International Journal of Pharmacy & Life Sciences
Open Access to Researcher

Morphological study of leaf Architecture in three taxa of Bellis (Asteraceae) in Libya

Ghalia T. El Rabiae* and Seham H. Elbadry

Department of Botany, Faculty of Science, Benghazi University, Libya

Article info

Received: 05/12/2019

Revised: 29/12/2019

Accepted: 15/01/2020

© IJPLS

www.ijplsjournal.com

Abstract

Bellis. Belonging to the family Asteraceae (Compositae) and has been included in subtribe Asterinae (tribe Astereae) Bremer, 1994. The leaf architecture in this family are extremely diverse. The objective of this work is to describe the morphology and leaf architecture for three taxa of Bellis in Libya, *Bellis annua*, *B. sylvestris* var *sylvestris* and *B. sylvestris* var *cyrenica*. The results of leaf architecture studies can provide more accurate basis for the identification of plant species.

Key words: *Bellis*, Asteraceae, , morphology, leaf Architecture Libya.

Introduction

Asteraceae a vast plant family that comprises roughly 1500 genera and 25000 species in different habitats (Souza and Lorenzi, 2012).

Bellis popularly is known as Daisy flower belonging to the family Asteraceae (Compositae) and has been included in sub tribe Asterinae (tribe Astereae) Bremer, 1994 .This genus consists of about 15 species and only two species in Libya. There are many disciplines associated with plant taxonomy, which are used by taxonomists as an aid, or to improve the identification, classification and systematic position of plant taxa. Among these disciplines leaf architecture is one of the most significant tools used by taxonomist to identify and differentiate closely related taxa. Leaf architecture plays an important role in ecology, plant systematics, paleobotany and conservation (Ellis *et al.* 2009). Venation patterns, in particular have been demonstrated to be an important feature for identifying and classifying plants (Corner 1968, Walls 2011).

Particularly in Asteraceae, leaf architecture characters are extremely diverse (Rogas-Leal et al., 2014,2018). The objective of this work is to describe the morphology and leaf architecture for three taxa of Bellis in Libya, *Bellis annua*, *B. sylvestris* var *sylvestris* and endemic *B. sylvestris* var *cyrenica*.

Material and Methods

Plant samples of mature and healthy leaves of three taxa were collected from January 2017 to April 2019. Venation patterns were investigated following a modified protocol of Payne (1969). One to several leaves were collected into petri dishes and immersed in 10% NaOH at room temperature until they became translucent. This step took one to three weeks, depending on species; thick, leathery or stone-like leaves took longer.

***Corresponding Author**

Then the leaves were washed twice with water and bleached in 50% commercial bleach for 10 minutes. After another two washing processes, the leaves were dehydrated for 10 minutes successively in 50% and then 75% ethanol. Leaves were then stained by 1% Safranin in 95% ethanol for 20 minutes. Stained leaves were washed for a minute or two, depending on leaf thickness, with absolute ethanol to de-stain non vascular tissues. Preparations were then immersed in absolute ethanol : Histo-Clear (1:1) mixture, and then removed with fine forceps to be mounted in DPX resin between glass slides and cover slips for permanent preservation. Photographs of venation patterns were taken at a range of magnifications with a camera attached to a dissecting microscope. Leaf lamina and mid-vein descriptions follow Metcalfe and Chalk (1979), Dickison (2000), Hickey (1979) and Koch et al. (2009).

Results and Discussion

***Bellis annua* L.**

Leaves petiolate, alternate, simple; lamina size nanophyll, lamina shape slightly obovate, margin entire, apex acuminate, base Oblique.

Primary veins framework pinnate, primary vein undulate, secondary venation festooned brochidodormous and the angles irregular increasing toward the base, vein spacing irregular, tertiary veins random reticulate (dichotomizing), areole development moderate, veinlets branched one time, marginal ultimate venation looped with apical papillate teeth.

B. sylvestris* var. *cyrenieca

Leaves petiolate, rosulate, simple; lamina size microphyll, lamina shape spathulate , margin sinuate to dentate, apex obtuse, base Oblique.

