USDA United States Department of Agriculture

SCARLET GILIA

Ipomopsis aggregata (Pursh) V.E. Grant

Plant Symbol = IPAG



Common Names: Skyrocket, skunkflower, scarlet trumpet flower
Scientific Names: *Gilia aggregata*, *Cantua aggregata*

Description
General: Phlox Family (Polemoniaceae). Scarlet gilia is a biennial to short-lived perennial forb arising from a basal rosette and taproot. Individual plants remain in rosette form for one to many years and typically die after flowering (Fertig, 2017). Scarlet gilia's lifespan varies, but one study found an average lifespan of 4.8 years with no plants surviving after ten years (Campbel, 1997). In production trials conducted at Rocky Mountain Research Station, the proportion of plants behaving as biennials was approximately 99%. A very few were noted as possibly carrying over to the following year, but those may have been seed that germinated a year later (Jensen, 2017). Mature plants can reach as much as 1 m (3 ft) tall, but plants typically range from 0.5 to 0.6 m (18 to 24 in) in height. The basal leaves are 2 to 8 cm (0.8 to 3.1 in) long and highly pinnatifid with narrow segments. The stem leaves reduce further up the stem. The flowers are typically scarlet as in varieties *aggregata*, *arizonica* and *maculata*, but can be white, salmon or pink in variety *macrosiphon*. Flowers are long tubular (1.5 to 5 cm long) with five spreading petals. The fruit is a 5 to 10 mm (0.2 to 0.4 in) capsule bearing 1 to several, 2 to 4 mm long seeds. As is typical in the phlox family, the seeds become mucilaginous (slimy) when wet (Welsh et al., 2003). Jensen (2017) reported that from 36 collections, seed weights ranged from 280,000 to 700,000 seeds/lb.

Distribution: Scarlet gilia is located throughout western North America from Montana south to Texas and west to British Columbia south to California. For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site.



Adaptation
Scarlet gilia is typically found in sunny openings in mountain shrub, sagebrush steppe, and alpine timber communities from 1,100 to 3,300 m (3,600 to 10,800 ft) elevations in the Sierra, Intermountain and Rocky Mountain regions (Hickman, 1993; Welsh et al., 2003). It is very drought tolerant, shade intolerant, and has higher germination success and seedling survival in disturbed soils (Juenger and Bergelson, 2000). Scarlet gilia prefers medium to coarse loam to sandy loam soils in areas receiving 250 to 1,000 mm (10 to 40 in) mean annual precipitation.

Uses
Wildlife: Scarlet gilia can be included in conservation and wildlife habitat plantings to increase species diversity. Plants are highly palatable, with the flowering stocks regularly utilized by native wildlife and livestock (Fertig, 2017). The timing of herbivory can influence plant response, with overcompensation (increased flower and seed production compared to non-grazed plants) observed with early season herbivory and reduced flowers and seed production with late season herbivory (Paige and Whitham, 1987; Paige 1999).

Pollinator: Hummingbirds and bumblebees are attracted to this showy species from which they extract nectar (Irwin, 1998). Caruso (1999) documented visitation by broad-tailed (*Selasphorus platycercus*) and rufous (*Selasphorus rufus*)

hummingbirds at a study site in Colorado. Scarlet gilia typically flowers in early- to mid-summer depending on the region. In the Intermountain and Rocky Mountain West, flowering dates ranged from April to July (Jensen, 2017). Flowers are self-incompatible and rely on cross pollination for seed production (Wolf et al 1986).

Status
Please consult the PLANTS Web site (http://plants.usda.gov/) and your state's Department of Natural Resources for this plant's current status (e.g., threatened or endangered species, state noxious status, and wetland indicator values).

Planting Guidelines
Based on a seeding rate of 50 pure live seeds (PLS) per foot, the full stand seeding rate is approximately 6 lbs/ac. The seeding rate should be adjusted to match the desired percentage within a seed mixture. Seed can be planted with a drill or broadcast seeder. Very shallow seeding depths, on the surface to no more than 3 mm (1/8 in) are typically recommended; however, Jensen (2017) observed no differences in emergence when planted at depths between 1.5 and 4 cm. Juenger and Bergelson (2000) found that tilling prior to broadcast seeding increased establishment significantly.

In a 2017 field trial conducted by the authors in Idaho and Utah (results in preparation), germination rates of scarlet gilia were increased significantly using a mixture of cold and warm stratification over 10-day periods. In the same trials, coating scarlet gilia seed with a broad-spectrum fungicide (Obvius®, BASF Corporation, North Carolina, USA) also resulted in significantly higher rates of seedling emergence compared to a non-treated control. At sites that received 325 to 485 mm (13 to 19 in) annual precipitation, establishment of scarlet gilia seedlings within the first year of seeding was relatively high, with 40% of seedlings surviving during the first growing season.

