Selecting and Evaluating Accessions of *Epilobium* Sect. *Zauschneria* (*Onagraceae*)©

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The current taxonomic treatment of *Epilobium* sect. *Zauschneria* includes two species, *Epilobium canum* (Greene) P.H. Raven and *Epilobium septentrionale* (Keck) Bowman & Hoch. Both species are fall-flowering woody perennials restricted to western North America. *Epilobium septentrionale* is a narrow northern-California endemic, restricted to rocky crevices along the Eel, Mattole, and Trinity River drainages. The polytypic species, *E. canum*, is divided into three subspecies; *canum*, *latifolium,* and *garrettii. Epilobium canum* subsp. *canum* encompasses all of the varied forms of the California coastline and the Central Valley from Clear Lake to Baja California. *Epilobium canum* subsp. *latifolium* is primarily restricted to the inland Cascade Range of extreme southwestern Oregon and the Sierra Nevada of eastern California. *Epilobium canum* subsp. *garrettii* is separated from its western relatives by the vast Great Basin. It occupies rocky crevices and cliffs of western Wyoming and northern Utah (Bowman, 1980).

The focus of this investigation considered the development of sect. *Zauschneria* taxa as fall-flowering, perennial crops for low-water landscaping. The specific objectives included collection of germplasm across the geographical range, establishment of a hybridization program to develop horticulturally superior plants, and development of efficient vegetative propagation techniques.

Representative specimens, totaling 31 accessions, were collected in northern Utah, southeastern Idaho, western Wyoming, and northern California during the spring and fall of 2010 and 2011. In Spring 2012 additional collections were made in southwestern Utah. Herbarium vouchers were collected along with live cuttings and seeds from each sampled population.

Field-collected, live cuttings were harvested in June while still vegetative. Each was rolled in moistened newspaper, placed into air-tight plastic bags, and transported from the field in ice-filled chests. Mother plants were established from field-collected vegetative material under greenhouse conditions and outplanted into a common garden at the Utah State University Botanical Center in Kaysville.

A study conducted in 2012 investigated the effect of four rooting substrates (Oasis®, vermiculite, peat/perlite, and perlite) on rooting potential and quality of live cuttings of *E. canum*. Terminal cuttings of non-flowering stems, approximately 3-5 mm in diameter and 5 cm in length, were collected on 12 April 2012. The bottom leaves were removed leaving those at the terminal and first node beneath the terminal. Cuttings were then held at 4°C overnight before dipping in Hormodin® #1 rooting powder (0.1% indolebutyric acid), striking in Oasis #5615 rooting cubes, and placing on a heat mat set at 21°C under intermittent mist (initially for 6 sec every 10 min, but adjusted to 4 sec every 15 min). The greenhouse temperature ranged between 21-24°C.

There were significantly fewer roots in the perlite treatment as compared to the other three ($P<0.05$) (Table 1). We also found that cuttings in the perlite treatment had a poorer rating and shorter longest root than those in the Oasis® or vermiculite treatments. In addition, we found a higher percentage of necrotic leaves in the perlite treatment.

Table 1. Effect of rooting substrate on rooting of *Epilobium canum* cuttings under greenhouse conditions.

Rooting substrate	Roots per cutting	Root rating[x]	Longest root	Leaf necrosis (%)[y]
Vermiculite	5.4 a[z]	2.2 ab	3.4 a	19 a
Oasis	5.3 a	2.8 a	3.8 a	23 b
Peat:perlite (1:1, v/v)	5.2 a	1.8 bc	2.2 b	43 ab
Perlite	4.5 b	1.2 c	1.4 b	54 b

[x]Root rating of 0 = no roots; 1 = <1 cm, no branching; 2 = roots 1-5 cm, no branching; 3= roots > 1-5 cm, with branching; 4 = roots >5 cm, with branching.

[y]Percentage of leaves with necrosis present.

[z]LS-means with the same letter are not significantly different at P<0.05. Data was analyzed using PROC GLIMMIX in SAS with the number of roots being square root transformed before analysis.

It has been our experience that rooting of nursery grown stock can be improved by holding stock plants at 4-10°C which provides for shorter internodes, thicker stems, and a longer window of opportunity for taking cuttings. Rooting percentages can approach 100% (data not shown). Cuttings root within 2 weeks and can be transplanted by Week 3 into 2¼ in. wide by 3⅓ in. deep liner pots and grown for 4 weeks under cool (4-10°C) greenhouse conditions, at which time they can be harvested as liners.

A natural cross between two cultivars of *E. canum* subsp. *garrettii* was conducted in the fall of 2010. Seedlings of that cross were planted in a common garden in 2011 and evaluated in 2012. A two-toned variation which exhibited a pink flared corolla and a red hypanthium was discovered within the population (Fig. 1). In the fall of 2011 viable seed was collected from five controlled crosses between *E. canum* subsp. *garrettii* and the various California forms of sect. *Zauschneria*. Seedlings from these crosses will be out-planted into a common garden and evaluated in 2013.

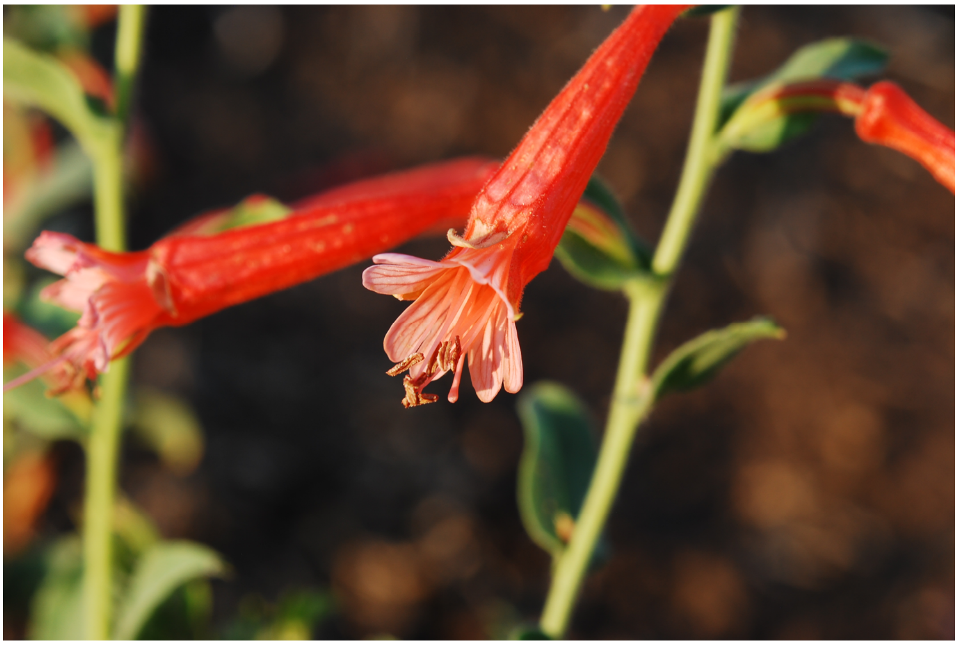

Fig. 1. Flower resulting from a cross of *Epilobium canum* subsp. *garrettii* 'Orange Carpet' and *Epilobium canum* subsp. *garrettii* 'Mountain Flame'. Note two-toned variation of a pink flared corolla and a red hypanthium.

Literature Cited

Bowman, R.N. 1980. Phylogenetic implications from cuticular wax analyses in *Epilobium* Sect. *Zauschneria* (*Onagraceae*). Amer. J. Bot. 67(5):671-685. JSTOR. Utah State University Library, Logan. 16 Nov 2010. http://links.jstor.org/