Summary

The families Costaceae and Zingiberaceae are well-known for their medicinal and economic significance, occur chiefly in the tropical regions of the world mainly in the Indo-Malaysian area of Asia. India has a rich diversity of Zingiberales, representing with about 22 genera and 170 species. The Indo-Burmese region, one of the mega-biodiversity hot spots, also has several wild and domesticated species of medicinal Zingiberales.

The survival/existence of many of these Zingiberaceous species have been threatened due to deforestation, jhum cultivation, habitat disturbance for conversion of wetland ecosystems into agricultural land and uncontrolled plucking/uprooting of plants. Plant tissue culture has been effectively applied to mass multiplication of diverse, rare and endangered plants. In the present investigation, four elite species, viz., *Alpinia allughas*, *Alpinia galanga* (family Zingiberaceae), *Costus speciosus* and *Costus pictus* (family Costaceae) were taken up for *in vitro* propagation. Three different explants were used in the present investigation, viz., nodal segments, rhizomatous eyes and root tips. In the case of *Alpinia allughas*, root tips and rhizomatous eyes/buds were used as explants while for *Alpinia galanga* only rhizomatous eyes/buds were used. For *Costus speciosus*, 

nodal segments were used while for *Costus pictus* nodal segments and rhizomatous eyes/buds were used.

In *Alpinia allughas*, highest frequency of microshoot induction and maximum average number of multiple shoots were produced on 5µM BAP and 0.6µM NAA. In *Alpinia galanga*, the maximum average number of shoots was produced in the treatment of 5µM BAP and 0.9µM NAA. The shoots of *Alpinia allughas* produced maximum number of roots in medium supplemented with 2µM BAP and 7µM IAA. whereas *Alpinia galanga*, the maximum was observed in medium supplemented with 2µM BAP and 5µM NAA. The roots were thin and lean.

Callus was initiated at the root tips of *Alpinia allughas* in medium supplemented with 2µM BAP and 9µM IAA. The calli proliferated when transferred on to medium supplemented with 2µM BAP and 9-15µM IAA. Regeneration increased when transferred to medium supplemented with 5µM BAP and 0.3-1.2µM NAA. Maximum average number of shoots was obtained in MS medium supplemented with 5µM BAP and 0.9µM NAA.

Microrhizome induction for *Alpinia allughas* does not pose any difficulty as compared to *Costus pictus*. *A. allughas* plantlets cultured in 8% sucrose with 10-30µM BAP showed microrhizome formation. The best medium was 20µM BAP supplemented medium.
In *Costus pictus*, the highest frequency of bud-break (93.33%) was observed in medium supplemented with 0.6µM NAA, 3µM BAP and in *Costus speciosus* 1µM NAA, 5µM BAP, 10µM AdS showed the highest frequency of bud-break. Nodal segments of *Costus pictus* showed bud-break in medium supplemented with 3% sucrose. However, in *Costus speciosus*, 5% sucrose was optimal for bud-break. *Costus speciosus* explants produced highest average multiple shoots in medium supplemented with 1µM NAA, 7µM BAP, 10µM AdS but in *Costus pictus*, the highest average multiple shoots was observed in 0.6µM NAA, 8µM BAP. For both the species, 5% sucrose was optimal for shoot multiplication.

*Costus pictus* shoots rooted when the concentration of auxin was increased more than 0.6µM NAA. The highest average was achieved on 8µM NAA and 3µM BAP. In *Costus speciosus*, there was increase of root, when the plantlets were transferred from bud-break medium to shoot multiplication medium. The present investigations have suggested that axillary bud sprout and microrhizome induction in *Costus pictus* requires specific ratio of auxin and cytokinin, sucrose concentration, photoperiod, strength of medium and physiological status of the explants. The plantlets cultured in 5-13% sucrose, 7µM BAP and 0.6µM NAA showed axillary bud sprout. The best axillary bud sprout was achieved in plantlets from which shoot