Management
Scarlet gilia should be used as a minor component of pollinator and restoration seed mixtures. Management strategies should be based on the key species in the established plant community. Grazing should be deferred on seeded lands for at least two growing seasons to allow for full stand establishment (Ogle et al., 2011).

Environmental Concerns
Scarlet gilia is native to western North America. It does not pose any environmental concern to native plant communities under proper management.

Seed Production
Seed collection dates for Intermountain West populations ranged from the last week of June through the last week of September (Jensen, 2017). Small scale production fields and wildland collections can be harvested by beating the seeds off the plant into a bin or bag, or by clipping the flower heads. Small amounts can be dried in paper bags at room temperature with the top of the bag covered with open weave cloth. Larger amounts are dried on tarps in a greenhouse or shed. Plants are covered with garden row cover to prevent seed loss from the potentially explosive dehiscence of the capsule (Skinner, 2007). Seed is cleaned by running the collected material through an air-screen cleaner. Clean seed is stored in controlled conditions at 40 degrees Fahrenheit and 20 to 40% relative humidity.

There are many issues preventing scarlet gilia from being adopted into large scale seed production. Scarlet gilia is usually considered a biennial, but may remain in the rosette stage for several years before flowering and is probably more properly considered a monocarpic perennial (Skinner, 2007). Because the plants flower indeterminately and the capsules dehisce forcefully upon ripening, a single harvest is inefficient for gathering a significant amount of seed. Multiple hand harvests are difficult and time-consuming. There is wide variation in seed size and seeds per capsule depending mostly on pollinator effectiveness (Wolf et al 1986). Shock et al (2014) reported extrapolated yields of 47, 61 and 64 lbs/acre from a single harvest with 0, 4 and 8 inches supplemental precipitation respectively (Shock et al., 2015). Rocky Mountain Research Station observed yields of 25, 87, 110 lbs/acre extrapolated from production beds from multiple harvests (Jensen, 2017).

Field observations suggest browsing scarlet gilia plants resulted in bushier canopies with increased flower numbers (Paige and Whitham, 1987; Paige 1999). However, Jensen et al (2011) showed clipping treatments conducted in June and July resulted in approximate fourfold reduction in the number of flowers as compared to the control plants. A second set of trials looking at earlier clipping dates (beginning in April) again showed no overcompensation among any treatments (Jensen, 2017).

Plant Production
Seed from montane Oregon germinated poorly under all conditions (Link 1993); however, Rose et al (1998) reported that no pretreatment is necessary for germination. Skinner (2007) found best results (90% emergence) with 45 days of cold moist stratification for a seed collection from Paradise Creek drainage near Pullman, Washington. Unpublished data from trials

conducted at the Pullman Plant Materials Center showed that 5% emergence occurred without stratification and that 90 or more days of cold, moist stratification did not increase emergence beyond that achieved with 45 days. Slightly higher emergence was obtained from plants grown outdoors under cool, fluctuating growing conditions but these plants were not ready to be transplanted to the field the same spring (Skinner, 2007).

Greenhouse transplant production can take four months and should be started in late November or early December. Seed can be sown into 10 cubic inch conetainers filled with a standard soil mix and covered lightly. A thin layer of pea gravel or sand should be applied to the top of the planting soil to prevent seeds from floating during watering. Conetainers should be watered deeply and placed outside before being moved to the greenhouse in early to mid-January. Alternately, seed can be moist stratified in a refrigerator for 45 days before sowing in the greenhouse. Emergence may begin in four to eight days and it may take two weeks for the seedling to become established. Once established, the plant enters and active growing phase and should remain in the green house for three months. Watering deeply should occur daily and a water soluble fertilizer should be added weekly. Hardening can take place in late March or early April depending on the weather. Plants can be moved into a cold frame and watered every other day when cool, every day when hot. Hardening may take two to four weeks and the plant should be ready for transplant by early May (Skinner, 2007).

Stem cuttings can be propagated in a frame (Mirov & Kraebel 1939).

Cultivars, Improved, and Selected Materials (and area of origin)

Limited quantities of wildland collected seed may be available from commercial sources. There are currently no commercial releases of scarlet gilia. Seed sources should be selected based on the local climate, resistance to local pests, and intended use. Consult with your local land grant university, local extension or local USDA NRCS office for recommendations for use in your area.

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Citation

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