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**Title of Dissertation:** "Biotechnological studies on the insectivorous plants and their effect on the growth of date palm using tissue culture techniques"

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## ABSTRACT

Carnivorous or insectivorous plants belong to several botanical families, the most important of them is Droseraceae, which includes *Drosera* plants. Some economic substances are extracted from *Drosera*. Tissue culture technique provides the best way to obtain as high and clean quantity as possible of the biomass needed to obtain these substances. This study aimed to propagate the *Drosera capensis in vitro* and evaluate its content from phytohormones and total amino acids, indoles and phenols. Also studying the effect of *Drosera capensis* leaf and root extracts as plant growth substances on *in vitro* growth of *Phoenix dactylifera* cv. Bartamouda as one of the most important crops. And studying the effect of *Drosera capensis* residue on larva of red palm weevil. Shoots were visible on leaf explants, apparently forming directly on leaf surfaces without intermediate callus. The best results of shoot number (13.8 shoots per explant) and shoot length (2.93 cm) were obtained at 0.05 mg L<sup>-1</sup> BA compared with the control, BA-free media, observed 2.8 shoots per explant and 2.27 cm in length. MS basal medium supplemented with 1.0 mg L<sup>-1</sup> IBA achieved the best root formation where the root number was 47.3 per plant. Using of ½ MS medium supplemented with NAA at 0.25 mg L<sup>-1</sup> and BA at 0.3 mg L<sup>-1</sup> gave rise to biggest callus weight. The amounts of phytohormones in *Drosera capensis* plant (mg 100g<sup>-1</sup> fresh weight) were as following: Indole acetic acid in leaf was 2.055 mg, while in case of root

was 2.291 mg. Zeatine in leaf was 1.609 mg, while in case of root was 0.418 mg. Other Cytokinins in leaf was 18.791 mg, while in case of root was 1.003 mg. Gibberellic acid in leaf was 70.938 mg, while in case of root was 86.59 mg. Abscissic acid in leaf was 0.500 mg, while in case of root was 0.158 mg. The amount (mg 100g<sup>-1</sup> fresh weight) of total amino acids in leaves was 200 mg, while in case of roots were 100 mg. The amount of total indoles in leaves was 17 mg; while in case of roots was 11 mg. The amount of total phenols in leaves was 0.05 mg; while in case of root was 0.02 mg. Concentrations of the extract of *Drosera capensis* leaves and roots were applied at different ratios in *in vitro* experiments of date palm cv. Bartamouda. The results revealed that *Drosera capensis* root extract had a significant effect on fresh weight of date palm embryogenic callus as the best result (4.63g) was observed with using *Drosera capensis* root extract at 3.0ml L<sup>-1</sup> (0.042g residue). Using of *Drosera capensis* root extract at 0.05ml L<sup>-1</sup> (0.0007g residue) gave rise to higher number of mature embryos. The highest significant shoot number (21 shoots) of date palm was obtained with using 1.0ml L<sup>-1</sup> (0.01g residue) *Drosera capensis* leaf extract. Also the length of date palm shoots increased significantly by using the same concentration of *Drosera capensis* leaf extract and reached 3.3cm. In rooting stage, the best result was obtained with the use of *Drosera capensis* root extract at 1.0ml L<sup>-1</sup> (0.014g residue). In acclimatization stage, the best result was obtained with the use of *Drosera capensis* root extract at 1.0ml L<sup>-1</sup> (0.014g residue). Finally, *in vitro* date palm cultivation can be achieved with MS medium supplemented with *Drosera capensis* extract as a source of phytohormones at different micropropagation stages. The residue of *Drosera capensis* plants at different concentrations (0.0, 50.0, 100. 500.0 mg per liter) had been given to fully developed larvae of red palm weevil (*Rhynchophorus ferrugineus* Oliv.) through their feeding diet. Larvae were obtained from the field and

were maintained on the stems of sugarcane prior to mass rearing, artificial diet, which was formulated from sucrose, molasses, potatoes and agar. The residue of *Drosera capensis* had toxicological effects on *R. ferrugineus* larvae. The lethal action of *Drosera capensis* residue had appeared clearly at 500 mg L<sup>-1</sup> where the lethal percentage of red palm weevil larva was 65% after ten days.

**Key words:** *Drosera capensis*; Shoot multiplication; Benzyl adenine; Rooting stage; Indole butyric acid; *Drosera capensis* extract; Phytohormones; *In vitro*; date palm cv. Bartamouda; Embryogenic callus; Mature embryos; *Rhynchophorus ferrugineus* Oliv.

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## LIST OF ABBREVIATIONS

<b>2,4-D</b>	2, 4-Dichlorophenoxyacetic acid
<b>2iP</b>	6-( $\gamma$ - $\gamma$ -Dimethylallylamino)purine
<b>AC</b>	Activated charcoal
<b>BA</b>	Benzyladenine (6-Benzylaminopurine)
<b>IAA</b>	Indole-3-acetic acid
<b>IBA</b>	Indole-3-butyric acid
<b>Kin</b>	Kinetin(6-furfuryl aminopyrine)
<b>mg L<sup>-1</sup></b>	Milligram per liter
<b>MS medium</b>	Murashige and Skoog medium <b>(1962)</b>
<b>NAA</b>	$\alpha$ -Naphthalene acetic acid
<b>NOA</b>	naphthoxyacetic acid
<b>PGRs</b>	Plant growth regulators
<b>RT</b>	Room temperature
<b>TDZ</b>	Thidiazuron (1-phenyl-3- [1,2,3-thiadiazol-5-yl] urea)
<b>Zea</b>	Zeatin, 6-[4-hydroxy-methyl-but-ethylamino]purine
<b><math>\mu</math>M</b>	Micro mole