

ANCIENT GRAINS FROM EXCAVATIONS AT NEVASA, MAHARASHTRA*

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ABSTRACT

Grains of various cereals, millets, pulses and oil seeds have been recovered from the excavations at Nevasa in Ahmednagar district, Maharashtra. The site lies on the left bank of the river Pravara, and has yielded cultural deposits of the Chalcolithic, Satavahana, Indo-Roman and Muslim-Maratha periods ranging from 1500 B.C. to 1800 A.D. All the grains are carbonised except those of the Indian jujube (*Zizyphus jujuba* Linn.). The cultivated seed assemblage comprises grains of wheat (*Triticum* cf. *sphaerococcum* Perc.), barley (*Hordeum vulgare* Linn.), rice (*Oryza sativa* Linn.), sorghum millet (*Sorghum* sp.), kodo millet (*Paspalum scrobiculatum* Linn.), finger millet (*Eleusine* sp.), lentil (*Lens esculenta* Moench.), black gram/green gram (*Phaseolus mungo* Linn./*Phaseolus aureus* Roxb.), gram (*Cicer arietinum* Linn.), hyacinth bean (*Dolichos lablab* Linn.), field pea (*Pisum arvense* Linn.), and oil seeds of safflower (*Carthamus tinctorius* Linn.). Fruitstones of tamarind (*Tamarindus indica* Linn.) and Indian jujube (*Zizyphus* sp.) are also reported. The occurrence of pearl millet (*Pennisetum typhoides* Stapf. & Hubbard) is suggested.

