshit, Reader, Department of Ancient Indian History and Culture, Nagpur University, who also very kindly provided detailed information regarding the archaeological provenance of the samples. There are three samples which definitely belong to the Post Mauryan (about 300 B.C. to 200 B.C.) — one of them from B_3 layer 7 contains matter and the Jujube and the other from D_4 layer 7 comprises rice and bamboo. The third sample containing a hard tar-like mass of spikelets of rice comes from D_4 layer 9 (about 500 B.C.-400 B.C.) and is slightly earlier than the Mauryan stratum.

Later, Dr. Dikshit kindly sent me a potsherd from layer 2 at Kaundinyapur, which is decorated by a pattern believed to have been formed by turning an ear of maize on a bolstered surface of clay. It is discovered from a Muslim building from the excavations dated to the Bahmani Period. From similar sherds at Kolhapur it appears that the specimen might be slightly earlier to 1435 A.D.

Methods — The carbonized grains were examined under the low power binocular for any recognizable morphological details and measurements taken. From the impression on the potsherd plasticine casts were prepared and matched with those of the modern ears of maize. On the clay models of the potsherd prepared here impressions were made by turning an ear of maize and these were then compared with those on the potsherd.

For opportunity to work this interesting material my thanks are due to Dr Moreshwar, G. Dikshit, who very kindly sent this interesting material to me and to Dr. K. R. Surange, the Director of the Birbal Sahni Institute of Palaeobotany for permission to undertake this investigation.

DESCRIPTION OF THE FOOD GRAINS

CEREALS

Rice

Oryza sativa var *sativa* L.

The grains of rice from D_4 layer 7 are more or less oblong and strongly ribbed (usually three-ribbed) and are made up of two varieties one comprising comparatively longer seeds than in the other. The kernels of the long-seeded variety are sixty-five in number while those of the short-seeded variety are comparatively broader than those of the long-seeded variety. Their dimensions are shown in Tables 1 & 2. In some grains a part of the fertile lemma showing the chessboard pattern is also preserved.

TABLE 1—*ORYZA SATIVA* VAR. *SATIVA* L.

Shorter grains

	AVERAGE	MIN.	MAX.
Length in mm.	3·2	3·0	3·5
Breadth in mm.	2·7	2·0	3·0
Thickness in mm.	1·3	1·2	1·5
L : B	1·1	0·70	0·88
T : B	0·40	0·60	0·50

TABLE 2 — *ORYZA SATIVA* VAR. *SATIVA* L.

Longer grains

	AVERAGE	MIN.	MAX.
Length in mm.	4·0	3·0	4·8
Breadth in mm.	2·0	1·5	2·2
Thickness in mm.	1·1	1·0	1·5
L : B	2·0	2·0	2·1
T : B	0·55	0·66	0·68

The spikelets in the hard tar-like mass are very fragile. Several attempts to recover complete spikelets from the mass proved in vain, consequently it has not been possible to know the exact size of the spikelets, the shape, the nervation of the fertile lemma and also the presence or absence of the awn. Rachilla has been seen in some grains. The fragments of the fertile lemma, however, show the outer surface made up of a chess-board pattern but the hairs or their scars have not been noted. From the fragments still sticking to some grains it appears that the fertile lemma was probably 5 nerved. The Palea as far as could be made out is less convex and closely adhering to the grains. It is three-nerved.

The spikelets are invariably single-grained. With the exception of a few which approach the long grains, the rest have exactly the same shape and dimentions as those of the short-seeded variety (cf. TABLE 1).

The carbonized grains of rice are referred to the variety *sativa* of *Oryza sativa*, though the shorter grains, both in shape and size, seem to approach those of *O. glaberrima* Steud., a species distributed in Western Tropical Africa. This species has been introduced into India in recent times. That the Kaundinyapur rice grains do not belong to this african species is borne out by the following observations:

(i) The grains (except in the tar-like mass) are made up of two kinds — the long and the short ones which in other essential characters are exactly similar.

(ii) The grains and the spikelets in the tar-like mass are exactly similar to the short grains in the other sample.

(iii) Very much similar short grains are produced by some strains of rice grown in Nepal, Japan, Korea and China and these are referred to *Oryza sativa* var. *sativa* (HIMADA, 1956, PLATES 1-6).

