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Plant Science 2018- Effect of vitamins on improving morphogenic competence in Cuminum cyminum L. cultures- Smita Purohit- India

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Cuminum cyminum L. is an important seed spice belonging to family Apiaceae. Production of cumin is limited due to limited genetic diversity and several biotic stresses. Hence, the present study aims at improving the regeneration of cumin in in vitro cultures. A regeneration medium was standardized comprising of MS supplemented with kinetin (0.5 mg/l). Effect of thiamine was studied on the morphogenic competence of the in vitro cultures. The levels of thiamine in the induction as well as proliferation medium highly influenced the shoot regeneration. Highest number of shoot buds per explant was obtained when the concentration of thiamine was twofold the normal MS level at both induction as well as proliferation stages. Shoots upto 2 cm or more in length were excised and inoculated on rooting medium i.e., MS medium supplemented with 0.5 mg/l indole-3-butyric acid (IBA). Rooted plantlets were transferred to field conditions.

Totipotent plant somatic cells typically undergo in vitro regeneration through one of the following four pathways: direct adventitious shoot meristem formation (direct shoot organogenesis), direct somatic embryo formation (direct somatic embryo- genesis), indirect adventitious shoot meristem formation (indirect shoot organogenesis), or indirect somatic embryo formation (indirect somatic embryo- genesis) (Thorpe 1994). Direct pathways occur without passing callus phase while indirect pathways occur through callus. Simultaneous study of different in vitro morphogenesis pathways can reveal exclu- sive insight in dissecting and defining the fundamental nature of cell totipotency. Since, various morphogenesis pathways have not been commonly investigated in a given explant of a defined plant; the major difficulty can be finding reliable plant materials which exhibit more than one pathway for precise comparison and elimination of errors related to different explant sources. Dolendro-Singh et al. obtained both organogenesis and somatic embryogenesis on seedling explants of pigeonpea (Cajanus cajan L.) in different concentrations of TDZ. Using immature cotyledons of soybean as explant, Thibaud-Nissen et al. (2003) developed and compared direct somatic embryogenesis from the adaxial side of the cotyledon and callus from abaxial side. Since, the both direct and indirect pathways were induced on a single explant under the similar condition and similar plant growth regulator combination, the error sources dramatically decreased resulting precise comparison between pathways.

During our previous studies (Ebrahimie et al. 2003, 2006), it was observed that mature embryo of cumin, an important medicinal plant, has highly capable tissues for rapid and continuous initiation and regeneration of in vitro morphogenesis pathways without showing variation in genotypic and phenotypic characteristics. Efficient direct organogenesis and indirect organogenesis from mature embryo explant of this plant have been reported by the authors (Ebrahimie et al. 2003,2006).

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Recent Publications

1. Purohit S and Agarwal M (2017) Mineral manipulation and Antioxidative studies in Carnation - Dianthus caryophyllus L. International Journal of Crop Science and Technology 3:1-8.

2. Yadav A, Joshi A, Kothari S L, Kachhwaha S and Purohit S (2017) Medicinal, nutritional and industrial applications of Salvia species: A revisit. International Journal of Pharmaceutical Science Review & Research 43(2):27-37

3. Agarwal M and Purohit S (2013) Overcoming hyperhydricity and profiling the affected proteins in micropropagated

carnation. IIS University Journal of Science and Technology 2(1):32-37.

4. Agarwal M and Purohit S (2013) Changes in antioxidant enzymes activity during in vitro morphogenesis of carnation and the effect of antioxidants on plant regeneration. World Journal of Sciences and Technology 2(7):87-92

5. Purohit S and Kothari S L (2007) Direct somatic Embryogenesis from cotyledon and cotyledonary node explants in Bishop???s weed- Trachyspermum ammi (L.) Sprague. In vitro cellular & developmental biology- Plant 43(2):154-158.