Primary veins framework pinnate, markedly curved to straight, secondary venation festooned brochidodormous and the angles smoothly decreasing toward the base, vein spacing irregular, tertiary veins random reticulate, areole well developed, veinlets twice and more branched, marginal ultimate venation looped with lateral papillate teeth.

B. sylvestris* var. *sylvestris

Leaves petiolate, rosulate, simple; lamina size microphyll, lamina shape obovate to spathulate, margin sinuate to dentate, apex obtuse, base Oblique.

Primary veins framework pinnate, sinuous,markedly curved to straight secondary venation festooned brochidodormous, and the angles smoothly decreasing toward the base, vein spacing increasing toward the base, tertiary veins random reticulate, areole well developed, veinlets more branched, marginal ultimate venation looped with lateral elongated papillate teeth.

Leaf morphology and leaf architecture characters

	B. annua	***B. sylvestris* var *cyrenica***	***B. sylvestris* var *sylvestris***
Leaves	Leafy stem - alternate	Rosulate	Rosulate
Lamina			
Shape	Slightly obovate	Spathulate	Obovate to spathulate
Apex	Acuminate	Obtuse	Obtuse
Base	Oblique	Oblique	Oblique
Margin	Entire	Sinuate to dentate	Entire to sinuate
Size	Nanophyll	Microphyll	Microphyll
Venation pattern	Pinnate -reticulate	Pinnate -reticulate	Pinnate -reticulate
Pri. venation	Undulate	Pinnate markedly curved to straight	Pinnate markedly curved to straight
Sec. venation	Festooned brchidodormous	Festooned brchidodormous	Festooned brchidodormous
Tert. venation	Random reticulate	Random reticulate	Random reticulate
Areoles	Moderate developed	Well developed	Well developed
Vein spacing	Irregular	Irregular	Increasing toward base
Veinlets	Branched one time	Twice and more branched	More branched
Marginal u. v.	Looped with apical papillate teeth	looped with lateral elongated papillate teeth	looped with lateral elongated papillate teeth

ISSN: 0976-7126
Rabiae & Elbadry, 2020

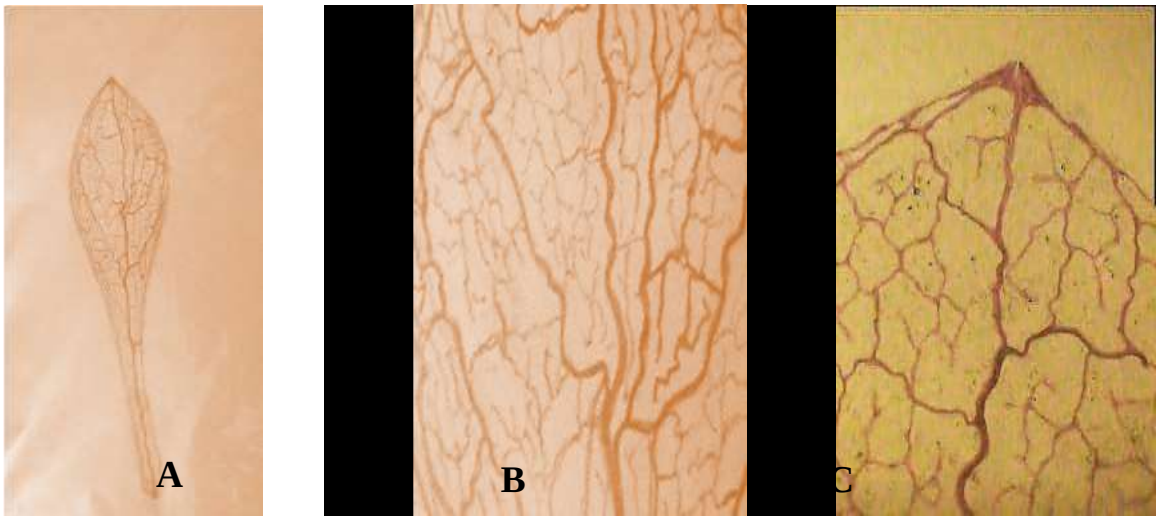

Figure (1): ***B. annua*** **. A. Leaf shape and mid vein , B. Leaf middle portion, C. Leaf margin and tip.**

