Table 1 *Effect of NAA, GA_3 and K_n on the cross B. c.* ssp. *Chinensis* × *B. o. var. capitata*

Treatment	Pistils pollinated	Increase in ovary length 15 DAP (cm)	Ovules containing embryos 20 DAP(%)
Water	20	2.4	–
NAA	60	3.2	–
GA_3	100	3.4	–
Kn	60	3.7	10
(GA_3 + NAA)	65	3.6	–
(Kn + NAA)	50	3.8	20

pollinated pistils were treated with water. The mean length of five ovaries was measured on the day of pollination and 15 days after pollination (DAP) for each treatment. Ovules from 10 pistils were dissected 20 days after pollination to observe embryos. The experiment was carried out during *rabi* 1984–85.

There was an increase in length of ovaries over control in all the five treatments (table 1). The increase was maximum with (Kn + NAA) and least with NAA. The ovules in each treatment were larger than in the control.

No embryos were observed in the ovules of the untreated pistils and also in the absence of kinetin in the treated pistils. Embryos were observed only in pistils treated with Kn and (Kn + NAA). In both cases, they were at the globular stage of development 20 days after pollination. However, in the combination treatment, the number of ovules with embryos was twice as many as those which received only Kn applications.

Thus application of kinetin, either singly or with NAA to incompatibly pollinated pistils promoted fertilization and embryo development. In addition, it also led to an increase in size of the ovules and ovaries. The chances of obtaining interspecific hybrids from the above cross by subsequent use of *in vitro* techniques are thereby increased. The present studies can lead to synthesis of *B. napus* at higher frequencies.

This paper forms part of the Ph.D. thesis submitted to IARI, New Delhi. The author is thankful to Dr R. N. Raut for discussions and encouragement.

6 February 1987

1. Namai, H., Sarashima, M. and Hosoda, T., In: *Brassica crops and wild allies*, (eds) S. Tsunoda, K. Hinata and C. Gomez-Campo, Japan Scientific Societies Press, Tokyo, 1980, p. 191.
2. Gland, A., *Z. Pflanzenzuecht.*, 1982, **88,** 242.
3. Raut, R. N. and Prakash, S., In: *Genetic manipulation of crop plants*, (ed.) V. L. Chopra, Oxford Publishing House, New Delhi, 1985, p. 205.
4. Inomata, N., *Jpn. J. Breed.*, 1979, **29,** 115.
5. Takeshita, M., Kato, M. and Tokumasu, S., *Jpn. J. Genet.*, 1980, **55,** 373.
6. Sastri, D. C. and Moss, J. P., *J. Exp. Bot.*, 1982, **33,** 1293.

PLANT REMAINS FROM BANAWALI, HARYANA

F. A. LONE, M. KHAN and G. M. BUTH
Department of Botany, Kashmir University, Srinagar 190 006, India.

THE carbonized plant remains recovered from the Harappan levels in the mound at Banawali in Tehsil Fatehabad, District Hissar, Harayana (recovered by the flotation process) comprise wheat and barley grains, a pulse and graminaceous culms and charcoals. Earlier, barley[1] and wheat[2] were reported from this site.

The wheat grains are oval to subglobular rather plumpy, about 4–5 mm long and 2.5–3.5 mm broad with embryo preserved at the base of dorsal surface. Thin-walled parenchyma cells are observed on the surface of these grains. They look like those of *Triticum aestivum* (figure 1).

