

## NOTES ON THE BIOLOGY OF *ERIGERON DECRESSENS* (ASTERACEAE) OF SOUTHEASTERN ARIZONA

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### ABSTRACT

Studies were conducted during 2020 to provide more detail concerning the biology of the newly described *Erigeron decrescens*. Several populations have been located in addition to the type locality and its range of more than 20 square miles in central Cochise County is mapped. One population is estimated to contain thousands of individual plants scattered over more than one hundred acres. *Erigeron decrescens* begins flowering later and ends earlier than *E. divergens* and *E. incomptus*, which are common in the same area. Scattered plants of *E. decrescens* develop as genetic mosaics, retaining the non-woody taproot, low habit, and discoid heads of *E. decrescens* while producing taller stems and radiate heads of *E. divergens*; other plants initially of *E. decrescens* morphology produce *E. incomptus* portions — with taller stems, radiate heads, and woodiness of the root and caudex.

*Erigeron decrescens* (Nesom & Roll 2020) was described based on collections made in April 2019 from the Pat Hills region of Cochise Co., Arizona. Studies continued during 2020 to provide more detail concerning its biology as well as to make a more complete assessment of its geographic range.

Four other *Erigeron* species occur in the desert grasslands of the Pat Hills area. Plants of *E. divergens* are annual and all appear to be variant no. 2 described by Nesom (2015; *Erigeron wootonii* Rydb., the earliest name). This variant has a multicipital caudex with stems arising from a caudex-like taproot apex. This multicipital caudex is similar to that in *E. decrescens*. *Erigeron incomptus* is distinct in its perennial duration, with a woody taproot and often with woody caudex branches — dead stems from the previous year often persist on early-season plants and basal leaves contrast with *E. divergens* and *E. decrescens* in their elongate petioles. *Erigeron arisolius* and *Erigeron canadensis*, both annuals, are also present in lesser numbers in the area.

### Distribution

Several populations of *Erigeron decrescens* have been located and documented in addition to the type locality. The current range of the species covers more than twenty square miles (Fig. 1). One population is estimated to contain thousands of individual plants scattered over more than one hundred acres.

### Ecology and associated species

The winter/spring precipitation at the type location in 2020 was average to above average. The Chiricahua National Monument (approximately 10 miles away) recorded 4.52 inches of rain between January 1 and June 15, with most of that falling before the end of March.

The type locality is a small draw in desert grassland just east of the Pat Hills. Within the draw are a number of wallows, or shallow depressions, that hold water after heavy rains. *Erigeron decrescens* was found along the edges of the wallows and in the lower portions of the extended draw. Additional populations have been discovered in low areas of grassland where the grass *Hilaria mutica* is dominant, and in other areas of grassland that are unusually wet. For instance, *E. decrescens* was

found growing at the margins of two cienega-like areas along former watercourses of Pine Creek, near the Chiricahua mountains.

*Erigeron decrescens* consistently occurs in close association with *E. divergens*. At the type locality, *E. incomptus* also is present in large numbers in the wetter bottoms of the wallows and other areas of the drainage where water collects.

The most common perennial associate of *Erigeron decrescens* is the grass *Hilaria mutica*. In addition to *E. divergens*, common annual associates include *Veronica peregrina*, *Plantago elongata*, *Plantago patagonica*, *Myosurus minimus*, *Androsace occidentalis*, and *Gamochaeta stagnalis*.

