the ornamental species are less responsive to the technique than their wild relatives[1]. The present communication is a brief account on anther culture in horticulturally important species, *Tropaeolum majus* Linn.

Flower buds having anthers with nonvacuolate uninucleate pollens were subjected to cold treatment[2] at 4 C for 4 days prior to excision and inoculation of anthers under aseptic conditions in MS medium[3] supplemented with NAA and BAP at the concentration of 2.5 mg/l. The cultures were maintained at 22 ± 2°C under diffuse light source of 2000 lux (16 hr/day).

The cultured anthers gradually swelled up in volume during initial days of culture and showed various stages of multicellular tissue enclosed inside the pollen walls (figure 1). The growing white calli free from pollen wall peeped out of longitudinally dehisced anther lobes only after 3½ months. The anther wall then slowly shrivelled and dried. The callus was subsequently subcultured regularly at intervals of 20 days. Its growth was quite rapid during the first week of subculture (figure 2) followed by cessation of growth during subsequent days.

The subcultured callus started producing numerous green shoot buds after continuous subculture for two months (figure 3). The buds when isolated and subcultured grew rapidly producing tiny shoots. Root induction was observed only from the base of well grown shoots (figure 4).

Cytological studies showed the majority of cells of the callus to contain haploid set (14) of chromosomes, though cells with hypo- and hyperhaploid numbers were also met with.

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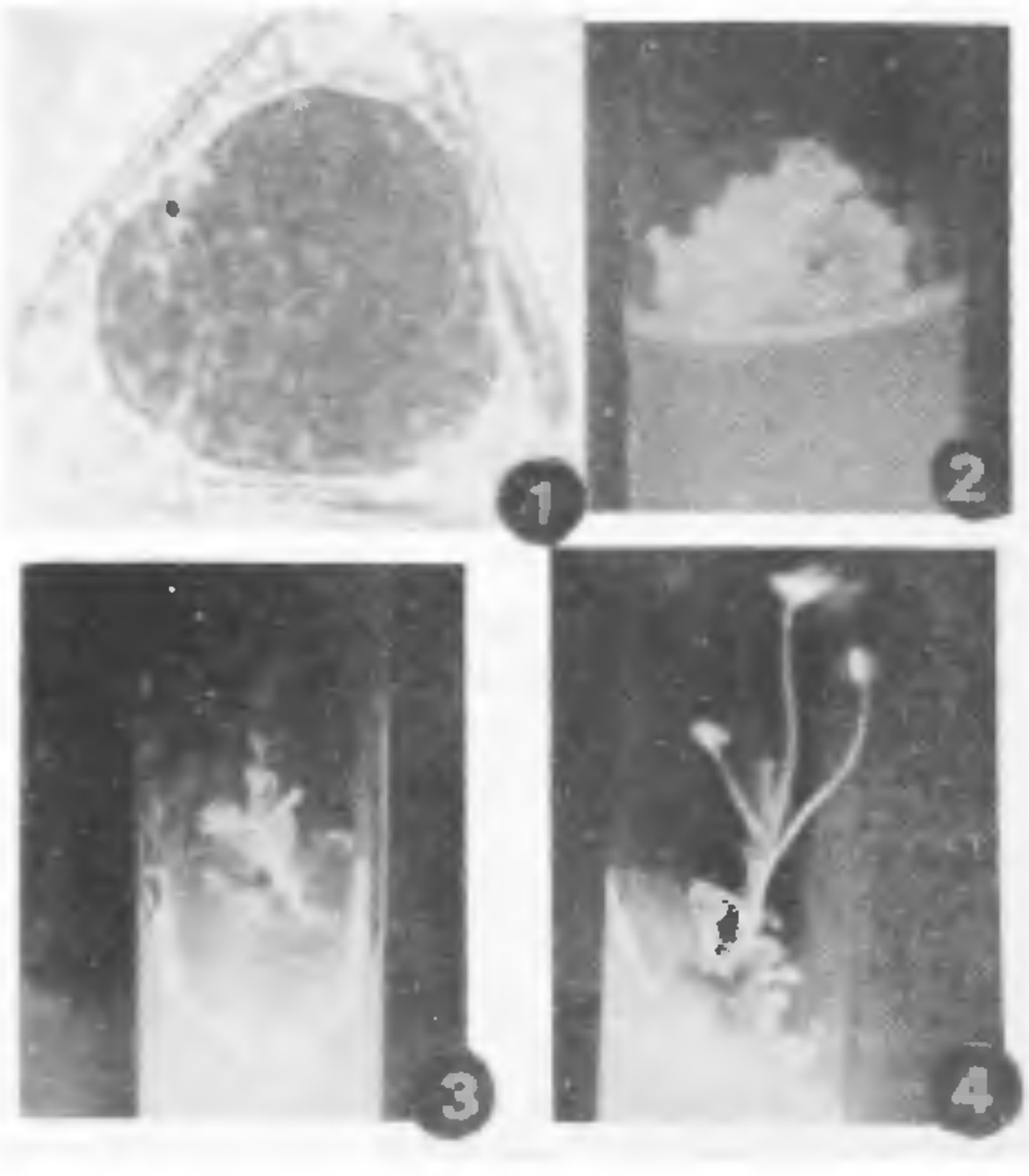

