



جامعة الإمارات العربية المتحدة
United Arab Emirates University

The College of Graduate Studies and the College of Food and Agriculture Cordially Invite
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PhD Dissertation Defense

Entitled

THE UNITED ARAB EMIRATES INDIGENOUS
ESSENTIAL OIL-BEARING PLANTS: ESSENTIAL OILS OF
AERVA JAVANICA AND *CLEOME AMBLYOCARPA* GROWN IN SANDY SOILS UNDER ARID CONDITIONS

by

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Date & Venue

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Abstract:

Essential Oils (EOs) are expensive hydrocarbons produced exclusively by specific species in the plant's kingdom. Nowadays, with the growing trends of healthy lifestyle and enormous research-based discoveries, EOs became a popular, attractive topic, for both research and industry, with revenues reaching billions of dollars annually. The United Arab Emirates (UAE) has rich traditional herbal medicine, associated with topical and EO-aromatherapy applications, that (in most cases) not scientifically justified nor clarified. This dissertation investigated the EO-bearing plants of the UAE, providing a databank with comprehensive knowledge for all indigenous and naturalized EO-bearing plant species of the UAE wild flowers. Also, this work studied EO for one of the common perennial medicinal shrubs of the UAE, which is *Aerva javanica* (Burm. f.) Juss. ex Schul. (Amaranthaceae). The focus was on EO isolated from leaves and flowers of this shrub, and how different factors (e.g., post-harvest drying methods) can significantly influence EO yield quantitatively (by hydrodistillation) and qualitatively (by Gas Chromatography Mass Spectrometry (GC-MS)). This work aimed to provide a scientific justification for the rich traditional applications of *A. javanica*, through investigating its antioxidant activity (*in vitro*) using DPPH, FRAP, and ABTS assays. Additionally, this dissertation wanted to explore EO of *Cleome amblyocarpa* Barr. & Murb. (Cleomaceae), which is a medicinal annual herb widespread in the UAE. Studies related to germination and seedlings emergence rate were conducted. The influences of three soil matric potentials were investigated (pF: 1.7 "control", 1.9 "moderate stress", 2.1 "high stress"), created by applying three irrigation schedules and measured by Stevens pF Sensors. Effect of water stress on vegetative growth parameters and yield were recorded (fresh and dry weight basis). Besides, this work studied the influence of the created three pF levels on the EO yield quantitatively (by hydrodistillation) and qualitatively (by GC-MS). Results of GC-MS analysis provided compounds identification for 27, 20, and 17 volatiles, under pF levels of 1.7, 1.9, and 2.1, respectively. Morpho-physiological analysis were conducted by Scanning Electron Microscope (SEM) and spectrophotometer methods. Finally, this dissertation explored (*in vitro*) the antioxidant activity of *C. amblyocarpa* EO (extracted from its seeds and whole plant) using DPPH, FRAP, and ABTS assays. Concluded by including this species as a new record of the Emirati EO-bearing plants and as a new natural resource of bioactive antioxidants.

Keywords: Essential oils (EOs), Indigenous medicinal plants, *Aerva javanica* (Burm. f.) Juss. ex Schul., *Cleome amblyocarpa* Barr. & Murb., Water stress, Stevens pF Sensors, Hydrodistillation, Morpho-physiological analysis, Scanning Electron Microscope (SEM), Spectrophotometer, Gas Chromatography Mass Spectrometry (GC-MS), Antioxidants, UAE.