Advances in Bioresearch
Adv. Biores., Vol 6 (5) September 2015: 83-88
©2015 Society of Education, India
Print ISSN 0976-4585; Online ISSN 2277-1573
Journal's URL:http://www.soeagra.com/abr.html
CODEN: ABRDC3
ICV 7.20 [Poland]

Advances in Bioresearch

ORIGINAL ARTICLE

Morphological and Palynological Systematic Study of Genus *Daphne* L.(Thymelaeceae) in Kurdistan-Iraq

Rupak Towfiq Abdulrazaq [1] and Shwan Mohammed Salih Mohammed[2*]
[1] Department of Horticulture, Faculty of Agricultural sciences, University of Sulaimani, Kurdistan Region-Iraq .Ph.D. Plant taxonomy. ropak2004@yahoo.com
[2*] Department of Agricultural Extension, Agricultural Technical Institute of Bakrajo, Sulaimani Polytechnic University, Kurdistan Region-Iraq .Ph.D. Plant taxonomy. Shwan1957@yahoo.com
*Corresponding author e-mail: Shwan1957@yahoo.com

ABSTRACT
The genus Daphne L. is representing by one species in Kurdistan-Iraq which is Daphne mucronata Royle, Family Thymelaeaceae and was studied from the morphological and palynological systematic aspects. For this purpose, the survey of phytogeographic districts was done to understand the distribution of the species under study. The leaf, flower, inflorescence and fruit traits were together useful in this identification process, where the properties of calyx, corolla and pods were the most effective. The pollen traits such as shape, diameter and configuration were contributed in identification of pollens which were found to be tricolporate. The new findings of this study are that the taxon of this genus which was recorded in the flora of Iraq was fully described for their morphological, (LM) and (SEM) palynological traits for the first time.
Keywords: *Systematic, Phytogeographic districts, Palynological traits, Tricolporate.*

Received 02.06.2015 Accepted 27.08.2015

How to cite this article:
Rupak T A and Shwan M S M .Morphological and Palynological Systematic Study of Genus Daphne L.(Thymelaeceae) in Kurdistan-Iraq. Adv. Biores., Vol 6 [5] September 2015:83-88**.** DOI: 10.15515/abr.0976-4585.6.5.8388

INTRODUCTION

Morphological Study

Daphne L. is a genus belonging to the family Thymelaeaceae which comprises 70 genera and about 600 species. *Daphne* is a genus of at least 70 species. It is a common shrub, deciduous and evergreen. It is native to Asia, Europe and north Africa; and popular in North America as an ornamental. It is noted for its scented flowers and poisonous berries. The genus *Daphne* L. of this family is represented only by one species in Iraq that is *Daphne mucronata* Royle grows on the slopes of mountains; MAM: Bekhair, Sharanish, Sarsing, Gara, Amadiya and Matina; MRO: Khanzad, Sefin, Handren, Rayat,Haji Umaran, Hissar-Rost, Sakran and Qandil;and MSU: Qala Diza, Pira Magron, Pinjwin and Avroman [4].The plants of this genus are medicinally well reputed and have been used in traditional remedy for the treatment of ulcer, rheumatism and toothache [18] and its alcohol extract, according to [12] has significant effect on treating breast tumor bearing rats. From the phloem fiber of *Daphne* plants a high quality of paper could be manufactured. Common names: Tivri, Shuwashinik, Têru, and Tirwa (Kurdish name) [21].