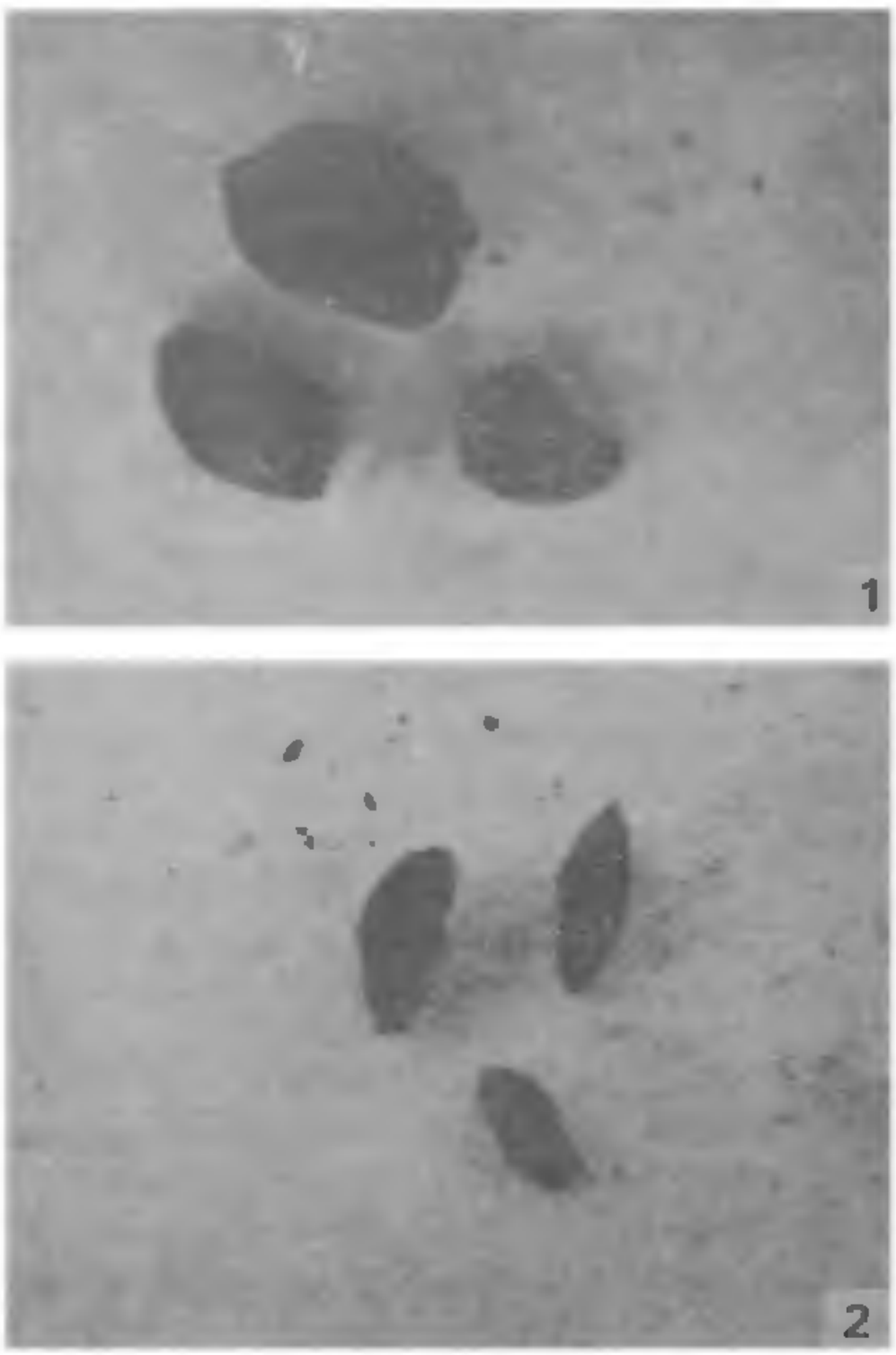
The barley grains are longish in shape, flat on the dorsal side and somewhat pointed on both the ends. They are 5–5.5 mm long and 2.5–3 mm broad. A furrow is seen on the ventral side. They are identified as *Hordeum* sp. (figure 2).

