

# Stress Tolerant *Epilobium latifolium*, or “River Beauty”, Provides Eye-Catching Color to Any Landscape

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## EXECUTIVE SUMMARY

*Epilobium latifolium*, being that it is naturally a perennial wildflower, is a low hassle, stress tolerant herbaceous perennial. The plant will flower in full or partial shade, and blooms for the duration of June to August providing wonderful color to any landscape. It can be produced as a potted plant, a cut flower, or an annual or perennial bedding plant.

**UNIVERSITY OF MINNESOTA:** Stress Tolerant *Epilobium latifolium*, or “River Beauty”, Provides Eye-Catching Color to Any Landscape

## I. INTRODUCTION

### A. Study Species.

In wet and stony environments, such as along the side of a riverbank or a sandy seashore in Alaska, the bright pink to purple color of the showy flower *Epilobium latifolium* can catch the eye of any traveler (Figure 1). This herbaceous perennial, commonly called Dwarf Fireweed, is known to grow in a range of inhospitable areas as long as there is good drainage and a consistent supply of water. Within the Onagraceae, *Epilobium latifolium* follows its family's reproductive morphology creating flowers with four petals, four sepals, and four or eight stamens.

Due to its striking floral features like size and coloration, it is also sometimes called “River Beauty”, given its ability to provide a pleasant visual addition to the surrounding environment while growing near the water's edge.

### B. Taxonomic Classification and Geographic Distribution in the Wild.

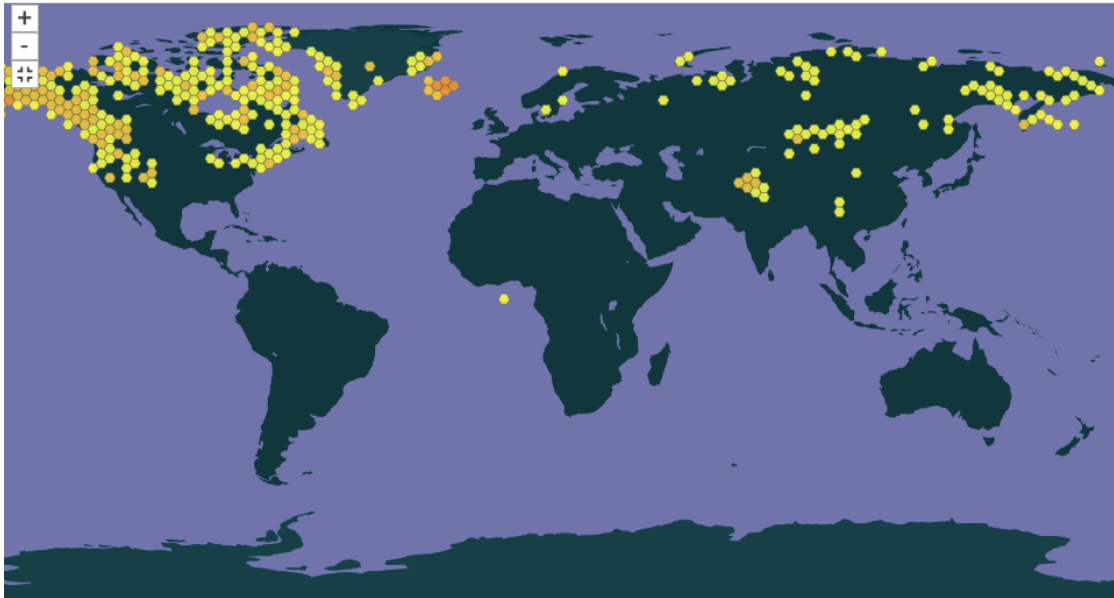
*Epilobium latifolium* (L.) Holub was once classified as *Chamerion latifolium* (L.) Sweet and *subdentatum* (Rydb.) Á. Löve & D. Löve. Other common names for this species include “Alpine Fireweed” and “Broadleaf Willowherb”. The variance in names of this plant can be attributed to its geographic distribution throughout the northern hemisphere. Within North America, it can be found throughout much of the continent (Figure 2), excluding the southernmost states near the

Figure 1: *Epilobium latifolium* water colored by Mary Vaux Walcott which is featured in the Smithsonian Art Museum.



