Table 2 *Contribution of male sterile genotypes*

Male sterile genotype used in cross	No. of types selected from cross
Co 421	81
Co 603	76
Co 281	14
Co 7201	5
Q 63	5
CoJ 64	3
Co A 71–1	2

Table 3 *Seedlings produced by selfing male sterile genotypes*

Male sterile genotype	No. of seedlings
Co 421	150
Co 603	49
Co 7201	25
Co 7401	199
Q 63	29

germination of fluff (true seeds of sugarcane) is that some of the male sterile genotypes produce seedlings on selfing. It may be mentioned that while selfing the arrows, care had been ensured to prevent contamination from outside source. The number of seedlings obtained in the male sterile genotypes is given in table 3.

Further studies are in progress to assess the genetic and breeding value of these seedlings and their utilization in sugarcane improvement.

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MULTINUCLEATE CONDITION IN THE DIFFERENTIATING SECONDARY XYLEM VESSEL ELEMENTS OF *DALBERGIA SISSOO* ROXB.

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CONSIDERABLE changes in volume, structure, ploidy and histone level in the nucleus of differentiating primary and secondary xylem elements are recorded.[1,2] Increase in nuclear number in differentiating vessel elements has been recorded till now only in four cases: *Ricinus communis*[3], two species of *Dioscorea*[4,5] and *Marsilea quadrifolia*[2]. All these reports concern only the differentiating primary xylem vessel elements.

During the study of vascular cambium and its activity in some tropical trees, differentiating secondary xylem vessel elements of *Dalbergia sissoo* containing more than a single nucleus were observed (figure 1). The multinucleate condition is due to the mitotic divisions of the nucleus of the mother cell as reported in *D. alata*[5] and *M. quadrifolia*[2] and not due to the obliteration of the transverse and lateral walls of the elements differentiating adjacent to one another as recorded by Hill and Freeman[4] in *Dioscorea prehensilis*. The coenocytic condition in the present