The archaeobotanical records take the history of cultivated rice in India as far back as 2300 B.C. (GHOSH, 1961) but such an extremely short-grained rice has hitherto not been reported. If the Kaundinyapur grains belonged to this African species, then it would imply an African influence or african contacts with the Kaundinyapur folk which is not borne out by the archaeological finds at the site. At the same time there is no Chinese or Japanese influence at the site but the Chinese Celadon or other wares have frequently been found in other and older sites in Deccan.

From the above it appears that one would be justified in referring Kaundinyapur rice grains to *O. sativa* var. *sativa* and not to *O. glaberrima*, the African species.

? Maize

? Zea mays L.

(Pl. 1, Fig. 1)

The correct interpretation of impressions of food grains on potsherds is indeed a very vexing problem. The potsherd from Kaundinyapur bearing impressions that look very much like those of a cob of maize presents a similar problem.

This potsherd (PL. 1, FIG. 1) bears incomplete impressions of two kinds. In one of them (of which there are two impressions) the impression is made up of 6 rows each separated by a ridge about 1 mm. to 3 mm. in thickness. Each row is made up of a linear series of squarrish or horizontally oval cavities each about 3·6 × 2·5 × 2·3 mm. in dimensions. These cavities in one of the impressions seem to grow narrower and smaller towards the top (if the part of the potsherd painted red represents the top) while in the other impression they grow narrower in the opposite direction. Each impression is about 3·5-4 cm. broad and was longer than 6 cm. since that much length can be measured from the longest incomplete impression.

These impressions look very much to have been made by turning an ear of maize on the bolstered surface of clay. The plasticine casts prepared of these compare with the impressions of an ear of maize. Plasticine and clay models of the potsherds were also prepared and the impressions were made on them by turning an ear of maize and the results seem to convince that the

Kaundinyapur artisans must have made similar imprints on their pots but the ears of maize they had used were of a small-grained variety with the rows of seeds not so contiguous as in our specimen. Some poorly developed ears of maize or those belonging to primitive varieties do often have spaced rows of grains which are usually smaller in size.

Between these two impressions there is seen another kind of impression which appears to have been made by pressing the under surface of a leaf of maize against the clay. A raised ridge corresponding to the midrib is seen running along the middle of the leaf-like impressions. There are two such leaf-like impressions, both incomplete and the longest of the two is 5·5 cm. and about 2·5 cm. braod at the broadest region. From the impression the blade seems to have been slightly curved and not straight.

From the present study it appears that the impressions on the potsherd were in all probability made from the blades and the ears of maize.

LEGUMES

The grains from B_3 layer 7 are variable in size, about 2·5 mm. in diameter, subangularly round, slightly compressed with a distinct hilum scar. A few of them are wedge-shaped and approach those of *Lathyrus sativus* L. while the rest appear to be a mixture of *Pisum arvense* L. and *Lathyrus sphaericus* Retz.

Fruit Remains

Zizyphus nummularia (Burm.f.) W. &.A.

In the collection of legumes from B_3 layer 7 five (one complete and the rest broken) fruit stones were discovered. The fruit stones, about 5-7 mm, are globose or ovoid in shape with rugose surface. From the broken specimens it appears that they are 1-3 celled.

Other Plant Remains

Charred Bamboo ?

The specimen from D_4 layer 7 labelled as charred bamboo is very much crushed and is a heap of fibres. It can hardly be precisely recognized as a bamboo but the presence of numerous fibres in the crushed stem fragment does, however, suggest that it might belong to a bamboo stem. There are hardly any recognizable characters in the specimen to help in the reference of the specimen to any species of Pooideae — Arundiaeae or to that of Bambuseae. A workable fragment has been however picked up for anatomical studies which might help in its identification.

DISCUSSION

The cereals in the collection include rice and maize only.

