

Phenotypic Diagnosis of Some Species of the Genus *Convolvulus* Developing in Central and Northern Iraq

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Abstract

The current research included a phenotypic study of five species: *C.arvensis*, *C.cantabrica*, *C.stachydifolius*, *C.pilosellifolius*, and *C.betonicefolius* in central and northern Iraq. The phenotypic study included the study of floral systems and characteristics of the calyx and corolla.

Keywords: Phenotypic diagnosis, genus *convolvulus*, *Convolvulaceae*

1. Introduction

The *Convolvulaceae* family (The morning glory family) belongs to the order *Solanales* and includes 1880 species and 57 genera. It is found on all continents except the polar regions (Staples, 2006; Staples & Austin, 2009; Staples & Noltie, 2007). The *Convolvulaceae* family is one of the plant families found in Iraq, which includes 1,600 species from 56 genera in the world (Simpson, 2006). In Iraq, it consists of 27 species within 3 genera (Al-Rawi, 1964). The genus *Convolvulus* belongs to the sweet potato family or the *Convolvulaceae* family or the perennial family of the related (Flavian) family (Wiese, A.F & A.F phillis 1976), which is spread by rhizomes and seeds and is one of the worldwide flowering families (Lawrence, 1951). This family includes two large genera (Al-Mayah, Abdel-Reda 2001), namely *Ipomoea* and *Convolvulus*, which is under study, which is the second largest genera of this family, according to what was reported by (Cronquist, A., 1981).

2. Materials and methods

Through field trips, 5 wild species of plants of the genus *Convolvulus* were collected from central and northern Iraq. It included the governorates of Salah al-Din, Kirkuk and Sulaymaniyah, where several areas were visited between a district, a district, a village, and several sites in these places, which led to the diversity of species belonging to this genus, as they spread in different environments, as in Figure (1). A number of phenotypic traits were studied for a number of samples, ranging from (10-7) samples for each type, and the number of measurements for each sample ranged from (10-5) measurements for each trait. The samples were examined using a dissecting microscope of the Italy type, and a compound microscope of the Olympus type. An ocular micrometer inserted into a compound microscope was used to measure the fine plant parts. Field samples were photographed as well as microscopic slides by a digital microscope camera mounted on a compound microscope.

3. Inflorescences

The current results showed that the studied species were all characterized by scorpioid flower systems and limited inflorescences (cymose, axillary, dishasium) or single flowers, and these inflorescences may be present in the same species as in *C.betonicefolius*. The inflorescences are peripheral or lateral. The bisexual flowers were always large or small. They were large or small, with attractive colors that varied between white, pink and purple. Flowers may be distributed along the stem or begin at the middle of the stem or branch or even at its end. The bracts were similar to ordinary leaves, but usually smaller and narrower. The bracts in *C.arvensis* are small, linear to lanceolate, Smooth or bristly, and the bracts in *C.cantabrica* are small, threadlike, green attached to the base of the calyx and less than 2 mm away from it, separated by the middle of the calyx ring at its base, and some bracts take a spear-shaped shape at the top of the plant and in the type *C.stachydifolius*, the bracts bear more than one lateral bud in their axils. The sepals of *C.pilosellifolius* are similar to the stem leaves, being longer or shorter than the pedicels. The flowers are arranged regularly on a stand called the inflorescence peduncle, which may be longer than the stalk or shorter, and sometimes several times longer. As for each flower, it is borne on a pedicel. It was noted that the oldest flower is at the bottom of the inflorescence and the youngest flower is at the top of the inflorescence. The lengths and diameters of inflorescences showed clear interferences at the level of the studied species, where the minimum inflorescence length was recorded in *C.betonicefolius* ranged between (1.5-0.7) cm, while the inflorescence width ranged between (1.3-0.6) cm. The upper limit in *C.cantabrica* ranged between (12.0-7.2) cm, while its width ranged between (6.8-4.3) cm and the type *C.betonicefolius* contained the least number of flowers (10-7) flowers compared to the rest of the studied species, and the type *C.pilosellifolius* contained the most number of flowers amounted to (85-60) flowers compared to the rest of the studied species. The lengths of the stalk flower interaction between the studied species if the stalk flower length