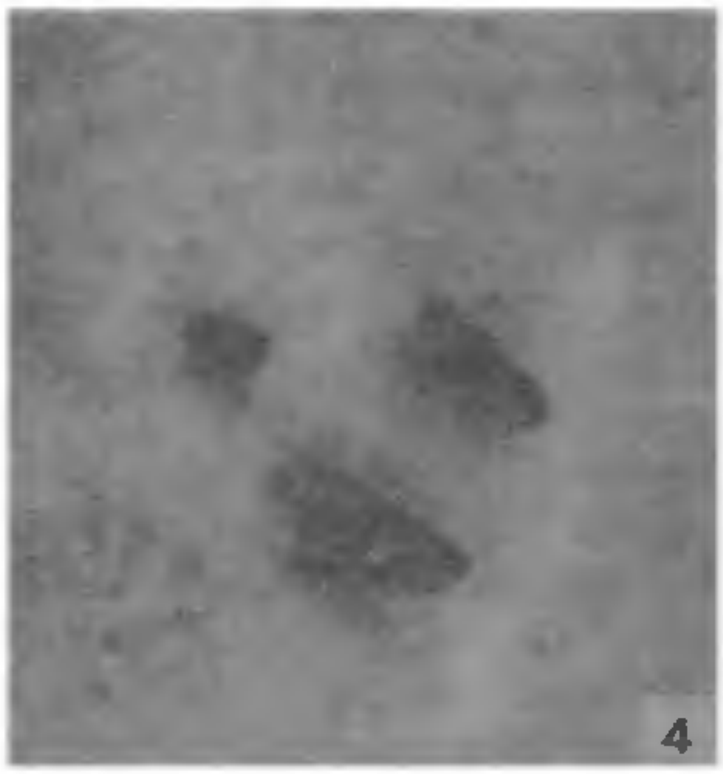
The seeds with a lateral hilum, oblong in shape, with a thin and smooth seed coat and about 4–4.2 mm long and 2.5–2.8 mm broad are distinctly papilionaceous in character. They appear to be like those of *Vigna mungo* (figure 3).

Cursary examination revealed that the graminaceous culms (figure 4) may belong to cereals or wild grasses and the charcoal pieces belong to some dicotyledonous plants. Detailed investigation and identification are in progress.

Recovery of *Vigna mungo* at this site (*c.* 2300 B. C.) is the earliest record in India.

Our thanks are due to Shri R. S. Bisht for these





Figures 1–4. Plant remains from Banawali. **1.** Wheat (*Triticum aestivum*); **2.** Barley (*Hordeum* sp.); **3.** *Vigna mungo*, and **4.** Graminecious culms.

fascinating materials and to the UGC, New Delhi for financial assistance.

15 July 1985; Revised 10 February 1986

1. Bisht, R. S., *Banawali A look back into the pre-Indus and Indus civilization*, 1977.
2. Vishnu Mittre, *Food economy of the Harappans*, In: *Harappan Civilization* pp. 205–221 (ed.) Gregory L. Possehl, Oxford and IBH Publ. Co, New Delhi, 1982, p. 205.

ANTHER CULTURE OF *NICOTIANA PLUMBAGINIFOLIA* VIV.

RAAGEEVA BIMAL
Department of Botany, Bihar University, Muzaffarpur 842 001, India.

NICOTIANA PLUMBAGINIFOLIA viv., the wild tobacco, is one of the 66 species of the genus *Nicotiana*. Although, not a commercial cash crop, it is rich in the alkaloid nicotine, and Australian aborigines chewed its leaves, prior to the introduction of *N. tabacum*. Nicotine, a colourless volatile liquid alkaloid which was isolated from tobacco leaves in the early years of 19th century, can produce both pharmacological as well as psychopharmacological effects. The wild tobacco is greatly desired for important agronomic attributes, and serves as a repository of genes or genetic information that could be potentially introduced to the commercial variety.

Flower buds, produced during the first four weeks of flowering, containing anthers at the uninucleate stage of pollen development (bud length 1.7 cm) and having sepals and petals of equal length, were surface-sterilized and the anthers were cultured aseptically on 0.8% agar solidified MS[1] basal medium either alone or MS medium containing various auxins, cytokinins and other growth adjuvants in varying concentrations and combinations. The cultures were incubated under continuous light (500 lux), at a temperature of $25 \pm 5°C$ and a