Figure 1–4. 1. Multicellular tissue included in pollen wall. × 1688. **2.** Well grown callus. **3.** Callus with differentiating shoot buds. **4.** Plantlet.

LEVELS OF SODIUM, POTASSIUM, CALCIUM, MAGNESIUM AND ZINC DURING THE EMBRYONIC DEVELOPMENT OF *CYPRINUS CARPIO*

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THE role of cations in biological processes is proved beyond doubt. It has been shown that the egg membrane is charged electronegative, hence the mobility of cations within the membrane is much higher than that of anions[1]. Exchange of cations across the egg membrane depends upon the requirement of developing embryo[2]. The present investigation deals with the levels of sodium, potassium, calcium, magnesium and zinc during the embryonic development of common carp, *Cyprinus carpio*.

Induced breeding and artificial fertilization of *C. carpio* was done following the method of Woynarovich and Horvath[3]. Egg samples at different developing stages (figure 1) were collected; washed with distilled water; dried and lyophilized immediately. Samples were digested with concentrated nitric acid for 24 hr at

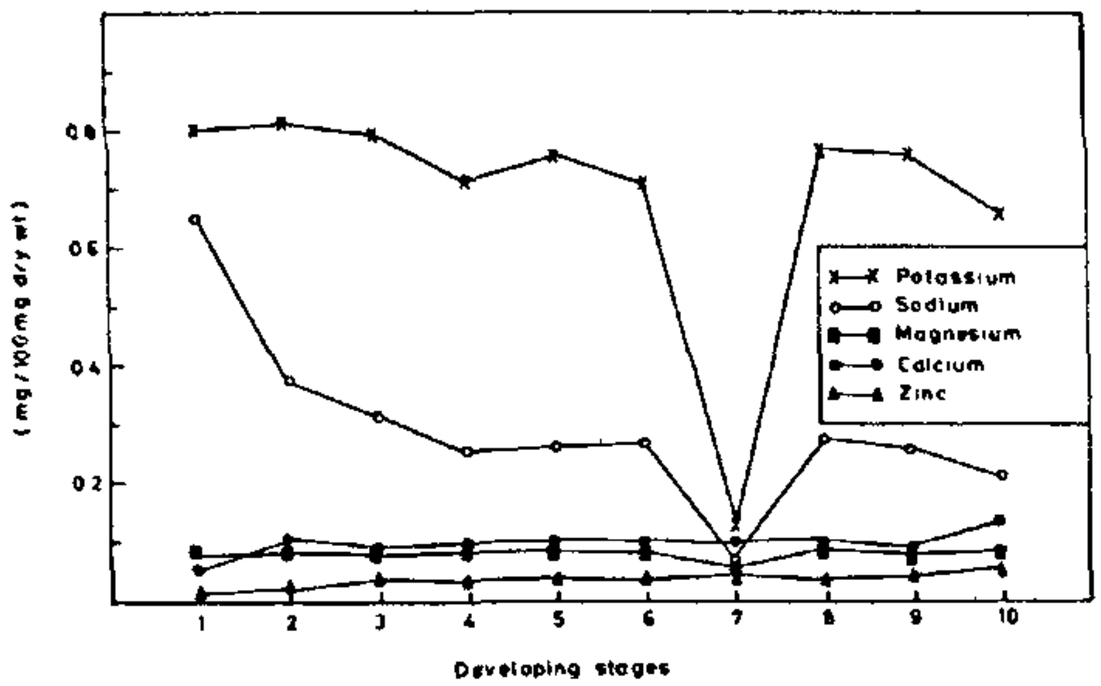

Figure 1. Levels of Sodium, Potassium, Calcium, Magnesium and Zinc during embryonic development of *C. carpio*.
1 = Unfertilized egg, 2 = Blastodisc, 3 = Early morula, 4 = Late morula, 5 = Blastula, 6 = Gastrula, 7 = Closing of blastopore, 8 = Comma, 9 = Eyed, 10 = Prior to hatching (Stages identified at 24°C–26°C).

115–120°. The Na^+, K^+, Ca^{++}, Mg^{++} and Zn^{++} were determined by double beam (AA-575 series) atomic absorption spectrophotometer. The values are expressed as mg/100 mg dry weight.

Changes in the levels of ions at various developing stages are shown in figure 1. High levels of Na^+ and K^+ in unfertilized egg of *C. carpio* are clearly related to holding yolk globulins in solution; the opacity of the egg, due to precipitation of yolk globulins following injury or death, being a natural consequence of exosmosis of electrolytes[4]. Relatively a higher level of Ca^{++} and a marked efflux of Na^+ denote gelation of cytoplasm[5], activation