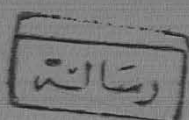




AIN SHAMS UNIVERSITY
FACULTY OF EDUCATION
DEPARTMENT OF BIOLOGICAL
SCIENCES AND GEOLOGY

**CYTOLOGICAL AND PHYSIOLOGICAL
COMPARATIVE
STUDIES ON SOME LETTUCE VARIETIES**



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THESIS

SUBMITTED FOR THE DEGREE OF MASTER OF
SCIENCE TEACHER PREPARATION

(BOTANY)

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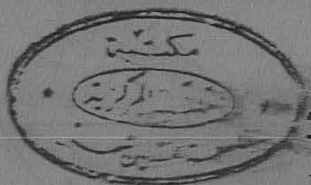
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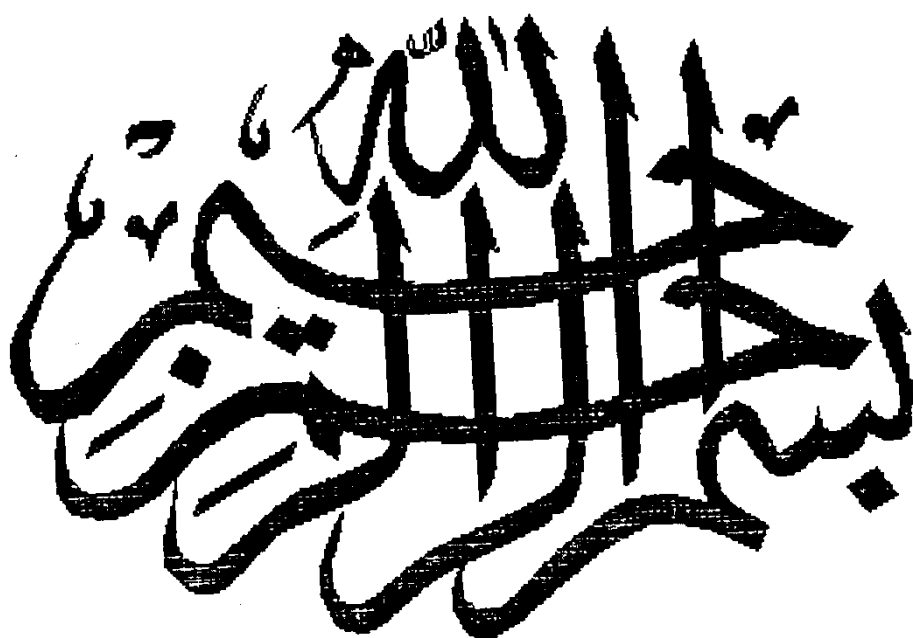
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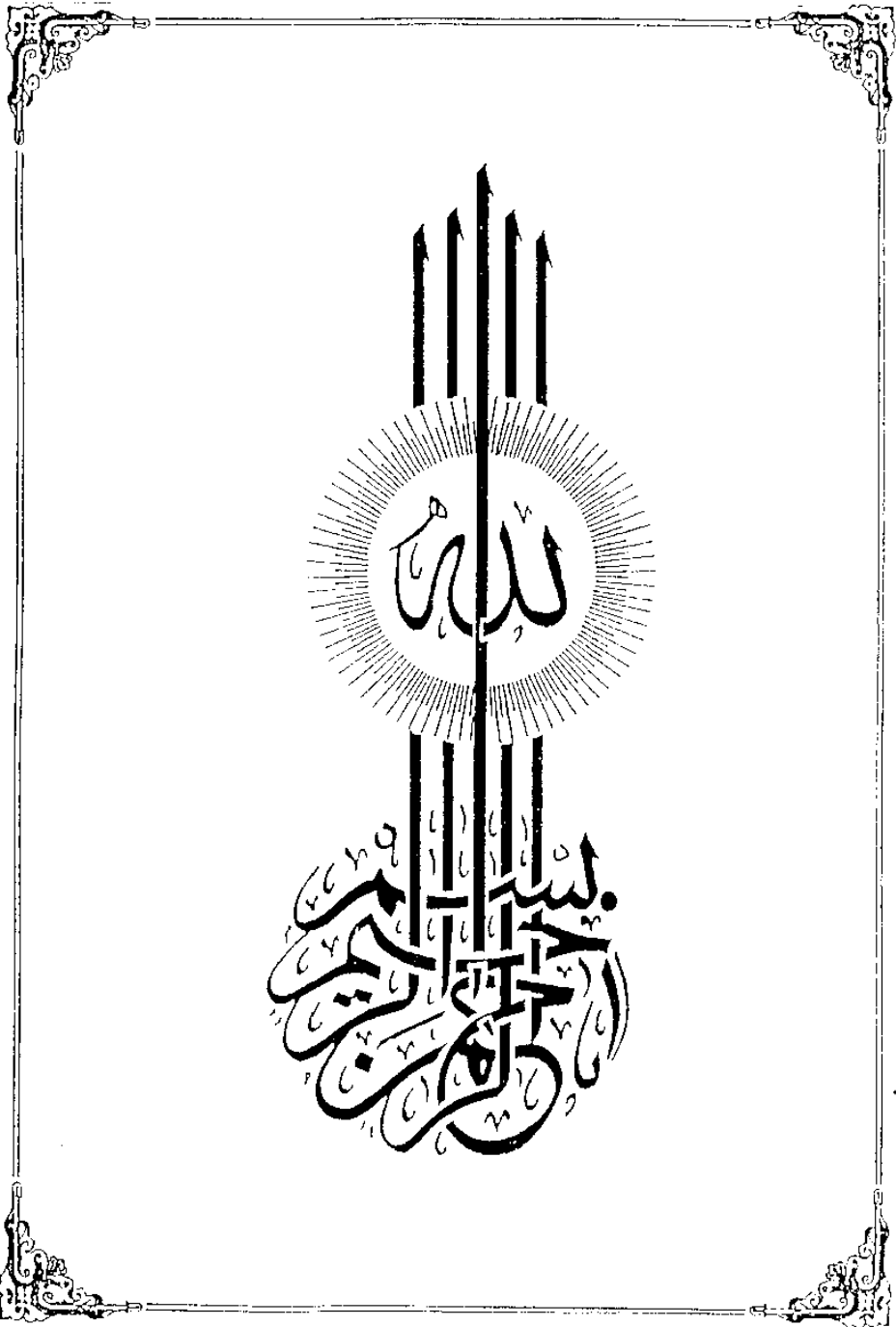
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**THIS THESIS HAS NOT BEEN
PREVIOUSLY SUBMITTED FOR
ANY DEGREE AT THIS OR AT
ANY OTHER UNIVERSITY**