was (0.8) cm in the type *C.arvensis*, while the stalk flower length was (3.4) cm in the type *C.pilosellifolius*, and with regard to the diameter of the inflorescence, no significant difference was observed in the studied species. The minimum inflorescence diameter was (0.2) cm in *C.betonifolius* and *C.pilosellifolius*, and the

maximum inflorescence diameter was (0.35) cm in *C.arvensis*, as shown in Table (1) and Panel (1). The results of the current study agreed with Al-Eidani (1998), Al-Musawi (2015) and Ataşlar (2019) on the number of flowers and the length of the inflorescence.

Table (1): Quantitative and qualitative traits of the flowering systems (inflorescences) of the studied species, measured in centimeters: (cm).

Traits species	stalk Inflorescence length	stalk Inflorescence diameter	Inflorescence color	Inflorescence dimensions		number of flowers in the inflorescence
				Inflorescence length	Inflorescence width	
<i>C.arvensis</i>	0.9-0.7 0.8)(	0.4-0.3 0.35)(	green	6.7-4.3 5.5)(	0.9-0.4 0.5)(	15-9 12)(
<i>C.pilosellifolius</i>	4.7-1.1 2.9)(	0.3-0.1 0.2)(	green	8.3-5.6 6.9)(	4.7-1.8 3.0)(	85-60 73)(
<i>C.stachydifolius</i>	5.2-1.6 3.4)(	0.3-0.2 0.25)(	Bluish green	10.1-6.3 8.2)(	5.7-3.3 4.5)(	35-20 27.5)(
<i>C.cantabrica</i>	6.5-1.8 3.4)(	0.4-0.1 0.3)(	dark green	12.0-7.2 9.4)(	6.8-4.3 5.2)(	26-17 21)(
<i>C.betonifolius</i>	1.7-0.5 1.1)(	0.3-0.1 0.2)(	yellowish green	1.5-0.7 (1.1)	1.3-0.6 0.9)(	10-7 8.5)(

()Average of five replicates.



C.cantabrica



C.arvensis



C.pilosellifolius



C.pilosellifolius



C.betonifolius



C.stachydifolius

Panel (1) Shapes and dimensions of inflorescences in the studied species.

Calyx Trophy

The calyx in the studied species consists of five separate sepals that are unequal, usually quincancially square, that is, there are two external, two internal, and one middle sepals, and the sepals

are circled to the right or left, and both patterns were seen in the same plant. Variations appeared in the dimensions of the calyx and the shape of the calyx lobe, its apex, its anterior and its edge. The shape is lanceolate in *C.arvensis* and *C.pilosellifolius* and

ovoid in *C.cantabrica*, *C.stachydifolius* and *C.betonifolius*. The base of the calyx lobes was obtuse circular in all species, while the apex of the calyx lobes was acute in *C.arvensis*, *C.pilosellifolius* and *C.betonifolius* species, and circular in *C.cantabrica* and *C.stachydifolius* species. The edge of the sepals is smooth in *C.arvensis*, *C.pilosellifolius* and *C.stachydifolius*, and wavy in *C.cantabrica* and *C.betonifolius*. Variations appeared in the dimensions of the cup, where the longest floral cup was in the type *C.arvensis*, reaching (2.7) mm, while

the shortest floral cup was in the type *C.cantabrica*, with an average length of (2.3) mm, and the widest floral cup appeared in the type *C.betonifolius*. Its average width was (2.7) mm, while the smallest floral cup had a width of (1.8) mm. The rest of the species ranged between these two limits, Table (2) and Panel (2). The cup has taxonomic importance in diagnosing the studied species. The results of the current study agreed with Al-Eidani (1998), Rabei and Abdl Khalik (2012), Aykurt and Sümbül (2014) and liaqat et al (2022).



