Resolving the Taxonomic Status and C₄ Photosynthetic Subtype of *Blepharis* Juss. (Acanthaceae) from Jordan

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Dedication

This thesis is dedicated to the pure soul of my father, whom I miss at this moment…

To my mother, she is the candle which enlightens my life…

To my brothers and sisters, for their love, endless support and encouragement…

Mai Mohammad Al-Shraideh

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List of Abbreviations

B.: Blepharis

Fig(s): Figure(s)

LM: Light Microscope

SEM: Scanning electron microscope

TEM: Transmission electron microscope

VB: Vascular bundle

BS: Bundle Sheath

M: Mesophyll

Mit: Mitochondria

P: Parenchyma

SL: Stroma lamellae

V: Vacuole

ICS: Intracellular space

Ch: Chloroplast

G: Granal stack

T: Trichomes

St: Stomata
Abstract

*Blepharis* constitutes an important element of the desert vegetation in the Middle East, inhabiting extreme desert habitats of the Saharo-Arabian and Sudanian regions. Controversy regarding species identity and C₄ biochemical subtype of *Blepharis* growing in the region has recently emerged. *Blepharis* is the only genus in the Acanthaceae that includes C₄ species; however, comprehensive assessments of C₄ photosynthesis for these species are generally absent. This study presents a thorough evaluation of morphological characters, both vegetative and reproductive, and C₄-related anatomical features using characters related to general growth habits and light and electron microscopy. A large collection of *Blepharis* plants from four distinct regions of Jordan (Kufranjah, Dead Sea, Wadi Araba, and Aqaba) were investigated for morphological and leaf anatomical characteristics. General distinctive features of all *Blepharis* plants examined included spiny growth habit with spike type inflorescence, lanceolate, leathery and dentate leaves with pseudo-whorl phyllotaxy, coriaceous, canaliculated, and recurved spiny bracts, and dimorphic stamens. However, bracts in the *Blepharis* population of Aqaba were generally wider with mostly five veins compared to the other populations. While visual characterization of all *Blepharis* populations did not provide sufficient information and stable diagnostic morphological characters, a multivariate canonical discriminant analysis segregated *Blepharis*