

## Morphological, chemical, geographical and the studies of pollen grain by scanning electron microscopy (SEM) for the species *Leucaena leucocephala* (Fabaceae)

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### Abstract

Morphological, chemical geographical and the studies of pollen grain by scanning electron microscopy (SEM) for the species *Leucaena leucocephala* (Fabaceae). Different external and internal morphological, chemical geographical and pollen grain characteristics were found in the examined species. Also the chemical analysis suggested the total. The detection for flavonoids using HPLC (High performance liquid chromatography) found six compounds of the aerial parts of this species which are they. Kaempferol-3-O-rubinoside, Isorhamnetin, Chrysoeriol, Isorhamnetin 3-O-galactoside, Quercetin-3-O-rhamnoside and Luteolin-7-glucoside. The pollen morphological analysis using light microscopy (LM) and scanning electron microscopy (SEM) done.

**Keywords:** *Leucaena leucocephala*, fabaceae morphology, pollen grain, electron microscopy

### Introduction

*Leucaena leucocephala* (family Fabaceae and the subfamily is Mimosoideae) is a small plant which growing very fast, multipurpose, nitrogen fixing tree legume and widely distributed in the tropics and subtropic <sup>[1]</sup>. It belongs to the family Fabaceae (Leguminosae), *Leucaena leucocephala* is native to Iraq. This family reported as a medicinal family that control stomach diseases, facilitate abortion and provide contraction, and it use as an alternative, complementary treatment for diabetes <sup>[2]</sup>. The Synonyms: *Acacia leucocephala* (Lam.) Link; *Leucaena glauca* (L.) Benth. (Misapplied); *Mimosa leucocephala* Lam <sup>[3]</sup>. The Common names: Coffee bush, cow tamarind, horse tamarind, jumbie bean, leadtree, leucaena, white leadtree, wild tamarind, melusine, lusina (Kiswahili) <sup>[4]</sup>. Medicinally, the bark is eaten to internal pain <sup>[5]</sup>. A decoction for the root and bark is taken as a contraceptive, ecboic, depilatory, or emmenagogue in Latin America. In experiments on cattle, leucaena has no effect on conception <sup>[6]</sup>.

### Materials and Methods

#### Morphological Studies

The species *Leucaena leucocephala* of the fabaceae family was fresh found in different localities of Iraq and dry specimens in some Iraqi herbaria in the period march 2018 - August 2018. These specimens are identified according to <sup>[7]</sup>.

#### Chemical studies

The flavonoid compounds were detected for the leaves of the species by HPLC Chromatography analysis following the method of <sup>[8]</sup>.

#### Geographical distribution

In this article the distribution for this species was studied, and also the geographical and habitat to all specimen examined and its data recorded in an index card such us: scientific name, date of collection, locality, altitude, Soil, habitat, abundance.

### Pollen grain

The materials for the study were collected from the garden of Iraq Natural History Research Center and Museum, Pollen grain were studied by means of light microscopy (LM). It's described by <sup>[9]</sup> and scanning electron microscopy (SEM) DSM 960A of an accelerating voltage of 10–15 kV.

### Results and Discussion

#### Morphological studies

**Table 1:** Systematic Classification of *Leucaena leucocephala*

Kingdom	Plantae
Division	Angiospermae
Class	Rosids
Order	Fabales
Family	Fabaceae
Genus	<i>Leucaena</i>
Species	<i>leucocephala</i>