From more or less the same horizon (500 B.C. to 200 B.C.), rice in India has been hitherto known from Ujjain, Rupar, Nagda, Pataliputra and Kunnattur (GHOSH 1961). A comparison of the dimensions of Kaundinyapur rice with that discovered from the sites mentioned above shows that the Kaundinyapur rice consists of smaller grains. Such a short-grained variety of rice hitherto has not been known from ancient India where the history of rice, as known from the archaeobotanical records, now goes back to 2,300 B.C. (GHOSH *loc. cit.*). The grains from Kolhapur dated to 100 A.D., however, approach the size of the Kaundinyapur rice grains. Of the two subspecies, comprising all the varieties of *Oryza sativa*, the subspecies *indica*, the long-grained rice, is believed to have originated in India, while the subspecies *japonica* — the short-grained rice, is believed to have originated in Japan. If that is true then the Kaundinyapur rice would tend to suggest the cultural contacts of the ancient inhabitants of Kaundinyapur with Japan but the archaeobotanical material does not support the above conclusion. About this Dr. Marchwar G. Dikshit informs (personal communication) that at this site there is " no direct evidence for any Chinese or Japanese influence. The site was remarkably free from Chinese Celadon or other wares which are frequently associated with some old sites in Deccan ".

The impressions of cobs of maize on the potsherd, as far as it has been possible to determine them, are all the more important. The practice of decorating the pots by rolling a maize cob on the wet clay is known to have been prevalent elsewhere too, for instance, during the post-Columbian times amongst the prehistoric folk of Ile Ife in the Yoruba territory in Africa (GOODWIN, 1953 & JEFFREYS, 1953; MANGELSDORF & REEVES, 1959). Kaundinyapur specimen is hitherto

the solitary example of the occurrence of prehistoric maize in India.

Layers 2-3 at this site, from which the potsherd has been discovered, are the Muslim layers and have yielded a lockward of the Turkish type (spring and push variety) known from the 7th and 9th century layers at Sirpur (M.P.), and also at the unstratified excavations at Sanchi and of about 6th to 7th century levels at Nalanda. The earliest date for these locks in Pompeii and Verulamuum in England is about 2nd and 3rd century A.D. Exactly similar sherds of the same date have been found in the excavations at Kolhapur conducted by Dr. Dikshit and the corresponding Kolhapur layers are dated to about 1435 A.D. (from personal communication by Dr. Moreshwar G. Dikshit). From this it would appear that the evidence of maize in India is not in any case later than 1435 A.D. which makes it older than the African find and tends to establish its pre-Columbian age. From Indian literature Professor P. K. Gode (1950) has been able to trace the antiquity of maize in India from 1540 A.D. which obviously means its introduction into India by the Portugese or Spanish travellers in about 1498 A.D. But this archaeobotanical find tends to extend the history of maize in India to the pre-Columbian period.

Together with the prehistoric maize from Java (KIHARA cf. SUTO & YOSHIDA, 1956, p. 503), the Kaundinyapur impressions are the only examples of the pre-Columbian occurrence of maize in the old world. From the New world numerous records of prehistoric maize are known. Long before the arrival of Columbus there, maize formed the basis of the highly developed Inca, Maya and Aztec civilizations and was the staple crop from Canada to Chile for several thousand years (NICKERSON, 1953). Hitherto the earliest archaeological evidence from the old world comes from Huaca Prieta in South America (about 850 B.C.), next to these are from the Tularosa Cave in North America about 400 B.C.-200 B.C. and from Mexico and Central America from a cave in Lower California dated to 100 B.C. (NICKERSON *loc. cit.*).

Evidences of the occurrence of maize from sedimentary deposits under Mexico city, which antedate human occupation, have been brought forward from the palynological investigation of these sediments (BARGHOORN *et al.* 1954). The human occupation in this region is now believed to date from 9000 years (RICHARDS 1953).

The origin of maize in the new world is now well-established and its pre-Columbian occurrence in the old world suggests that it reached the old world during the pre-Columbian times when the contacts between the old and the new worlds (South America and Asia) existed. That it was quite possible to sail in either direction across the vast expanse of the Pacific has been amply documented by Beck (1938).

Legumes in ancient India have, hitherto, been known from Navadatoli — Maheshwar, 1500 B.C. to 1000 B.C. (VISHNU-MITTRE, 1961); Khokhrakot, 100 B.C. (VATS, 1940) and Nevasa, 1318 A.D. to 1759 A.D. (SANKALIA *et al.*). The Kaundinyapur material seems to bridge the gap in the history of legumes in India from the Chalcolithic Period to the Early Historic Period especially the history of *Pisum arvense*.