Panel (2) phenotypic traits of the calyx in the studied species.

Table (2): Quantitative and qualitative phenotypic traits of the calyx in the studied species, measured in millimeters.

Traits species	Length	Width	Shape of Sepals	Apex of Sepals	Base of Sepals	Margin of Sepals
<i>C.arvensis</i>	2.8-2.6 (2.7)	2.7-2.0 (2.3)	Linear	sharp	Circular	smooth
<i>C.cantabrica</i>	2.5-2 (2.3)	2.5-2.3 (2.4)	oval	Circular	Circular	wavy
<i>C.stachydifolius</i>	2.7-2.5 (2.6)	2.1-1.5 (1.8)	oval	Circular	Circular	smooth
<i>C.pilosellifolius</i>	2.6-2.4 (2.5)	2.4-1.9 (2.1)	Linear	sharp	Circular	smooth
<i>C.betonifolius</i>	2.5-2.3 (2.4)	3.1-2.2 (2.7)	oval	sharp	Circular	wavy

4. Corolla

The corolla in the studied species has sympetalous fused petals wrapped in the flower bud towards the right or the left. The fused corolla is characterized by two parts called the basal part of the tube.

5. Corolla tube

As for the upper part, it is called the corolla limb. When it opens, the corolla is funnel-shaped with an entire or slightly lobed edge, and five clear strips appear from the outside, tapering towards the apex of the corolla. They are usually pubescent, especially from the top. As for the tube, it remains smooth, and these bands alternate with five narrower and less colored spaces that extend in the opposite direction, and the corolla is usually longer than the cup. The color characteristic was close in the studied species, as the color of the corolla in *C.cantarica* and

C.pilosellifolius was pink, and in *C.arvensis* it was white and pink, and in the type *C.betonifolius* was white, except in *C.stachydifolius*, the color of the corolla appeared purple. Variations were found in the dimensions of the corolla, as the longest corolla tube (2.9) mm appeared in *C.stachydifolius* and the shortest corolla tube was in *C.cantabrica*. It reached (2) mm, while the widest corolla tube was in the type *C.betonifolius*, reaching (1.6) mm, and the least width was (0.8) mm in the type *C.stachydifolius*. As for the petal limb, the longest limb appeared in the type *C.arvensis*, as it was (4.9) mm long, and the shortest limb was (4.2) mm in length in the type *C.stachydifolius*, while the largest width of the petals was in *C.stachydifolius*. Its width reached (4.8) mm, and the lowest width of the petal limb was (4.4) mm in *C.betonifolius*. Table (3) and panel (3). The results of the current study agreed with Al-Eidani (1998), Rabei and Abdl Khalik (2012), Aykurt and Sümbül (2014) and liaqat et al (2022).

Table (3): Quantitative phenotypic characteristics of the coronet in the studied species, measured in millimeters.

Traits species	Length corolla tube	Width corolla tube	Length corolla limb	Width corolla limb
<i>C.arvensis</i>	2.5-2 (2.2)	1.7-1 (1.4)	5.1-4.7 (4.9)	5.8-4.3 (4.6)
<i>C.cantabrica</i>	2.1-1.9 (2)	1.4-1 (1.2)	4.9-4.7 (4.8)	4.8-4.2 (4.5)
<i>C.stachydifolius</i>	3-2.8 (2.9)	1-0.7 (0.8)	4.4-4.1 (4.2)	5-4.5 (4.8)
<i>C.pilosellifolius</i>	2.9-2.7 (2.8)	1.6-1.3 (1.4)	4.8-4.6 (4.7)	4.6-4.4 (4.5)
<i>C.betonifolius</i>	2.6-2.3 (2.4)	1.7-1.5 (1.6)	4.7-4.5 (4.6)	4.5-4.3 (4.4)

* The average represents the value of five replicates divided by their sum

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