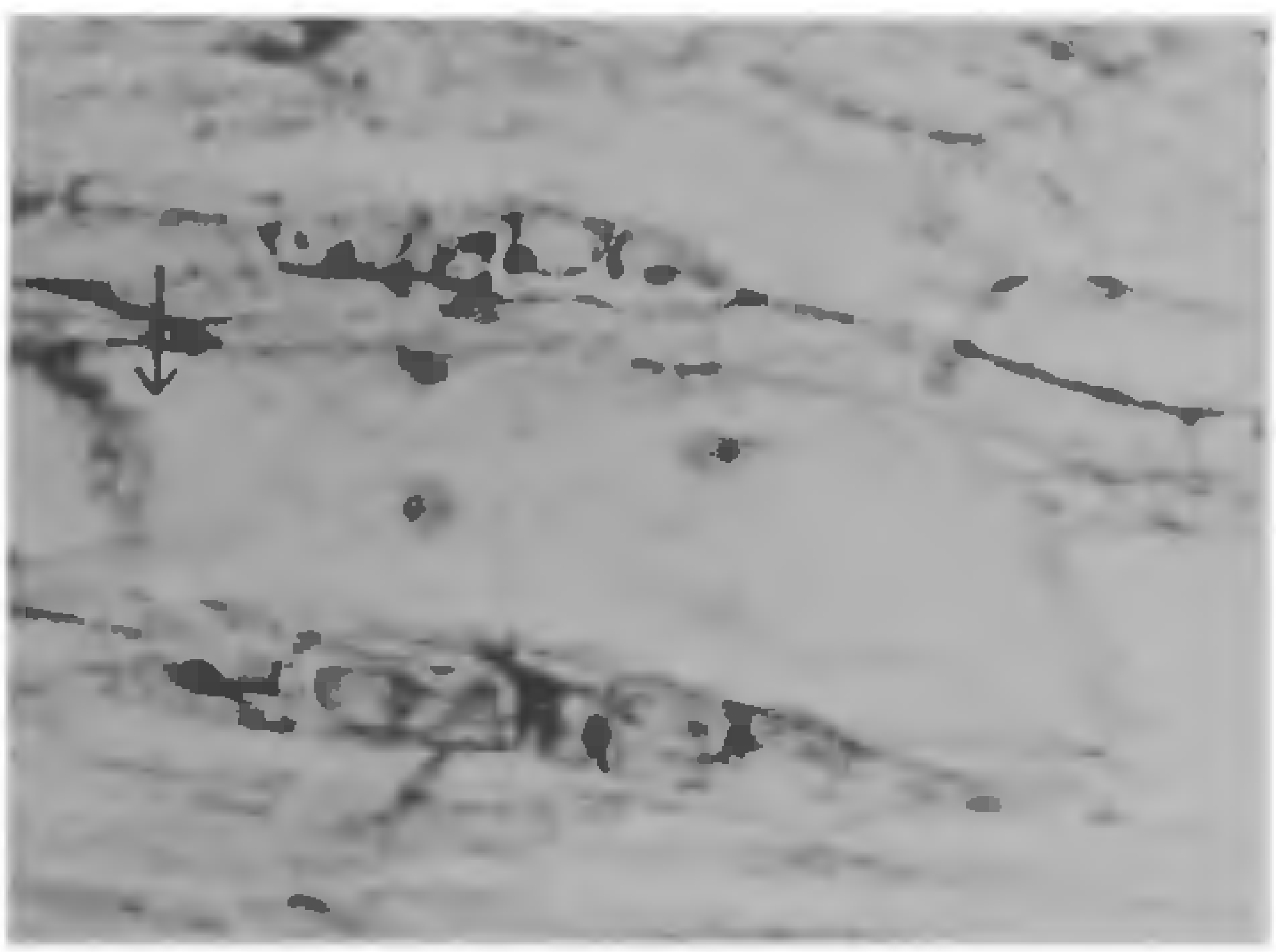

Figure 1. Tangential longitudinal section of differentiating secondary xylem region of *Dalbergia sissoo* showing multinucleate condition (three nuclei) in the developing xylem vessel element. Note also the swollen wall in the prospective perforation plate (see arrow). × 833.

material is lost before secondary wall deposition and before the formation of perforation plate unlike in *D. alata*[5]

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WATER STRESS INDUCED BY Zn DEFICIENCY IN CABBAGE

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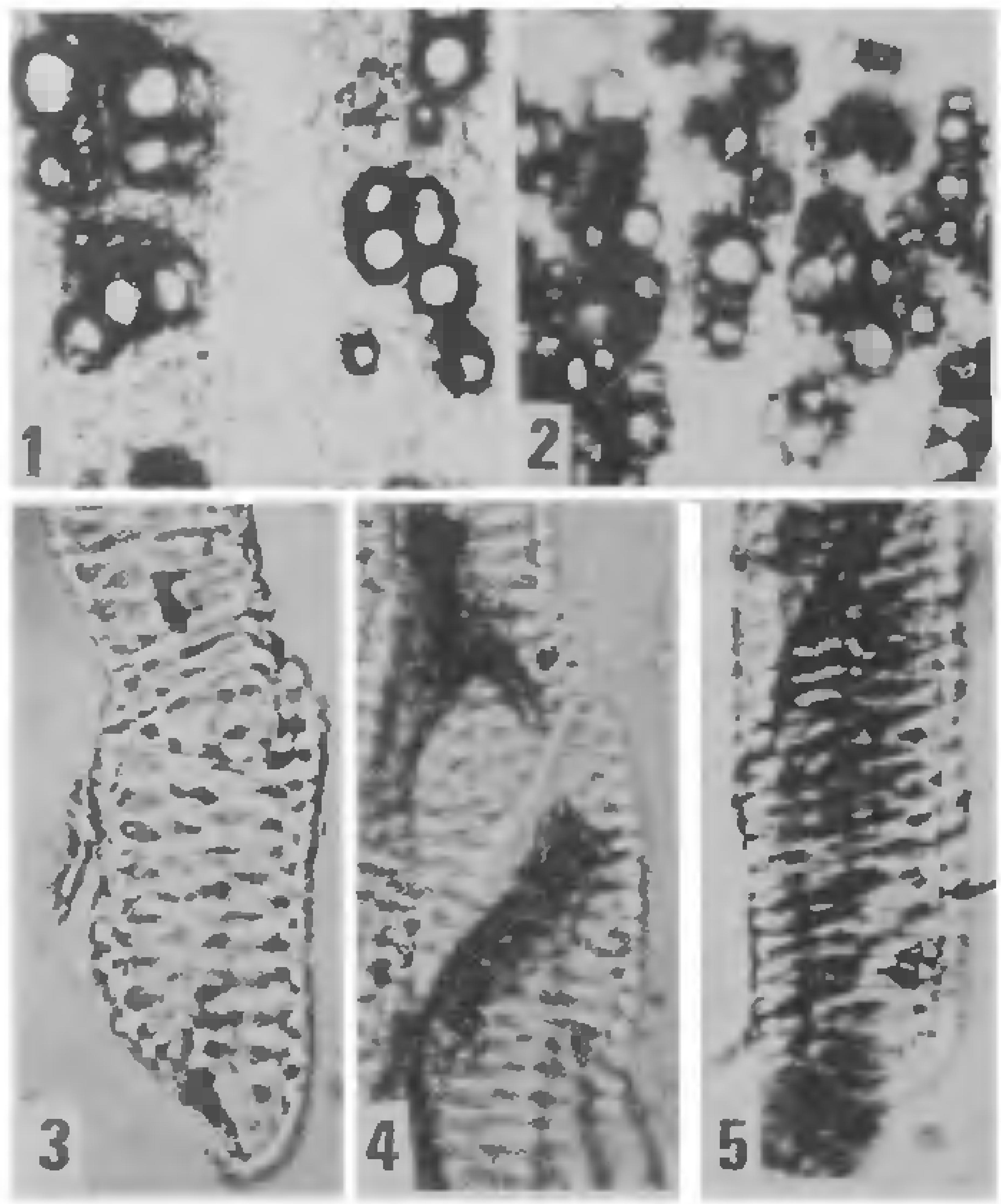
It has been shown that zinc deficiency lowers osmotic potential, increases water saturation deficit and induces stomatal closure suggesting development of water stress in cabbage[1]. Little is, however, understood about the involvement of zinc in water relations. In this study efforts were made to examine if the water stress in zinc-deficient plants was caused by impediment in water transport from roots to top parts.