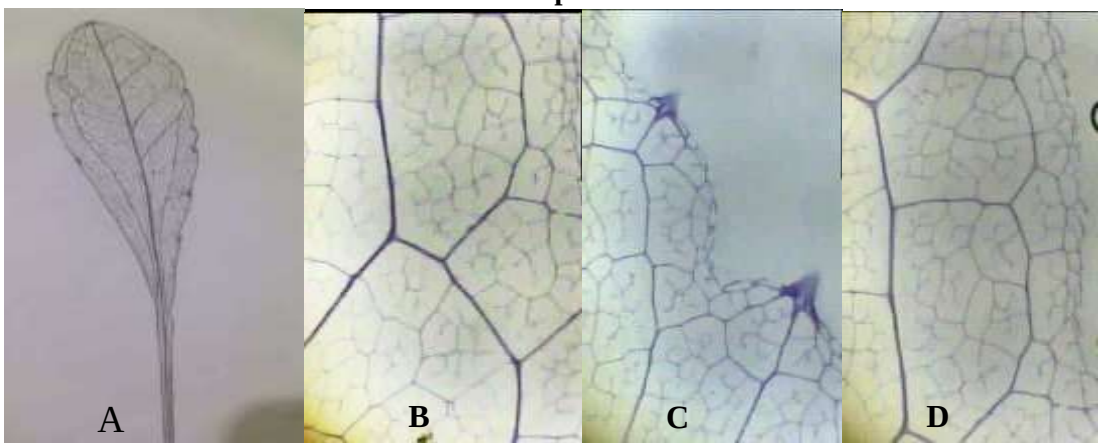

Figure (2): ***B. sylvestris*** **var.** ***cyrenieca*** **A. Leaf shape and mid vein ; B. Leaf middle portion; C&D. Leaf margin.**

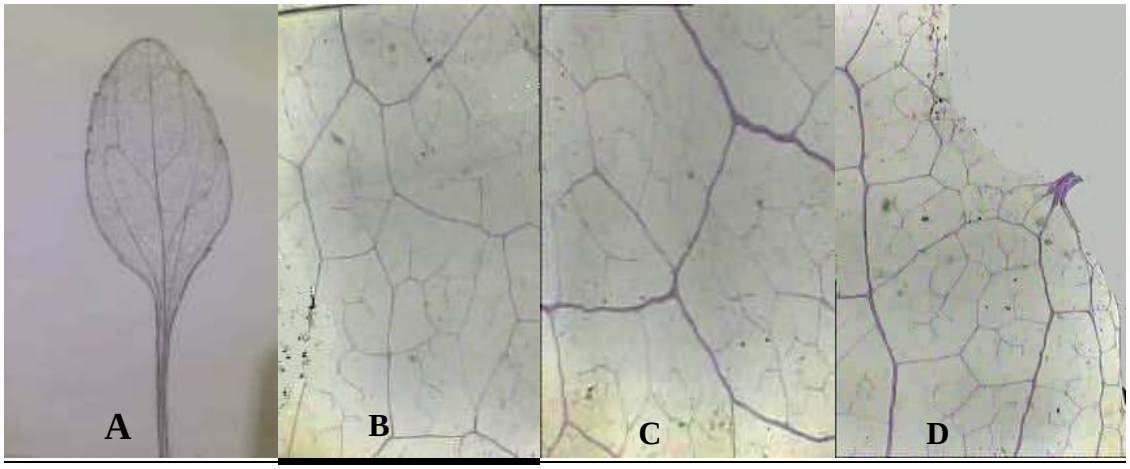

Figure (3): ***B. sylvestris*** **var.** ***sylvestris*** **A. Leaf shape and mid vein ; B. Leaf middle portion; C. Leaf margin and tip.**

Conclusion

From the study it is evident that the floating tablets based on Dexlansoprazole with gas propellant with controlled release can be developed to increase the time of gastric permanence and therefore increase its bioavailability. More detailed investigations are needed to establish the effectiveness of these formulations and to set the required dose.