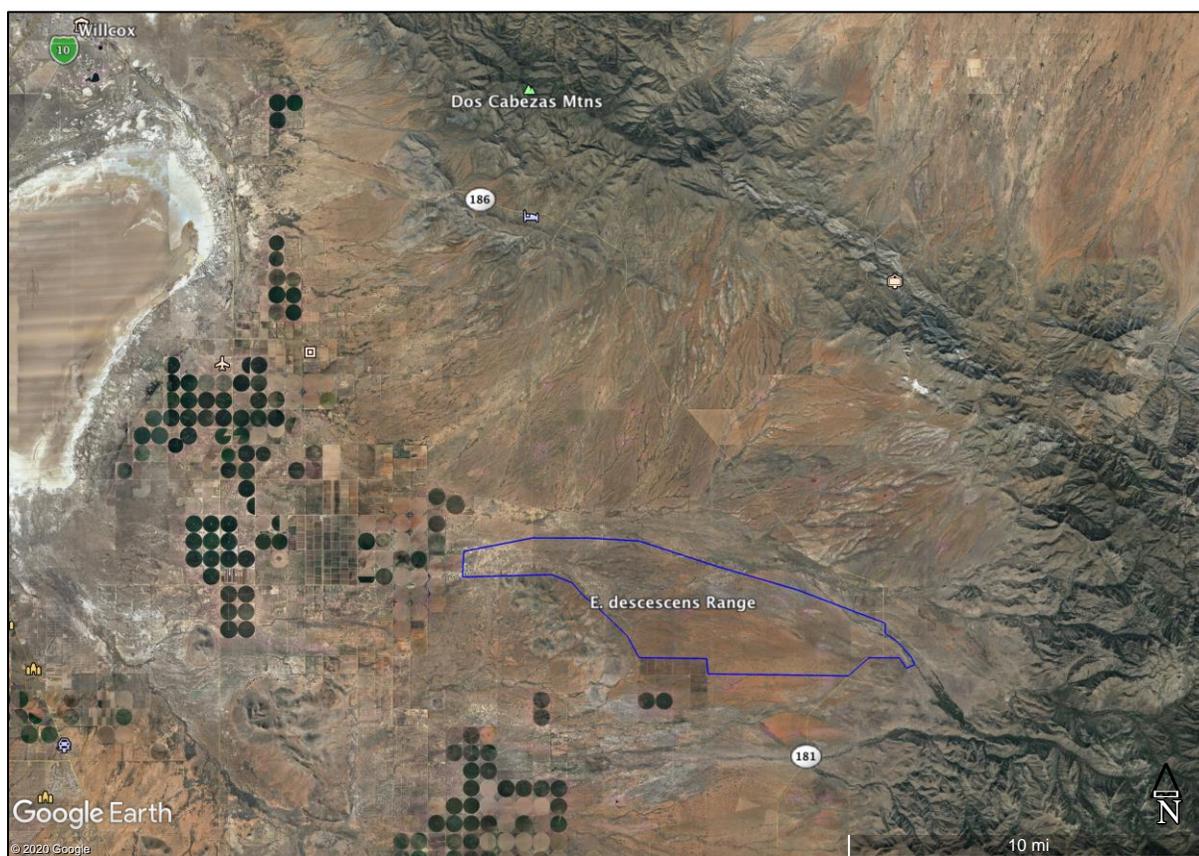


Figure 1. Estimated range of *Erigeron decrescens* in central Cochise County. The Chiricahua Mountains show as the high elevation on the east side.

### Life cycle

Seedlings of *Erigeron decrescens* and *E. divergens* appeared in January and February after winter rainfall. The seedlings are difficult to tell apart but differences between the two species develop as they mature. Plants of *E. divergens* began to flower around March 15 and plants of *E. decrescens* began to flower around 1 April.

By the middle of March, plants of the two species began to show significant differences. Comparative field measurements were made of *Erigeron decrescens* plants and *E. divergens* plants growing in pairs within approximately 20 cm of each other at two different localities on April 16. The averages of these measurements are summarized below in Table 1.

	<i>E. decrescens</i> at type location	<i>E. divergens</i> at type location	<i>E. decrescens</i> at secondary location	<i>E. divergens</i> at secondary location
Laminae length	1.0 mm	4.6 mm	--	--
Pedicel width	1.9 mm	1.1 mm	1.6 mm	1.0 mm
Stem length	4.5 cm	10.5 cm	4.3 cm	11.7 cm
Involucre depth	3.7 mm	2.8 mm	2.6 mm	2.2 mm
Taproot width below caudex	4.9 mm	2.7 mm	2.9 mm	1.8 mm

Table 1. Comparative measurements of *Erigeron decrescens* and *E. divergens* on 16 April.

*Erigeron divergens* began to have elongating stems with nodding buds, while *E. decrescens* remained very short (3–5 cm) with erect buds. Plants of *E. divergens* maintained a blue-green color and their pedicels were slender (1–1.5 mm), tending to become darker and purplish beneath the heads. Plants of *E. decrescens* had a lighter, yellow-green color, with pedicels shorter, wider (1.5–2.5 mm), and straw colored.

The taproot of *Erigeron divergens* is slender, from 1.5–3.5 mm wide at the caudex and usually longer than those of *E. decrescens*. The taproot of *E. decrescens* is wider and expanded just below the caudex. Its width at the caudex measured between 2 and 6 mm, however in large plants can exceed 8 mm. From there it tapers rapidly, often giving the appearance of a small carrot.

Stems of *Erigeron divergens* ranged from 5.8 to 16 cm in height, reaching 35 cm or more in more mature plants later in the spring, and produced multiple heads. Stems of *E. decrescens* ranged from 2.4 to 8.5 cm, although they rarely exceed 5 cm and usually only have a terminal head (comparative size and morphology illustrated in Figs. 2 and 3). Ray corollas of *E. decrescens* have greatly shortened laminae (0 to 3 mm long) and their involucre are deeper (2.5 to 5.0 mm deep). Ray laminae of *E. divergens* measured from 4 to 6 mm long and involucre between 2.0 and 3.2 mm deep.

A plant of *Erigeron decrescens* and one of *E. divergens* growing side-by-side were identified with the field marker 8484. Figure 4 shows the two plants in the field on 16 April. Figure 5 shows the two plants after collection on the same date.



Figure 2. *Erigeron decrescens* (above) and *E. divergens* (below) growing less than 20 cm apart on 16 April 2020.



Figure 3. *Erigeron decrescens* (3 plants on left) and *E. divergens* (3 plants on right) on 16 April 2020.