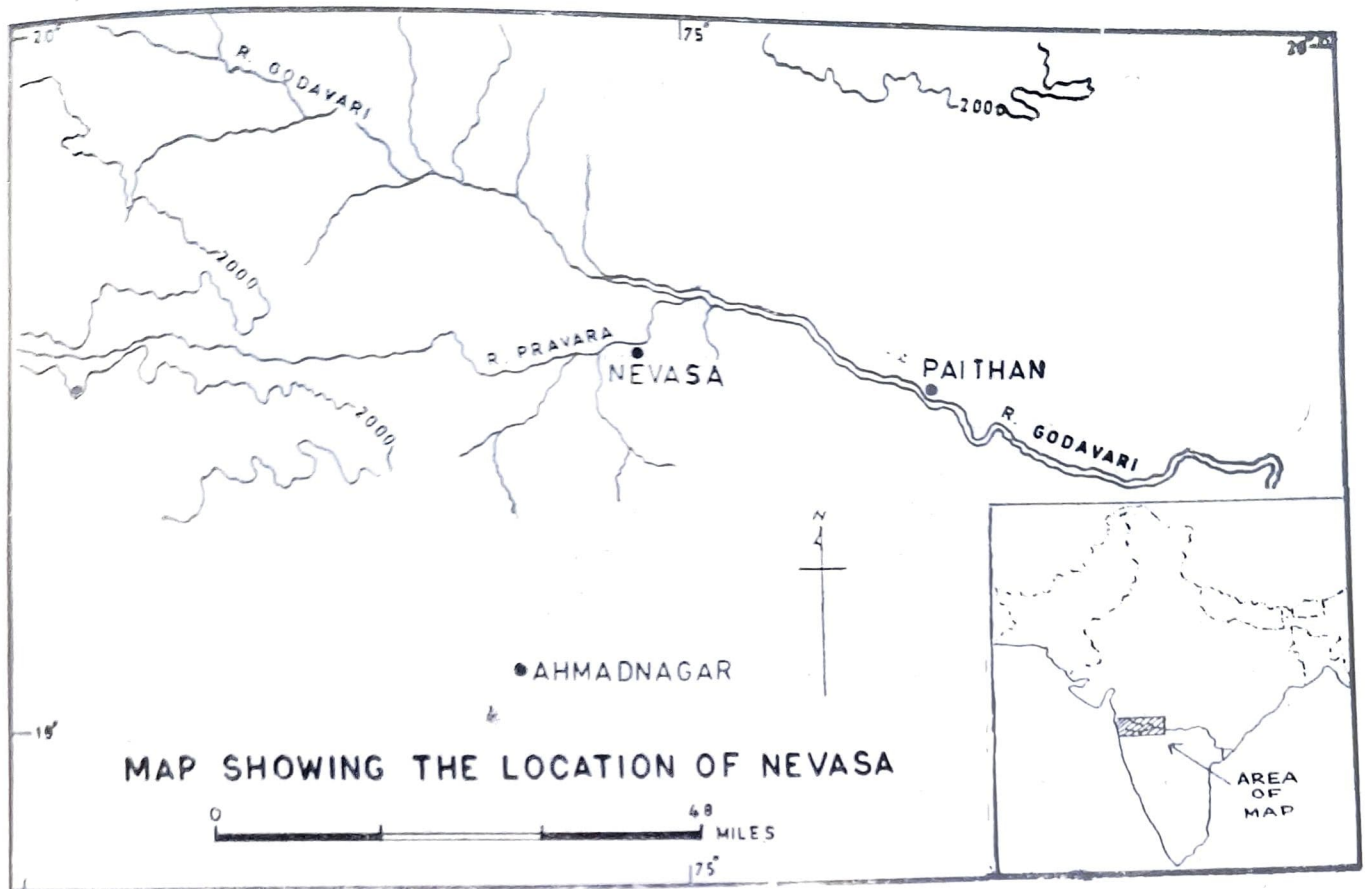
INTRODUCTION

This paper describes the evidence for archaeological grains recovered from the excavations at Nevasa. The site is situated on the left bank of the Pravara river, a tributary of the Godavari in western Maharashtra (Text-fig. 1). The site was excavated by the Deccan College, Poona during the years 1954-56 and 1959-60 and a detailed report has been published (SANKALIA, DEO, ANSARI & ERHARDT, 1960). The habitational deposits have been divided into the Chalcolithic (1500B.C.-1000B.C.), Satavahana (150B.C.-50B.C.), Indo-Roman (50B.C.-200A.D.) and Muslim-Maratha (1300A.D.-1800A.D.) periods. The plant remains recovered during the 1954-56 field seasons, have already been reported (*op. cit.* p. 549). They include wheat (*Triticum* sp.), rice (*Oryza sativa* Linn.), finger millet (*Eleusine coracana* Gaertn.), kodo millet (*Paspalum scrobiculatum* Linn.), hyacinth bean (*Dolichos lablab* Linn.), field pea (*Pisum arvense* Linn.), garden pea (*Pisum sativum* Linn.), chick pea (*Cicer arietinum* Linn.), Indian jujube (*Zizyphus jujuba* Linn.), oil seeds of safflower (*Carthamus tinctorious* Linn.) and seeds of coriander (*Coriandrum sativum* Linn.). The present paper is based on the material excavated by Prof. S.B. Deo in 1959-60 (2nd season). The present writer was able to identify all the previously reported grains (except coriander). However barley (*Hordeum vulgare* Linn.) is reported for the first time at Nevasa. The grain findings have been summarised in Table 1.

PRESERVATION

All the grains were found in a carbonised state excepting those of the Indian jujube (ber) from Trench I, layer 3, sample no. 3355. The latter covered by ashy material have, interestingly, remained uncarbonised.

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Text-fig. 1

METHODOLOGY

As far as possible only the well preserved grains were selected for study. Those grains which were highly distorted by carbonisation were not included in the quantitative study. Identification of the grains is based on their external morphological features. The non-cereal grains were dissected to confirm the position of the plumule and radicle. These features were then compared with those of modern seeds of the same species to aid identification.

