

STUDY ON THE EFFECT OF COLCHICINE ON *IN-VITRO* CULTURES OF TURMERIC (*Curcuma longa* L.) FOR POLYPLOID DEVELOPMENT

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Crop improvement possibilities in turmeric *Curcuma longa* (L.) are limited due to its triploid nature except for polyploidization. Colchicine is a chemical that is used frequently to make plants polyploidy. Hence, this research aimed to study the effect of colchicine on the ability to induce polyploidization of *in-vitro* turmeric cultures. The study consisted of two experiments: (1) assay on *in-vitro* culturing for callus induction and (2) assay on colchicine treatments and polyploidy screening. In experiment 1, turmeric rhizome buds were cultured on MS-solidified medium for callus induction with 100 mL coconut water, 2.5 and 4.5 mg L⁻¹ 2,4-Dichlorophenoxyacetic acid, 0.93 mg L⁻¹ Kinetin and without growth regulators. In addition, cell suspension culture was tested for callus induction with 4.5 mg L⁻¹ 2,4-Dichlorophenoxyacetic acid and 0.93 mg L⁻¹ Kinetin. For polyploidy induction in experiment 2, *in-vitro* developed root tip via callus tissues were transferred to liquid MS medium supplemented with various concentrations of colchicine for 2 days. Then, Acetocarmine staining method and microscopic observation were attempted to count the chromosome number. Nucleus size, nucleus area (μmSq), and perimeter (μm) were referred using microscopic observation under 1000× magnification and BEL capture software. As experiment 1 results, MS-solidified medium supplemented with coconut water (100 mL) was most effective in inducing callus and as experiment 2 results the change in the cell nucleus area (μmSq) of the turmeric cells with each concentration of colchicine; 0, 0.05, 0.10, 0.15, and 0.20 (%) for 2 days was 275.1^b, 371.23^a, 311.65^{ab}, 285.85^{ab} and 328.43^{ab} and changes in the nucleus perimeter (μm) was 53.33^b, 65.73^a, 61.08^{ab}, 58.75^{ab}, and 63.45^{ab} respectively. Therefore, 0.05% concentration of colchicine showed the highest results and was significantly different from each concentration. Therefore, it can be concluded that 0.05% colchicine concentration has an effect on nuclear size increment thereby possibly inducing polyploidization of turmeric.

Keywords: Colchicine, Crop improvement, Polyploid, Turmeric