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INTRODUCTION

INTRODUCTION

The genus *Lactuca* (Tourn.) L. is one of the genera of subfamily Cichorieae ; which can be easily distinguished by its crisp and prominently veined leaves . Linnaeus (Willis , 1966) chose the generic name *Lactuca* derived from the Latin lac , or milk , because of the milk like sap exuded from cut lettuce. It belongs to the Compositae (=Asteraceae) , one of the largest angiosperm families . There is no wild plant that can be definitely associated with lettuce although *Lactuca serriola* and some other species of the Mediterranean region appear to be very close relatives (Simpson and Conner-Ogorzaly , 1986) .

In the light of cytological and genetical evidence , Lundqvist (1960) , considers that *L. sativa* probably originated by hybridization of other species , including *L. saligna* L. , and that *L. serriola* arose from the same or subsequent hybridization and now exists as a camp-following weed. *L. sativa* and *L. serriola* are interfertile and natural hybrids occur (Purseglove 1968). He reported that lettuce is a cultigen derived from *L. serriola* L. , a prickly biennial ruderal of Europe , western Asia and northern Africa . Also , De Vries (1990) carried out crossing experiments of lettuce cultivars and species to study the degree of

relationships within *Lactuca sativa* and three wild relatives *L. serriola* , *L. saligna* and *L. virosa* . He studied the F1 hybrids obtained from crosses made in and between the four species. This study added evidence for descent of *L. serriola* and *L. sativa* . *L. saligna* also made part of the ancestral complex of cultivated lettuce .

Purseglove (1968) stated that the center of origin of *Lactuca sativa* is the Middle East. The first records of lettuce as vegetable is a long-leaved form depicted on Egyptian tombs dated 4500 B.C. Lettuce was grown by ancient Greeks and Romans. The Moors developed many types . Lettuce reached China in the 7th century A.D. Purseglove also stated that the first incontestable record of cabbage lettuce is by Fuchs in 1543 . Lettuce is a comparatively recent introduction into the tropics and no truly tropical races have been evolved .