The formulated floating tablets have given satisfactory results for various post-compressive parameters such as hardness, friability, thickness, weight variation and uniformity of the content. Sodium bicarbonate has a predominant effect on the buoyancy delay time, while chitosan has a predominant effect on the total flotation time and drug release. Carbopol also shows a significant effect in drug release. Sodium alginate and xanthan gum gave additional adhesive properties and helped maintain the integrity of the tablet. The swelling index has a significant effect on drug release. Formulations F2 and F4 showed a higher rate of swelling than others. In vitro release rate studies showed that maximum drug release was observed in F2 and F2 formulations for up to 12 hours. TLC studies revealed that there was no interaction between dexlansoprazole and the polymers used. The data obtained from *in vitro* dissolution studies were fitted in different models viz. zero order, first order and Korsemeyer's equation. The zero order plots were found to be fairly linear as indicated by their high regression values (r^2 = 0.979 to 0.996).

From the study it is evident that the floating tablets based on Dexlansoprazole with gas propellant with controlled release can be developed to increase the time of gastric permanence and therefore increase its bioavailability. More detailed investigations are needed to establish the effectiveness of these formulations and to set the required dose.

References

1. Bombo, A. B., T. S. De Oliveira, A. D. S. S. De Oliveira, V. L. G. Rehder, M. A. G. Magenta and B. Appezzato-Da-Glória. 2012. Anatomy and essential oils from aerial organs in three species of *Aldama* (Asteraceae-Heliantheae) that have difficult delimitation. Australian Journal of Botany 60(7): 632-642.
2. Bremer**, K.** 1994. *Asteraceae*: Cladistics and Classification. Timber Press, Portland OR.
3. Corner, E.H. (1968) *The life of plants.* Mentor Book, New York, 314 pp.
4. Ellis, B., D. C. Daly, L. J. Hickey, J. D. Mitchell, K. R. Johnson, P. Wilf and S. L. Wing. 2009. Manual of Leaf Architecture. Cornell University Press. New York, USA. 190 pp.
5. Koch, K., B. Bhushan and W. Barthlott. 2009. Multifunctional surface structures of plants: An inspiration for biomimetics. Progress in Materials Science 54(2):137-178.
6. Metcalfe, C. and L. Chalk. 1979. Anatomy of the Dicotyledons. 2nd edition. Oxford University Press. New York, USA. 276 pp.
7. Payne, W.W. (1969) A quick method for clearing leaves. *Ward's Bulletin* 8: 4–5.
8. Rojas-Leal, A., T. Terrazas and J. L. Villaseñor. 2014. Desarrollo del patrón de venación en cuatro especies de la tribu Senecioneae (Asteraceae). Botanical Sciences 92(1): 23-36.
9. Rojas-Leal, A., T. Terrazas and J. L. Villaseñor. 2018. Foliar architecture of some members of the tribe Senecioneae (Asteraceae) with a key for identification of the Mexican genera. *Phytotaxa* 364(2): 136-156.
10. Rivera, P., T. Teresa, A., A. Rojas-Leal, J.L Villasenor (2019). Leaf architecture and anatomy of Asteraceae species in a xerophytic scrub in Mexico City, Acta Botanica Mexicana 126:e1515Mexico
11. Walls, R.L. (2011) Angiosperm leaf vein patterns are linked to leaf functions in a global-scale data set. *American Journal of Botany* 98: 244–253.

Cite this article as:
Rabiae G.T. EI and Elbadry S.H. (2020). Morphological study of leaf Architecture in three taxa of Bellis (Asteraceae) in Libya, *Int. J. of Pharm.& Life Sci.*, 11(1): 6478-6481.
Source of Support: Nil
Conflict of Interest: Not declared
For reprints contact: ijplsjournal@gmail.com