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A plant of *Erigeron decrescens* and one of *E. divergens* growing side-by-side were identified with the field marker 8484. Figure 4 shows the two plants alive in the field on 16 April. Figure 5 shows the two plants after collection on the same date.



Figure 4. *Erigeron decrescens* (left) and *E. divergens* (right), field marker 8484, before collection on 16 April.



Figure 5. *Erigeron decrescens* (upper) and *E. divergens* (bottom), field marker 8484, after collection.

At the end of April, most *Erigeron decrescens* plants began showing signs of water stress, overall desiccation, and browning of foliage. Nearby plants of *E. divergens* and *E. incomptus* were in full flower without indication of desiccation and browning. By 26 May only one plant of *E. decrescens* remained in flower. Although some *E. divergens* plants were beginning to brown and shrivel, many were still green and in flower. *Erigeron incomptus* plants continued to flower and were not shriveling or browning. Figures 6 through 10 illustrate the differential senescence between *E. decrescens* and *E. divergens* at the type locality.



Figure 6. *Erigeron decrescens* (left) and *E. divergens* (right) on 6 May 2020.



Figure 7. *Erigeron decrescens* and *E. divergens* on 10 May 2020.



Figure 8. *Erigeron decrescens* and *E. divergens* on 20 May 2020.



Figure 9. *Erigeron decrescens* and *E. divergens* on 25 May 2020.



Figure 10. *Erigeron decrescens* completely desiccated and *E. divergens* with reduced flowering on 17 June 2020.

Mature heads of *Erigeron decrescens* collected on 26 May had produced few fully formed achenes. Most achenes observed were dark and small (less than 0.4 mm long) or pale and misshapen. In contrast, mature heads collected on April 28 produced numerous, fully formed (approximately 0.8–1.0 mm long) achenes.

Flowering of *Erigeron decrescens* had stopped at the type locality completely by 2 June. *Erigeron incomptus* and *E. divergens* continued to flower beyond 15 June, but flowering had slowed and most of those plants were beginning to dry. Although some of the *E. divergens* plants had died, many were still alive as the summer monsoon season was about to begin in late June. *Erigeron arisolius* was observed in flower in April and May; *E. canadensis* had not flowered prior to 15 June.

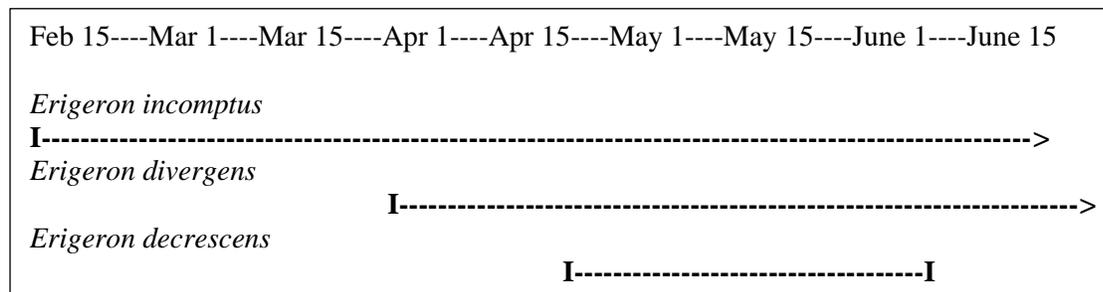


Table 2. Flowering periods of *Erigeron* species at the type locality of *E. decrescens*.

**Intermediates**

From mid to late April, apparent genetic mosaics of *Erigeron decrescens* and *E. divergens* and of *E. decrescens* and *E. incomptus* (Figs. 11–13) were discovered in both of the larger populations of *E. decrescens*, indicating that *E. decrescens* is polyploid, apparently incorporating at least three genomes.



Figure 11. Apparent genetic mosaic of *Erigeron decrescens* and *E. divergens*, with *E. divergens*-like stems arising from a plant of *E. decrescens*, 16 April 2020.

In early growth, these showed only features of *E. decrescens*, but in mid April they began producing shoots characteristic of *E. divergens*. These divergens-like stems are 2–3 (or more) times longer than the decrescens-like stems and have leaves and flowers typical of *E. divergens* (Fig. 11 and Fig. 12, Roll 2930).



Figure 12. Apparent genetic mosaic of *Erigeron decrescens* and *E. divergens* (Roll 2930), collected on 30 April 2020.

On April 30, a mosaic was discovered with a woody root/caudex, long stems from the multicapital caudex, and stems of the previous year still attached (*Roll 2931*, Fig. 12), as in *E. incomptus*. Shorter stems and heads were those of *Erigeron decrescens* (Fig. 12). Similar *E. decrescens/incomptus* mosaics were observed in May at the type locality.



Figure 11. Apparent genetic mosaic of *Erigeron decrescens* and *E. incomptus* (*Roll 2931*), collected on 30 April 2020. The shorter stems and discoid heads are *E. decrescens*; radiate heads on taller stems and the woody root/caudex are *E. incomptus*.

### ACKNOWLEDGEMENTS

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