Palynological Study

Palynology has shared a good contribution in solving many outstanding problems in classification of plants, especially that depending on other characteristics of the plant [1],[16] and the study of pollen grain helps in confirming evolutionary relationships between the families and taxa which have usually more or less the same type of pollen [15]. The first who successfully used the study of pollen in the classification of plants is [13] in England. The works of [10],[14] also are pioneer in this field and pollen morphology and plant taxonomy by [9] is the most important reference in the twentieth century of pollen study of many plant species Monocots and Dicots including the family Thymelaeaceae. Some of the characteristics of pollen grains are important taxonomically according to [6],[20],[7],[16] where they agreed on the characteristics of grain size, shape and thickness of the outer wall of the grain (Exine),

while the others [22],[9],[5]indicated other characters such as number of Furrows and Apertures and Surface Ornamentation. Recently the use of Scanning Electron Microscope (SEM) and Transmission Electron Microscope (TEM) aids in finding accurate information about the ornamentation and the wall of the pollen [19],[20],[16].

MATERIALS AND METHODS

Morphological Study

The plant specimens of the *Daphne* species were collected directly from Kurdistan region in Iraq during the seasons 2009-2010 at a rate of more than five field trips and during the season, with at least three visits for each site to take samples and collect information in different stages of vegetative, floral and fruit parts. A special record has been organized about field information for each specimen including number, date and site of collection; the type of soil, altitude measured by (GPS) Global Positioning System type (Garmin Rinollo). Detailed study of each specimen has been conducted concerning morphological aspects.

Palynological Study

Pollen grains were studied taken from anthers of floral mature buds collected from the field trips and preserved in 70% Ethyl alcohol. The anther was put in a watch glass, several drops of Glycerine-Sofranine were added [1], opened by using two minute anatomical needles to crush it and take out the pollen grains and treated with the pigment, after that the pigmented pollen grains were placed on a clean glass mount covered gently by a slide cover and examined by compound microscope Olympus type and under the power of magnification (40x). This study has used samples collected from different areas of Kurdistan in Iraq. Thirty pollen grains were studied for diameter of the grains and the thickness of the outer wall (Exine) using a scale of Ocular micrometer. The pollen grains shape were described in detail, as shown in (Figure4) and pictured under compound microscope type Olympus(LM) using the power (40x) and Scanning Electron Microscope (SEM) using acetolysis procedure of the pollen grains by[9] ,as indicated in (Figure5).

RESULTS AND DISCUSSION

Morphological Study

Habit and Duration

Plants of the genus *Daphne* L. are a common shrub, mostly temperate or tropical especially in South Africa and Australia. With respect to the species of this genus distributed in Iraq it is also shrub and similar to their respective species in the world and has one species in Kurdistan of Iraq that is *Daphne mucronata* Royle.

Root System

The roots of the species *Daphne mucronata* are characterized by cylindrical tap root system classification; due to difficulty of observation and measurement of the of root and the damage that happens during the taking of samples, it could not be relied upon in isolation of the species.

Stem

The stems length have been measured through the direct field observation as average 0.7-1.4m. Branches are reddish-brown. Older bark grayish and cracking, young twigs purplish and glossy. Older branches are glabrescent, younger branches tomentose.

Leaves

The leaves are simple, glabrous, pinnately reticulate veined and mostly arranged alternately on the stem .The leaves dimensions are (35-) 40-65mm long and 4-9mm wide.The ratio of length to width has importance to determine of the shape of leaflets that is elliptic-oblong or narrowly elliptic to lanceolate.The apex of leaves is acuminate or mucronate, the margin is semi-cartilagous and the leaves base is acute, as shown in (Figure 1) The surface of the leaves is glabrous.

Stipules

This study has showed that the leaves of this species are estipulate.

Leaf Petiole

The leaves are usually sub-sessile ca. 1mm long and green to light green colour.

Flowers

The flowers of the species under study are perfect, tetramerous, actinomorphic, creamy-white to greenish-yellow colour slightly fragrant arranged in subcapitate terminal racemes 3-9 flowers.

Peduncle

The flowers of the grown species in Kurdistan of Iraq have peduncle 4-8mm long and pedicels densely whitish-tomentose finally somewhat curved.

Calyx

Calyx is synsepalous, regular, tubular 3.0-4.5 mm long of four deltoid-ovate lobes. The inner surface of the calyx is glabrous and the upper surface is densely tomentose, as shown in (Figure2).