IDENTIFICATION OF GRAINS

Hordeum vulgare Linn.—Barley

The grains are elongated with the maximum width in the central part. The embryonal cavity is dorsal-basal and a few grains are preserved even with the radicle and plumule. In most of the grains, the embryo is symmetrically placed. In a few grains the central groove is symmetrically placed while in others it is asymmetrical. This gives a lop-sided appearance to the grains, proving their six-row nature. Since the spikelet is not preserved, it is not possible to determine whether these grains belong to dense-eared or lax-eared forms. The grains show the impressions of the palea and the lemma. They have been well preserved in spite of the fact that they are carbonised. A groove running from the base to the apex is seen on all the grains. The groove on the dorsal side of the grains is very faint while that on the ventral side is more deep and prominent. In a few grains the ventral groove widens towards the apex. The apex is generally straight, but one or two grains with a notched apex are also seen. Most of the grains are angular (hexagonal) in cross section.

Table of measurements (eight grains)

Measurements	Minimum	Maximum	Average
Length (L) in mm	3.20	4.50	3.933
Breadth (B) in mm	1.70	2.30	2.033
Thickness (T) in mm	1.40	1.80	1.600

Oryza sativa Linn.—Rice

The grains are seen in both clumped state as well as individually separate kernels and caryopses. The husk showing typical chessboard pattern is preserved in a few grains while in others it is lost due to carbonisation. Some of the grains show two glumes, one on either side of the caryopses. The glumes are lanceolate. Though the lemma and palea are seen in a few grains, the number of nerves on them could not be ascertained because of the charring effect. In one of the grains, even the stalk is also preserved. The apiculus in most of the cases is short and blunt. The embryo position is basal-lateral.

Table of measurements (thirty grains)

Measurements	Minimum	Maximum	Average
Length (L) in mm	2.50	3.90	3.24
Breadth (B) in mm	1.95	1.40	1.626

Triticum cf. **sphaerococcum** Perc.—Wheat

The grains are characterised by a central groove and a dorsal dome. The basal part of the grain is thickest. Wherever the embryonal cavity remains, it is either horse-shoe shaped or oval. The ventral groove is short, superficial and in many cases fused with endosperm.

Table of measurements (thirty two grains)

Measurements	Minimum	Maximum	average
Length (L) in mm	2.90	3.90	3.635
Breadth (B) in mm	2.30	1.70	1.980
Thickness (T) in mm	2.00	1.40	1.703
L/B			1.95
L/B			2.134
B/L			0.5172
T/L			0.468
T/B			0.860

VISHNU-MITTRE (1974) studied the dimensions of modern grains of *Triticum aestivum*, Linn., *Triticum compactum* Host., *Triticum sphaerococcum* Perc. and carbonised grains of wheat from Ter, Navdatoli Maheshwar, Mohenjadaro and Chirand. Wheat grains from Ter identified as *Triticum sphaerococcum* Perc. exhibit ratios of length/breadth, length/thickness, breadth/length, thickness/length, thickness/breadth, as 1.75, 2.12, 0.57, 0.46, 0.80 respectively. The dimensions of wheat grains from Nevasa are comparable to some extent with those of Ter.

Paspalum scrobiculatum Linn.—Kodo millet

The grains are fused to form a tar-like mass. Within this mass, at places ornamentation of the ventral aspect is seen while in adjacent parts the dorsaldomed surface can be observed. Casts of grains in the fused mass are also noteworthy. Most of the grains disintegrated while attempting to separate intact grains from the mass. The grains are round to oval in shape and exhibit a typical plano-convex nature. The husk is seen predominantly on the dorsal surface. In spite of the totally carbonised nature of the material, the husk covering the entire dorsal surface and a part of the ventral surface is observed in some of the grains. Such well preserved grains are few. There are a large number of grains which occur separately, wherein the husk is lost due to carbonisation. Since these dehusked grains occur predominantly, they have also been selected for measurements.