Generally lettuce is grown in countries within the cool temperate zone and within warm temperate zone at high elevations (Edmond *et al* , 1975) . Of the four principal lettuce types , the most popular , the crisp-heading lettuce (ice-berg is well-known variety) , have brittle , prominently veined leaves . Butter head types (Boston for example) have softer leaves and a smooth texture . Loose-leaf varieties , such as Oak leaf , do not form heads ; and cos lettuce

or romaine , forms a long , leaf shaped head .

Cos is slower to bolt than other lettuce and is therefore useful as a warm-weather crop (Simpson and Conner - Ogorzaly , 1986) .

The range of vegetative characters of the lettuce can be summarized as follows : the root system of mature plants is moderately extensive. In upland soil the tap root extends to 1.2-1.5 meter . Branches of the first order extend laterally to a distance of 15 - 20 [cm] and then downward. Branches of the second order are the most numerous.They usually fill the upper 25 - 30 [cm] of soil. The stem , during the vegetative stage, is short , usually from 10 - 15 [cm] long. Around it , the leaves arise in a rosette. They vary in size , shape and colour. During the reproductive stage,the stems elongate and branch ,and each of the various branches form a terminal inflorescence (Edmond et al , 1975) .

On the other hand , the general characteristic features of floral organs of the lettuce are : inflorescence is a panicle. Individual flowers are perfect , with five stamens one-celled ovary . They are usually self-pollinated . The fruit (one-seeded fruit , in which seed and fruit coats are fused) called seed , are very small ; each contains a single embryo (Edmond et al , 1975) .

Mayer and Poljakoff-Mayber (1975) , recorded that lettuce seeds (air-dry seeds) contain ; Ash 46.0 [mg/g] ; phytic acid 20.0 [mg/g] ; sucrose 30.0 [mg/g] ; glucose 2.0 [mg/g] ; Fat 370.0 [mg/g] ; total nitrogen 40.0 [mg/g] ; Protein 37.0 [mg/g] ; soluble nitrogen 1.0 [mg/g] ; riboflavin 0.012 [mg/g] ; Ascorbic acid 0.29 [mg/g] ; Carotene 0.004 [mg/g] and total P (free and bound) 8.5 - 14 [mg/g] .

In lettuce seeds 50 per cent of total phosphorus occurs as phytin , 6 - 10 per cent as free phosphate and the remainder in other phosphorus-containing compounds such as nucleotides , sugar-phosphates (20 - 25 per cent) , phospholipids nucleoproteins and other compounds (20 - 25 per cent) .

In addition , the nucleic acids constitute an extremely important part of the phosphorus-containing compounds . The nucleic acid occur partly in their form and partly in the form of nucleoproteins . The ratio of RNA to DNA (ribonucleic acid to deoxyribonucleic acid) is approximately 10 : 1 .

Lettuce is usually propagated by seeding directly in the soil although head-lettuce types are sometimes transplanted. Leaf lettuce is harvested about 40 days after seeding , head lettuce from 70 to 90 days (Purseglove , 1968 ; Tindall , 1983) . Like cabbage , lettuce heads are formed by the

suppression of the terminal bud , and they will also bolt if not picked soon enough (Simpson and Conner-Ogorzaly , 1986).

Flowring lettuce is a rank-looking plant about 1 [m] tall with small yellow heads resembling those of dandelions (Simpson and Conner-Ogorzaly , 1986) . All the flowers of the capitulum open at once and remain open for two hours only . During this time the unexpanded hairy stigma sweeps the pollen upwards and out of the anther column. The stigmas then fold back and the flowers are automatically self-pollinated . The flowers are visited by flies so a little out-crossing may sometimes occur (Purseglove , 1968).

Tindall , (1983), recorded the following botanical varieties of lettuce :

■var. *asparagina* Bailey, syn. *L. angustana* Vilm., *L. sativa* L.
var. *angustana* Irish ex Bremer (Asparagus or Stem Lettuce , Celtuce) . Mature leaves coarse and inedible ; basal narrow , lanceolate , alternate , sometimes with pointed apex , non-heading young , leaves used as a cooked vegetable ; mainly grown in China , from where it originated.

■var. *capitata* L. (Cabbage, Butter Head or Head Lettuce)

Compact rosettes of leaves forming a solid head ; leaves board , almost orbicular , midrib branching into small veins

■var. *crispa* L. (Leaf Lettuce , Curled Lettuce) .