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Induction of Callus and Expression of Compounds in Capsicum Frutescens Supplemented with of 2, 4-D

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Abstract : Cili padi or Capsicum frutescens is one of capsicum species from nightshade family, Solanaceae. It is famous in Malaysia and is widely used as a food ingredient. Capsicum frutescens also possess vast medicinal properties. The objectives of this study are to determine the most optimum 2,4-D hormone concentration for callus induction from stem explants C. frutescens and the effects of different 2,4-D concentrations on expression of compounds from C. frutescens. Seeds were cultured on MS media without hormones (MS basal media) to yield aseptic seedlings of this species, which were then used to supply explant source for subsequent tissue culture experiments. Stem explants were excised from aseptic seedlings and cultured on MS media supplemented with various concentrations (0.1, 0.3 and 0.5 mg/L) of 2,4-D to induce formation of callus. Fresh weight, dry weight and callus growth percentage in all samples were recorded. The highest mean of dry weight was observed in MS media supplemented with 0.5 mg/L 2,4-D, where 0.4499 ± 0.106 g of callus was produced. The highest percentage of callus growth (16.4%) was also observed in cultures supplemented with 0.5 mg/L 2,4-D. The callus samples were also subjected to HPLC-MS to evaluate the effect of hormone concentration on expression of bio active compounds in different samples. Results showed that caffeoylferuloylquinic acids were present in all samples, but was most abundant in callus cells supplemented with 0.3 & 0.5 mg/L 2,4-D. Interestingly, there was an unknown compound observed to be highly expressed in callus cells supplemented with 0.1 mg/L 2,4-D, but its presence was less significant in callus cells supplemented with 0.3 and 0.5 mg/L 2,4-D. Furthermore, there was also a compound identified as octadecadienoic acid, which was uniquely expressed in callus supplemented with 0.5 mg/L 2,4-D, but absent in callus cells supplemented with 0.1 and 0.3 mg/L 2,4-D. The results obtained in this study indicated that plant growth regulators played a role in expression of secondary metabolites in plants. The increase or decrease of these growth regulators may have triggered a change in the secondary metabolite biosynthesis pathways, thus causing differential expression of compounds in this plant.

Keywords : callus, in vitro, secondary metabolite, 2,4-Dichlorophenoxyacetic acid
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