Table of measurements

(A) Husked grains (ten)

Measurements	Minimum	Maximum	Average
Length (L) in mm	2.35	2.20	1.785
Breadth (B) in mm	1.20	1.55	1.305
Thickness (T) in mm	1.80	1.05	0.870

(B) Dehusked grains (twenty five)

Measurements	Minimum	Maximum	Average
Length (L) in mm	0.950	1.300	1.272
Breadth (B) in mm	0.8000	1.300	1.0819

Eleusine sp.—Finger millet

The grains are found both separately and as a fused mass. They are oval to sub-round. The embryo position is seen on the dorsal side which is only slightly domed. The embryo position is generally symmetrical. In most of the cases, the husk is not preserved due to its carbonised nature. These grains are much smaller than those of kodo millet.

Table of measurements (twenty five grains.)

Measurements	Minimum	Maximum	Average
Length (L) in mm	0.80	1.10	0.8412
Breadth (B) in mm	0.50	0.90	0.5862

Pennisetum typhoides Stapf. & Hubbard.—Pearl millet?

The grains are found both in masses as well as individually. The preservation is poor and the hylum scar is not clear, hence the identification is tentative. The grains are elongated, broad at the base and narrow at the apex. The embryo position cannot be seen clearly.

Table of measurements (fifty grains)

Measurements	Minimum	Maximum	Average
Length (L) in mm	1.60	2.30	1.80
Breadth (B) in mm	0.80	1.50	1.112

Sorghum sp.—Sorghum millet

Only six grains are found. They are subround, flat with an apical point. The basal embryo position is clear. One of the grains is plump, while two are of elongate type. The average length and breadth are 2.296 mm and 1.804 mm respectively.

Carthamus tinctorius Linn.—Safflower

The seeds are broad at the base and taper towards the apex. They show the basal hylum scar and vertical ridges characteristic of safflower seeds. Most of them were hollow from inside. This is likely to be due to the evaporation of fats from the seeds.

Table of measurements (seventy five grains)

Measurements	Minimum	Maximum	Average
Length (L) in mm	2.85	4.65	3.412
Breadth (B) in mm	1.40	2.60	2.014

Phaseolus mungo Linn.—Urd

The grains are oval to rectangular and are plump. A linear protruding hylum scar is also noted.

Table of measurements (fifty grains)

Measurements	Minimum	Maximum	Average
Length (L) in mm	1.80	2.85	2.3915
Breadth (B) in mm	1.20	2.50	1.7740

Phaseolus sp.—Green gram—Black gram

The grains are smaller but similar to those of black gram. The hylum scar is not clearly seen.

Table of measurements (twenty six intact grains)

Measurements	Minimum	Maximum	Average
Length (L) in mm	1.75	3.10	2.173
Breadth (B) in mm	1.30	1.80	1.549

Table of measurements (thirty cotyledons)

Measurements	Minimum	Maximum	Average
Length (L) in mm	2.10	2.75	2.371
Breadth (B) in mm	1.30	1.90	1.636

Dolichos lablab Linn.—Hyacinth bean

The grains are kidney-shaped and of variable size. There is a long curved hyphae on one side of the grains at the base of which the hylum scar is noticeable. The average length and breadth are 4.50 mm and 3.00 mm respectively.

Lens esculenta Moench—Lentil

The grains are round with a keeled margin. The average length and breadth are 2.60 mm and 2.35 mm respectively.

Pisum arvense Linn.—Field pea

The grains are generally rounded, but it is not uncommon to find grains slightly flattened on either or both sides. The hylum scar is minute. Most of the grains have lost their seed coats during the process of carbonisation.

Table of measurements (fifty grains)

Measurements	Minimum	Maximum	Average
Length (L) in mm	2.20	3.70	2.850
Breadth (B) in mm	1.80	3.05	2.6015

Cicer arietinum Linn.—Chick pea

The grains exhibit a peculiar beak-like structure with a tiny hylum scar below it. At the apex of the beak lies a minute opening, the micropyle. The seed coat is damaged due to carbonisation.

Table of measurements (fifty grains)

Measurements	Minimum	Maximum	Average
Length (L) in mm	2.30	3.80	3.463
Breadth (B) in mm	2.00	3.40	2.579

Lathyrus sativus Linn.—Grass pea

The seeds are characteristically triangular and squat. In most of the grains, the length is less than the breadth.