Corolla

Corolla is absent.

Androecium

The male reproductive organ of this species consists of eight free fertile orange-coloured anti sepalous stamens in two whorls, namely Anther and Filament.

Anther

Anther in the species *Daphne mucronata* is bilobed, longitudinal dehiscence, glabrous surface and dorsifixed. However, the anther ca.1.5-2.0 mm long and the colour are yellow with ovoid shape.

Filament

Filament is very short.

Gynoecium

The female reproductive organ of this species consists of a polycarpous pistil in three parts Stigma, Style and Ovary.

Stigma

Stigma is capitate and warty surrounding ovary as a crown.

Style

Style is terminal, slender, glabrous and very short ca.1mm long.

Ovary

The ovary in the studied species is ovoid, ca.2.5-3x1-2 mm diameter, densely sericeous.

Fruit

The fruit is drupe that develops from a superior polycarpous ovary, 8.5 - 11.0 mm long. The colour is orange or bright red at maturity and their shape is sub-globose. The drupe surface is sericeous.

Seed

Seed is a mature ovule that forms after the processes of pollination and fertilization. Seed is 2mm diameter as average and discoid, as shown in (Figure3).

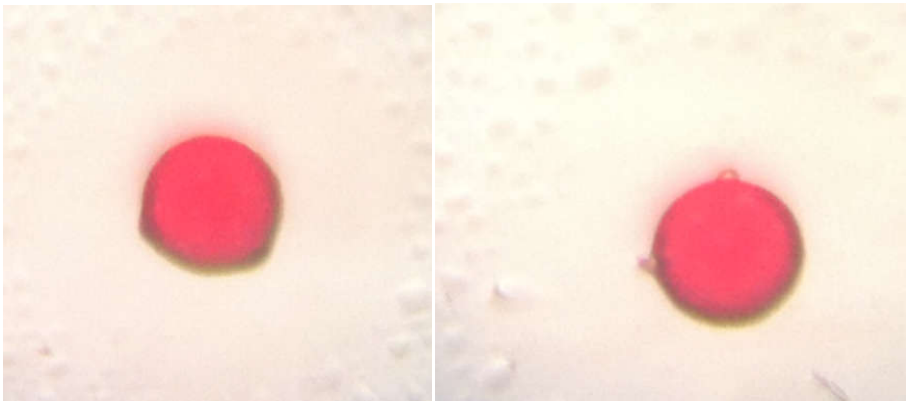
Palynological Study

The pollen grains of this species have been studied for the first time in Iraq. The results of the current study have stated that pollen grains of the studied species are monomorphic which has pollen grains in one type or shape, polyporate [3], spheroidal [11] pantoporate aperture types [2],[17]. With regard to grains size and based on [9] findings, it has found that the pollen grain have different sizes, it been divided (small, medium and large), it is small when the length of equatorial axis not more than 20 µm, medium when 25 µm and large size at 40 µm grain diameter. The current study has indicated that the size of pollen grain is in the small range 17-22µm grain diameter, as shown in (Figure4). Where the shape of pollen grains is uniformly spheroid and the thickness of the wall of the pollen grains is ranging from 0.40 - 0.70 µm in the studied species, as it shown in (Figure 4). The wall of the pollen grains as shown by Electron Microscope scanning (Figure5) is formed by a basal and secondary reticulum, the latter is derived from a complete or partial fusion of supratectal elements that form trihedral, dome-shaped or circular variously arranged supratectal subunits, which result in a ornamentation with crotonoid or semi-crotonoid pattern**.**

Figure1. Type of the leaves in the studied species.

Figure2. Type of the flower and inflorescence in the studied species

Figure3. Fruit type of the studied species.



←10 µm→

In Equatorial view. In polar view.

Figure.4. Type of pollen grain in the studied species.