of ATPase[6] and a return to low passive permeability at fertilization[7]. Large scale efflux of Na^+ and K^+ at closing of blastopore is the most significant feature of this study and is visualized to be on account of the release of these ions following extensive degradation of yolk proteins[8]. During comma and eye stages, on the other hand, with the synthesis of a wide array of new proteins and enzymes, uptake of Na^+ and K^+ and the consequent rise in their levels are only too natural. At hatching, however, with the developmental activities at low ebb, there is a slight fall in levels of Na^+ and K^+ and a rise in Ca^{++}, the latter perhaps due to its role in activation of proteolytic enzymes related to hatching.

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SOME NEW RECORDS OF FUNGI CAUSING TURMERIC RHIZOME ROT

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IN recent years fungal infection has been a serious problem[1], in storage in the seed rhizomes centres, like Krishna district (Andhra Pradesh), Tiruchirapalli and Coimbatore districts (Tamil Nadu) and Barua Sagar, Jhansi (UP). Considering that fungal infestation may be initiated in the field itself, freshly harvested rhizome samples were collected from two important centres, Coimbatore (1980) and Barua Sagar (1980–1982) and our studies are reported in this communication.

As much as 21% of rhizomes carried rotting symptoms in the Coimbatore samples, while 18, 16 and 20% disease incidences were noted in Barua Sagar samples of 1980, 1981 and 1982 respectively. This suggests that substantial rotting is initiated in field itself and even if a part of this inoculum is carried to the storage centres, it may lead to spoilage of large number of rhizomes.

Most of the rotted rhizomes were covered by white, grey and pink-coloured mycelia. Some were deshaped and also shrinked. The fungi associated with these rhizomes were isolated following usual mycological techniques after surface sterilization.

Ten fungi were found consistently growing on diseased bits plated on blotter and Czapek's agar plate. These were inoculated on surface-sterilized healthy