Table of measurements (fifty grains)

Measurements	Minimum	Maximum	Average
Length (L) in mm	1.90	3.10	2.850
Breadth (B) in mm	1.80	3.00	2.60

Zizyphus sp.—Indian jujube

The grains occur in the form of fruitstones. The endocarp with its rough convulose surface is preserved.

Table of measurements

(A) Uncarbonised grains (twenty six)

Measurements	Minimum	Maximum	Average
Length (L) in mm	4.20	7.5	5.426
Breadth (B) in mm	3.50	5.7	4.469

(B) Carbonised grains (twenty five)

Measurements	Minimum	Maximum	Average
Length (L) in mm	3.80	6.00	4.240
Breadth (B) in mm	3.20	5.60	4.224

Tamarindus indica Linn.—Tamarind

Three flat seeds were found. One of them retains the outer fruit cover (pericarp) and the hylum scar. The average size measures 8mm × 9.5mm.

Unidentifiable fruit

A few fruits with thin pericarps are present in sample number 1105, Trench E(2). Some fruits bear the remains of a stalk at the base. The broken seeds exhibit an internal cavity, suggestive of some wild oil seed.

Table of measurements (thirty grains)

Measurements	Minimum	Maximum	Average
Length (L) in mm	2.60	3.60	3.2355
Breadth (B) in mm	2.00	2.90	2.4500

Table 1—Summary of stratigraphic distribution of charred grains from Nevasa

Grains	Chalcolithic (Period I) (1500B.C.— 1000 B.C.).	Satavahana (Period II) (150 B.C.— 50 B.C.)	Indo-Roman (Period III) (50 B.C.— 200 A.D.)	Muslim-Maratha (Period IV) (1300A.D.— 1800A.D.)
1. Barley	—	—	*	—
2. Rice	—	*	*	—
3. Wheat	—	—	*	*
4. Kodo millet	*	*	*	*
5. Finger millet	—	*	*	—
6. Pearl millet	—	—	*	—
7. Sorghum millet	—	—	—	*
8. Safflower	—	—	*	—
9. Green gram/Black gram	*	*	*	—
10. Black gram	—	*	*	—
11. Hyacinth Bean	—	—	*	—
12. Lentil	—	*	*	*
13. Field Pea	*	*	*	*
14. Chick Pea (Gram)	—	—	—	*
15. Grass Pea	*	*	*	—
16. Indian Jujube (Ber)	*	—	*	*
17. Tamarind	—	*	—	—
18. Unidentifiable seeds	—	*	*	*

*Presence

—Absence

DISCUSSION

The stratigraphic distribution of charred and uncharred grains from Nevasa gives an account of the food habits of Nevasians right from Chalcolithic times almost to the present day. The Chalcolithic deposits are represented by the Jorwe culture dated from 1500 B.C. to 1000 B.C. The deposits have yielded grains of kodo millet, black gram/green gram, field pea, grass pea and Indian jujube (ber).

Overlying the Chalcolithic deposits, is a black weathered horizon indicating a time gap of about 800 years. The Satavahana culture which succeeded the Chalcolithic one is dated to 150B.C.-50B.C. The habitational deposits of this period are found to be the source of grains of barley, kodo, millet, finger millet, black gram/green gram, lentil, field pea, grass pea, tamarind and an unidentifiable fruit. In this connection it may be noted that tamarind seeds were first reported from the Satavahana deposits at Kolhapur (KUMAR, 1952). The only other evidence to date of tamarind seeds comes from Nevasa.

The Satavahana deposits are overlain by the Indo-Roman culture dated to 50 B.C.—200A.D. These layers have yielded evidence of all the grains except those of sorghum,

millet, chick pea and tamarind. It is essential to note the first appearance of safflower seeds during this cultural phase. Outside India, the seeds of safflower were found to be stored in tombs dating back to about 2000 B.C. (FORBES, 1959). Seeds of *Carthamus* have also been found from the Ocampo phase of the Ocampo cave site in Mexico which dated between 4000 B.C. to 2000 B.C. (CALLEN, 1959).