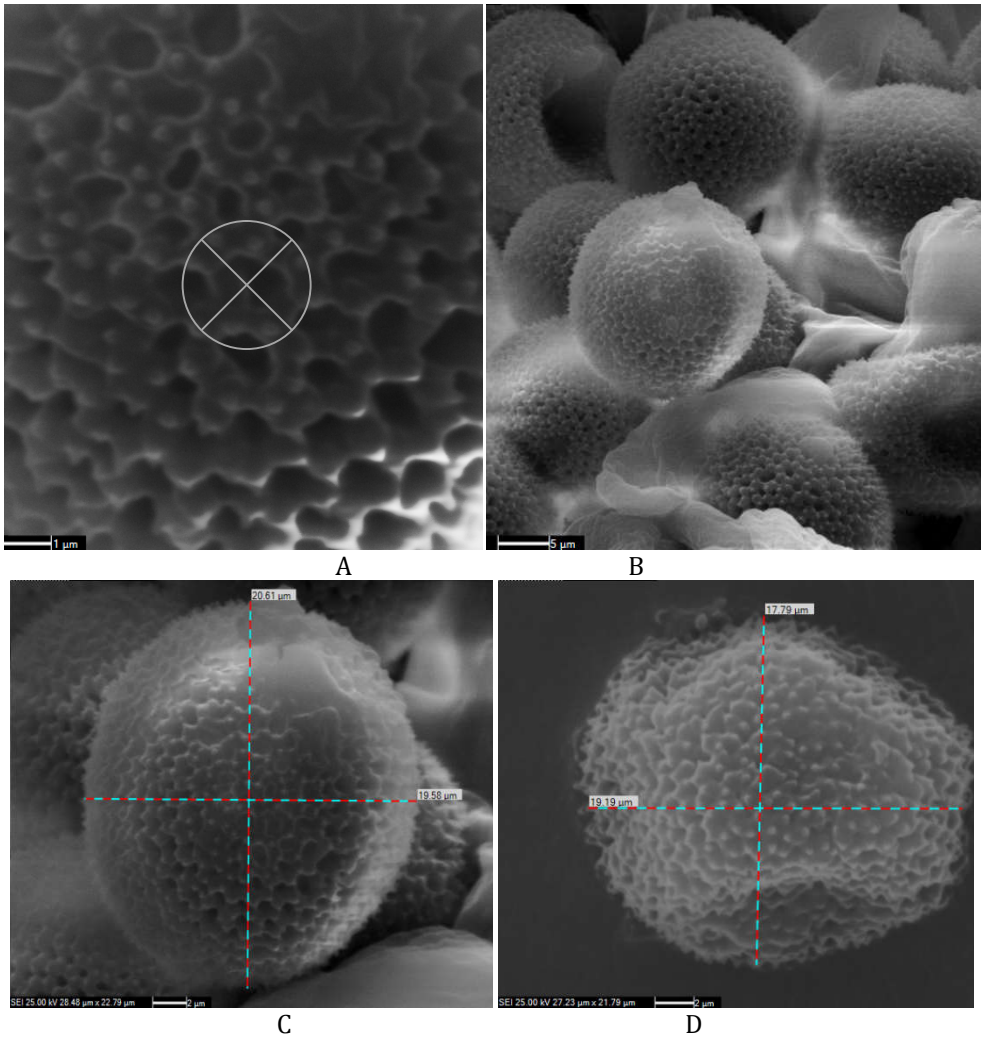


Figure5. Scanning Electron Micrographs of acetolyzed pollen grains of the species under study.{A,B,C: Pollen grains, D: Surface with groups of fused supratectate projections surrounding lumina (encircled portion in C showing one unit of seven fused subunits)}.

ACKNOWLEDGEMENTS

The authors are thankful to each of Prof.Pola Khanaqa , Mr,Karwan Qadir and Mr.Hemin in (Kurdistanian Board of Strategically Studies and Scientific Research-Ministry of High Education & Research /Kurdisan-Iraq) for providing necessary facilities for conducting SEM for the pollen grains.