**Fig 1:** Morphological features of *Leucaena leucocephala*.

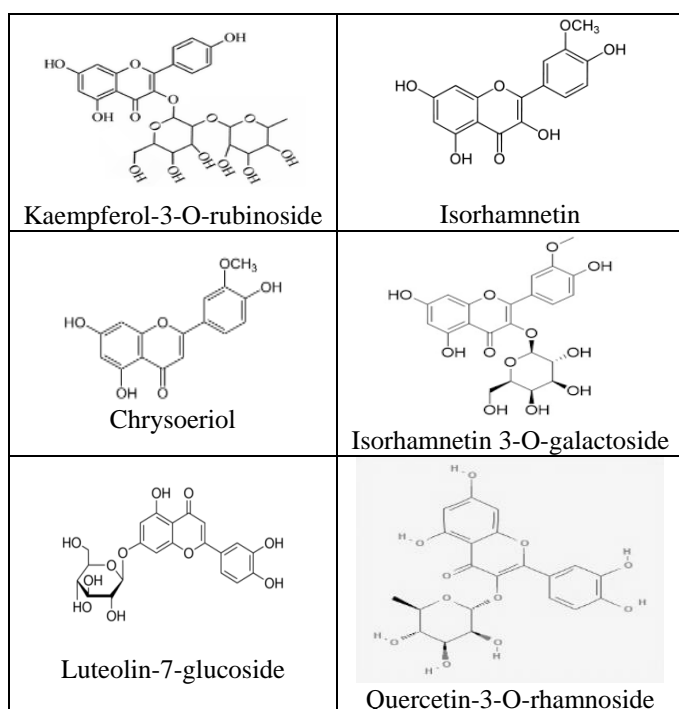
According to table. 1 and fig. 1 we found that this plant was shrub or small tree, up to 6-10 m tall; leaves bipinnate, to 25 cm long; pinnae 4-8 pairs, The long up to 8-10 cm; leaflets 12 -16 pairs, The long about 8-12 mm, and the wide is 2-4 mm, opposite, lanceolate, acute;, green, flowers in globose, pedunculate heads, The long of peduncles is 5-6 cm, corolla and stamens white color; calyx 3 mm long; petals linear;

stamens 10, 1 cm long, ovary pubescent in apex; pods linear, flat, 15–20 cm long, 1.8–2 cm wide, dark brown, beaked in apex, 20 seeds, brown, oval-oblong, flat, 6 mm long. The individual flowers are small and cream–white, ten free stamens per flower and hairy anthers. These small flowers are arranged 100–180 per dense, 12–21 mm diameter. Flowers are hermaphroditic, self-fertilised and self-compatible. The flower heads are in groups of 3–6. Pods are flat and thin, starting green, then become dark brown and hard. 11–19 cm long and 1.5–2.1 cm wide. these data in agreement with result of [10, 11, 12, 13].

The detection for flavonoids with HPLC was six compounds for the aerial parts of the species *Leucaena leucocephala* were found (Table.2) which are they: Kaempferol-3-O-rubinoside, Isorhamnetin, Chrysoeriol, Isorhamnetin 3-O-galactoside, Quercetin-3-O-rhamnoside and Luteolin-7-glucoside (fig. 2). These data in agreement with result of [14].

**Table 2:** The flavonoids component of the species

No	Flavonoid Compounds	Retention time	Area
1	Kaempferol-3-O-rubinoside	10.44	44.71
2	Isorhamnetin	11.35	52.75
3	Chrysoeriol	13.45	48.93
4	Isorhamnetin 3-O-galactoside	16.91	33.84
5	Quercetin-3-O-rhamnoside	17.55	45.97
6	Luteolin-7-glucoside.	19.82	33.72



**Fig 2:** The structure of the investigated flavonoid

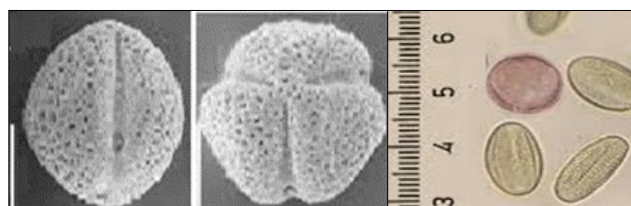
### Distribution

*Leucaena leucocephala* is native to Iraq. The current study showed that the observation for geographical study of this species showed very high level in the diversity and the dispersal in its wide localities Because the high ability of crossing-pollination and the dispersal of pollen to distant localities. this agreement with result of [15].

### Pollen grain

P/E Ratio: 1.44 Size: Polar axis P 42.2 (44.41) 45.31  $\mu\text{m}$  and equatorial diameter E 30.20 (31.22) 32.73  $\mu\text{m}$ . Prolate, tricolporate, non-angular, colpi length 15.66 (16.51) 17.66

$\mu\text{m}$  and breadth 6.34 (7.62) 8.62  $\mu\text{m}$ . Mesocolpium 21.45 (24.37) 25.65  $\mu\text{m}$ . Apocolpium 35.33 (37.75) 40.22  $\mu\text{m}$ . Exine 2.47 (2.72) 3.32  $\mu\text{m}$  thick this agreement with result of [16, 17, 18, 19].



**Fig 3**

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