The youngest habitational deposits at Nevasa belong to the Muslim-Maratha period. Grains of wheat, kodo millet, sorghum millet, hyacinth bean, lentil, field pea, chick pea, Indian jujube and an unidentifiable fruit have come to light from these cultural deposits.

The present study reveals an ancient plant economy, somewhat similar to that earlier reported at the Satavahana Bhokardan (KAJALE, 1973) at Satavahana Ter (VISHNU-MITRE, PRAKASH & AWASTHI, 1972), and at Chalcolithic Navdatoli-Maheshwar (VISHNU-MITRE, 1961). Bhokardan has yielded the only evidence so far of pigeon pea (*Cajanus cajan* Millsp.). At Navdatoli-Maheshwar the greater presence of linseed reveals it to be the oil yielding crop, while safflower is the oil crop at Nevasa.

The ancient plant economy appears little different from that of today. There is no evidence suggestive of any major palaeoenvironmental change, as the various crops described herein show a considerable degree of overlapping with present day environment for the same crops. Hence the precise qualitative aspects of the palaeoenvironment are quite complex to be unravelled on the basis of grain remains alone.

REFERENCES

- CALLEN, E. O. (1969). Diet as revealed by coprolites in *Science in Archaeology*. Eds., Brothwall, D. and Higgs, E., Thames and Hudson, Bristol.
- FORBES, R. J. (1966). *Studies in Ancient Technology*, Vol. 4, Brill, E. J., Leiden.
- KAJALE, M. D. (1973). Plant economy at Bhokardan. *Excavations at Bhokardan (Bhogavardhana) 1973*, Nagpur University, Marathwada University, Ed. Deo, S.B., 217-224.
- KUMAR, L. S. S. (1952). Identification of charred Ragi and Rice grains from the excavations at Kolhapur, 1945-46. *Bulletin of the Deccan College Research Institute*. 14 (1): 79-80.
- SANKALIA, H. D., DEO, S. B., ANSARI, Z. D., & ERHARDT, S. (1960). *From History to Prehistory at Nevasa*. Deccan College, Poona.
- VISHNU-MITRE. (1961). Plant Economy in Ancient Navdatoli-Maheshwar. *Technical Reports on Archaeological Remains*. Deccan College, University of Poona, 15-32.
- VISHNU-MITRE, PRAKASH, U & AWASTHI, N. (1971). Ancient Plant Economy at Ter, Maharashtra. *Geophytology*. 1(2): 170-177.
- VISHNU-MITRE. (1974). Palaeobotanical evidence in India. *Evolutionary studies in World Crops, Diversity and Change in the Indian Sub-continent*. Cambridge University Press, Cambridge.

EXPLANATION OF PLATE 1

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| 1. Barley grains. ×2. | 12. Black gram cotyledons. ×4. |
| 2. Rice grains. ×7.5. | 13. Hyacinth bean cotyledons. ×2.5. |
| 3. Wheat grains, dorsal view. ×2. | 14. Field pea grains. ×2.5. |
| 4. Wheat grains, ventral view. ×2. | 15. Chick pea grains. ×3.5. |
| 5. Kodon millet grains forming lump. ×2.5. | 16. Grass pea grains. ×2.5. |
| 6. Kodon millet grains without husk. ×3 | 17. Lentil grain. ×3.5. |
| 7. Kodon millet grains showing ventral view. ×7.5. | 18. Safflower grains. ×4. |
| 8. Finger millet grains. ×5. | 19. Indian jujube (ber) intact grains. ×2. |
| 9. Pearl millet grains. ×3. | 20. Indian jujube (ber) broken grains. ×2 |
| 10. Sorghum grains. ×3. | 21. Tamarind esed. ×7.5. |
| 11. Black gram intact grains. ×4. | 22. Unidentifiable fruits. ×3. |