REFERENCES

1. Al- Mashhadani, A. N. (1992). A Comparative Systematic Study of Genus *Onosome* L . (Family: Boraginaceae) in Iraq. MSc Thesis, Baghdad University, Baghdad ,Iraq.
2. Archangelsky, D.B. (1971). Palynotaxonomy of the family Thymelaeaceae s.l. In: L.A. Kuprianova and M.S. Jakovlev, eds.
3. Blaise, S.(1959). Contribution a l'étude caryologique et palynologique de quelques Thyméléacées. Rev. Gen. Bot. 66:109–161.
4. Chakravarty,H.l.(1976).Plant wealth of Iraq. A Dictionary of Economic Plants. Vol . Baghdad.
5. Davis,P.H.& V.H.Heywood.(1973).Principle of Angiosperm Taxonomy. Robert, E. Krieger Publishing company , Huntington, New York.558 pp.
6. Diez, M. J. (1983).Pollen morphology of genus *Anchusa* L. (Boraginaceae) and its taxonomic Interest, Pollen spore, 25,3-4:367-382.
7. Dönmez, Ali .A. (2005) .A new species of *Crataegus* (Rosaceae) from Turkey .Bot.J.Linn.Soc.,148:245-249.
8. Erdtman, G. (1960) . The asetolysis method:a revised description. Svensk Bot.Tidskr. 54:561-564.
9. Erdtman, G. (1971) .Pollen Morphology and Plant Taxonomy, Angiosperms (an Introduction to palynology). 552 pp.

10. Fritzsche,J.(1832).Beitrage zur Kenntniss des Pollen,1Berlin,Stetten,and Elbing.
11. Garg,A. & Z.S.Rogers (2011).A Palynological Investigation of *Daphne papyracea* and *Daphne bholuua* (Thymelaeaceae)in India. J. Bot. Res. Inst. Texas 5(2): 635 – 641.
12. Hedayati H, Parsons J. & C.Crowther (2003) Rectal analgesia for pain from perineal trauma following childbirth. Cochrane Database of Systematic Reviews, Issue 1. Chichester: John Wiley and Sons Ho E (1985) Should midwives be repairing episiotomies? Midwives Chronicle and Nursing Notes 98: 296
13. Lindley J. (1830). The genera and species of orchidaceous plants. London.UK.
14. Mohl,H.(1835).Sur la structure et les formes des grains de pollen. Ann.Sci.nat., 2.ser.,3.
15. Pandey, B.P.(2007) Botany for degree students CI. Diversity of seed plants their systematic. S. CHAND & COMPANY LTD . 8 : P. 222.
16. Prithipalsingh(2007). Introduction to Biodiversity.ANE Books India.P:36-37.
17. Punt, W., P.P. Hoen, S. Blackmore, S. Nilsson, & A. Le Thomas. 2007. Glossary of pollen and spore terminology. Rev. Palaeobot. Palynol. 143:1–81.
18. Rasool,Mohammed Azam,Muhammad Imran ,Haq Nawaz , Abdul Malik & Shahana Urooj Kazmi(2009). Phytochemical studies on *Daphne mucronata.* Journal of Pakistan Chemistry Society.No.5.
19. Stace, C.A. (1984). Plant Taxonomy and Biosystematic. Second edition. Edward Arnold, London .UK. P: 264.
20. Stuessy, T.F. (1990).Plant Taxonomy (The systematic Evaluation of Comparative Data.Columbia Univer. Press NewYork.P.233-234.
21. Townsend,C.C. & Evan Guest (1980).Flora of Iraq. Ministry of Agriculture. Iraq. Vol. 4,P: 125-126.
22. Wodehouse, R. P. (1935). Pollen grains, their structure identification and significance in science and medicine. Hafner publishing company. New York &London. 574pp.