

FORMATION OF NEGATIVELY GEOTROPIC ROOTS IN EXPLANT CULTURE OF *CARDIOSPERMUM HALICACABUM* LINN.

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Various explants of *Cardiospermum halicacabum* seedling viz. hypocotyl cotyledon and epicotyl were cultured on Murashige and Skoog's medium supplemented with various combinations of auxins i.e. NAA and 2, 4-D and cytokinin, i.e. Kn and BAP. Negatively geotropic roots were formed after 3 to 4 weeks of culturing on NAA + cytokinin combinations in the ratio of 1:1, however, the subsequent subculturing on the same medium as well as on the medium devoid of auxin reduced the frequency of negatively geotropic roots. Whereas all the combinations of 2, 4-D + cytokinin did not induce negative geotropic roots.

Key Words: *Cardiospermum halicacabum*, Tissue culture.

Cardiospermum halicacabum L. (Balloon vine) which belongs to family Sapindaceae is a perennial herbaceous vine distributed throughout India. The herb is diuretic stomachic and rubefacient and is used in rheumatism, lumabago, nervous disease and as a demulcent in orchitis and dropsy.

In the present study negatively geotropic roots were observed in calli of various explants. The explants viz. hypocotyl, epicotyl and cotyledon were derived from 15 days old aseptically raised seedling on medium containing MS salts, 0.5% sucrose and 0.8% agar-agar.

These explants were cultured on MS medium supplemented with different concentrations of auxins like NAA (0.5, 1.0, 2.0 mg/l) 2,4-D (0.5, 1.0 mg/l) and cytokinins like Kinetin (0.5, 1.0 mg/l) and BAP (0.5 and 1.0 mg/l).

The rhizogenesis was observed after 3-4 weeks of culturing. A number of combinations containing NAA and cytokinin (i.e. 0.5 mg/l NAA + 0.5 mg/l Kn or BAP, 1.0 mg/l NAA + 1.0 mg/l Kn or BAP) in 1:1 ratio showed negatively geotropic roots (Fig.1) on all the calli irrespective to the nature of explant. Whereas on 2,4-D with both Kn and BAP, calli showed normal rooting. Role of Kn and NAA in inducing negative geotropism in roots was also reported by Goyal and Pillai (1983). They reported negative geotropism with high auxin and low kinetin concentrations, but in the present studies the roots showed negative geotropism with equal concentrations of

auxin and cytokinin. It was noticed from the present studies that negative geotropism was induced on NAA + cytokinin medium rather than 2, 4-D + cytokinin medium which indicate that the negative geotropism was more an auxin dependent rather than concentration and ratio.

The roots which grew upward into air were white, thin and short. A few roots were stout and short showing diageotropism. Geotropic roots showed profuse branching which resulted into anastomoses. The subsequent subculturing of the calli on the same medium and also on the medium devoid of auxin resulted into reduced frequency of negatively geotropic roots more on the medium without auxin, which indicated that auxin determined the fate and type of roots. Contrary to this Goyal and Pillai (1983) reported continued production of negatively geotropic roots after subculturing. Vasil and Hildebrandt (1966) also observed negatively geotropic roots on *Petroselinum hortense* but did not elaborate the causative factors.

Efforts were made to induce positively geotropic roots by wrapping up the culture vessels upto the level of the medium by black carbon paper and it was observed that as much as 90 per cent of the negatively geotropic roots turned to become positive, this indicated that the effect of light along with the auxin play a vital role in inducing negative geotropism in roots.

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