STUDY OF SOME PHYTOCHEMICAL CONSTITUENTS AND BIOLOGICAL ACTIVITIES OF *Eriocephalus africanus* L. PLANT BY TISSUE CULTURE TECHNIQUE

By

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B.Sc. Agric. Sci., Fac. Agric. Cairo Univ., 1991
M.Sc. Agric. Sci. (Horticulture), Fac. Agric. Al-Azhar Univ., 2011

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APPROVAL SHEET

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Supervisors: Dr. Tarek Abou Dahab Mohamed
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ABSTRACT

Shoot tips were used as explants for growth and development of *Eriocephalus africanus* L. plant in this study. The results showed that, B_5 medium gave the best results in most of growth measurements when culturing the shoot tips explants which grown in 2000 lux. 2.00 mg/l BAP recorded the highest values in survival percentage 93.33%, shootlets number/cluster 16.50 and shootlet strength 4.50. Use 4.00 mg/l GA_3 in medium was more effect in the elongation of shootlets. In rooting stage B_5 medium+0.50 mg/l IBA+0.15% active charcoal was more effect at increased roots number/explant to 8.67 and root length to 5.78cm. The planting soil medium containing peatmoss, sand and vermiculite interaction at equal volume 1:1:1 v/v/v was recorded the best results in acclimatization of rooted plants. In the indirect organogenesis, B_5 medium free hormones (control) showed the highest value of shoot formation alone or callus and shoot together. The highest percentage for callus formation was obtained with B_5 medium+4.00 mg/l 2,4-D+0.50 mg/l BAP. Concerning the formation of callus with bud together the highest record as observed with B_5 medium+0.50 mg/l 2,4-D+1.00 mg/l BAP. B_5 medium+4.00 mg/l GA_3+0.25 mg/l BAP recorded the highest value of buds and shoot formation together, also the highest callus, buds with shoot formation together was obtained on B_5 medium+1.00 mg/l GA_3+0.50 mg/l BAP, the highest record of buds produced alone as observed with B_5 medium+1.00 mg/l NAA+0.50 mg/l BAP. The chemical analysis for the volatile oils extracted from three samples of *E. africanus* L. by using GC/MS confirmed that, the total number of the constituents identified were 30-34 compound accounting for 79.67-99.41% of the total oil contents. The total phenolic acids and flavonoid contents were determination which reached to the highest values 3.665 mg/100 mg d.w and 5.118 mg/100 mg d.w respectively in the sample extract from *in vitro* produced plantlets. The antioxidant activity for *in vitro* produced plantlets was higher than *in vivo* grown plants which recorded 81.01%. From the RAPD-PCR analysis for *in vitro* and *in vivo* plants found that the distances among five treatments, the maximum distance 0.91 was recorded between M3 and M2, also M2 (B_5 medium +4.00 mg/l GA_3) was the best treatments where the most recent genetic diversity because of self-motivation and thus improve plant productivity. In the indirect organogenesis it was found that the genetic distances among eleven treatment (combination hormones) the maximum distance 0.90 was recorded between M9 and M4. That is, M4 (B_5 medium+4.00 mg/l GA_3+0.25 mg/l BAP) was the best treatments where the variation can occur due to endogenous stimulus exerted by exogenous hormonal combination as well permanence of nuclear genome helps to maintain the genetic fidelity of the plant and its proper functioning at the cellular level. The study proved that ethanolic extract for *in vivo* plants was appeared obvious effect against all tested organisms. The cold water extract for *in vitro* plantlets was antimicrobial activity against tested bacteria and fungi except *P. chrysogenum*. In addition to, the hot water extract for *in vitro* and *in vivo* plants had considerable effect against *K. Pnumoniae*, *S. aureus* and *C. albicans*.

Key words: Shoot tips , (*Eriocephalus africanus* L.) , acclimatization , callus formation , volatile oils , GC-MS , *in vitro* , *in vivo* , phenolic , flavonoid , antioxidant activity , RAPD-PCR , genetic diversity and antimicrobial activity.

DEDICATION

I would like to dedicate this work to spirit my mother and father. Special dedicate to my wife, my sons; Youssef, Yassin and Malk for their patience and help me as well as to all my friends for their helping and supports.

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