The remains of Ber have hitherto been found at Navadatoli — Maheshwar (VISHNU-MITTRE *loc. cit.*) and both the Navadatoli — Maheshwar finds, earlier referred to *Z. jujuba*, as well as Kaundinyapur specimens belong to *Zizyphus nummularia* (Burm.f.) W. & A. This is in fact a dry wasteland species and is also found in the ravine tracts in the vicinity of rivers such as Jumna and Chambal. It grows abundantly and often gregariously in such habitats and is of common occurrence in Merwara and Bundhelkhand. It extends from the Punjab and Rajputana to Central and Southern India. The dry branches of this plant are extensively used for making fences, and the leaves, are used as fodder for camels, sheep, goats, etc. The fruit is eaten by the inhabitants especially during famine.

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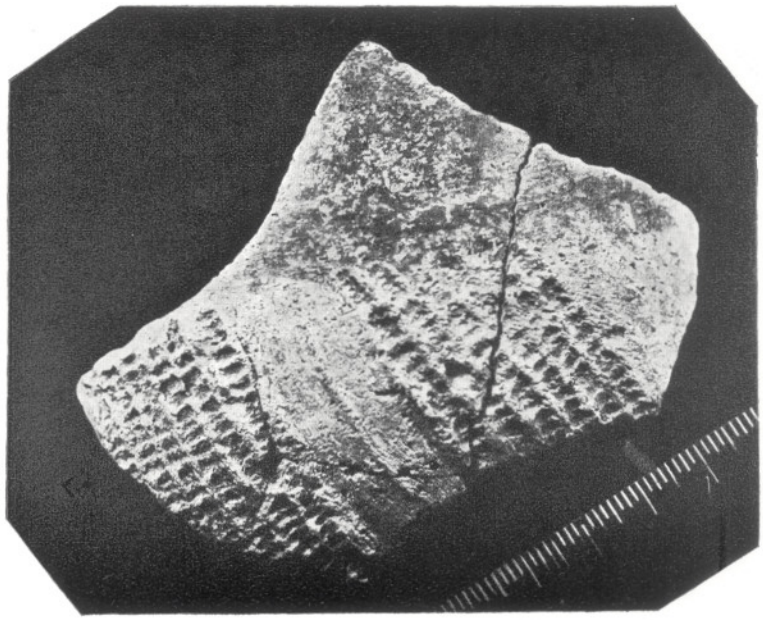
EXPLANATION OF PLATE

1. Photograph of the potsherd from Kaundinyapur (M.P.) showing impressions looking like those of cob of maize. Nat. size.

2. Photograph of the potsherd from Kaundinyapur (M.P.) showing impressions looking like those of cob of maize. × 2.



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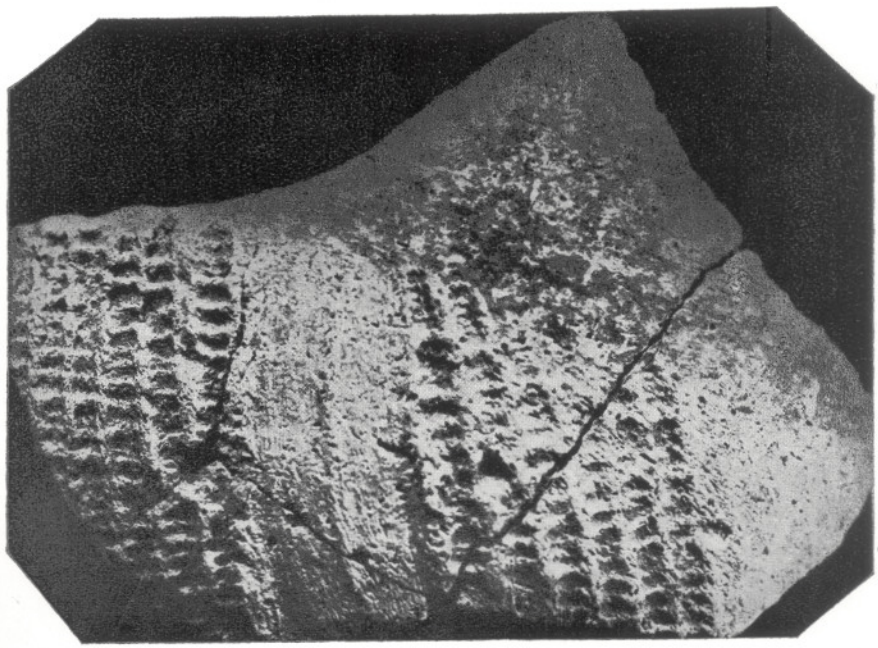

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