Cabbage (*Brassica oleracea* L. var. capitata cv. Pride of India) plants were grown at normal (1 μM) and deficient (0.001 μM) supply of zinc in 5 litre corning glass beakers in half strength Long Ashton nutrient solution[2]. At 2 months growth, zinc deficiency effects were examined on root morphology, stomatal aperture, tissue hydration, water potential (ψ), water saturation deficit and proline content and on water loss (transpiration) from comparable middle leaves (15th to 17th from the base) as described earlier[1]. The freshly cut transverse sections of roots and mechanically isolated xylem vessels from the roots were examined in microscope after some histochemical tests.

Zinc deficiency retarded growth and induced visible symptoms. Middle leaves of zinc deficient plants were small, thick and leathery. Old leaves appeared dull with purplish pigmentation along the margins. Zinc deficient leaves lacked succulence and lustre and were shed premature. The rootlets of zinc deficient plants produced copious mucilage, developed inter-xylary cork and showed more pronounced periderm.

A large number of xylem vessels in the roots of zinc deficient plants contained a yellowish to light brown thick viscous substance (figures 1–5), which was soluble in HNO_3, insoluble in alcohol, ether and acetone, formed crystals upon treatment with NaOH, loosened and oozed out of the vessels upon treatment with HCl, gave positive test with 5% tartaric acid in ethanol and I-KI solution recommended as a histochemical test for alkaloid localisation[3]. The accumulation of this substance, an alkaloid or possibly a glucosinolate derivative, along the perforation plates in xylem vessels of cabbage roots impeded water transport from roots to top parts inducing water stress manifest as poor tissue hydration, high water saturation deficit, low water



Figures 1–5. 1. Xylem elements in transverse section of root of a normal plant. **2.** Xylem elements in transverse section of root of a zinc deficient plant showing blocking of vessels. **3.** A vessel isolated from the root of a normal plant. **4.** A vessel isolated from the root of a zinc deficient plant showing blocking around perforation plate. **5.** A vessel isolated from the root of a zinc deficient plant from which the substance causing blocking is seen oozing out upon treatment with concentrated HCl.