Gulf of Mexico. Globally, it can commonly be found in northern Europe, Greenland, Iceland, and Northern Russia (GBIF Secretariat, 2017).

Figure 2: The geographic distribution of *Epilobium latifolium* from the Global Biodiversity and Information Facility.



This species can grow in many locations as long as there isn't competition for resources, and the right soil types and sufficient moisture are present. For this reason, *Epilobium latifolium* has been called a "colonizer" since it regularly occurs in newly disturbed areas that lack neighboring vegetation. It has been found on the sides of bare mountains and is frequently the first plant to grow in an area after a forest fire (Elpel, 2018). This plant will grow in many different growing conditions. It has been discovered at sea level as well as on the sides of rocky mountain slopes (Mosquin, 1966). Habitats where this population can be found include wetlands, woodland borders, and meadows. Due to the plants need for consistent water, it is limited to areas near valleys, seashores, and runoff areas composed of gravel, silt, or clay. *Epilobium latifolium* can grow in sun or partial shade. While it

prefers rocky or sandy soils, it can grow in almost any soil type and can tolerate a pH from alkaline, neutral to acidic. It is not commonly found in nutrient poor or water logged soils (Fleenor 2016).



Figure 3. Flowering closeup of *Epilobium latifolium*.

*Epilobium latifolium* is a dwarf species. Its vegetative morphology is described as growing erect, but near ground level, ranging from 5 to 30 centimeters high. It grows extensive, fibrous roots and also has rhizomatous stems near or just below the soil line (Aiken et al. 2007). Its leaves grow alternately and, in the absence of a petiole, form a lanceolate leaf (Mosquin, 1966). The top of its leaves display a darker green color while the leaves underneath are more pale in color. Its fruit is a long, slender capsule and contains many small seeds. The seeds have a yellow or white tuft on them that aid in their dispersal via the wind. Due to this dispersal method, once this plant becomes established and produces fruit, its population grows quickly. This can become a problem if it is planted as an ornamental crop. With an easy dispersal method, and a high tolerance to stressors, this plant can easily become weedy or invasive. Consequently, in order to avoid it becoming unmanageable, the United States Department of Agriculture recommends collecting the seed capsules from the plants in the garden area prior to maturity (known as deadheading) to prevent any spreading or unwanted growth (Fleenor, 2016). *Epilobium latifolium* blooms in the beginning of June through late August. The flowers have long pedicels and form an indeterminate raceme (Figure

3). Although the plant is self-compatible, the flowers are protandrous (in which the anther shed pollen the stigma is receptive), which promotes outcrossing (Fleenor, 2016).

*Epilobium latifolium* has other uses beyond its beauty. The entire plant is edible to both humans and animals. Wildlife, such as deer, cattle, and moose, value this plant as food. As for humans, the leaves, flowers, roots, stem and seed pods can be eaten raw (Aiken et al. 2007). The young leaves and shoot tips can be made into a salad and eaten as vegetables. They are said to be a good substitute for asparagus (Pemberton et al. 2019). A sweet tea can be made from the dried leaves and is a very popular drink in Russia. Called “Kaporie tea”, it is often drunk for its medicinal properties. A review by Schepetkin et al. (2016) determined that the plant contains polyphenols, which are organic chemicals that are beneficial to human health. Extract of *E. latifolium* is said to have antioxidant, anti-inflammatory, anti-bacterial, and anti-aging properties (Schepetkin, 2016). Traditional uses of this plant have been utilized by Native people for many years. The North American Indians of the Potawatomi tribe called it, “kêgi'nano'kûk” or sharp pointed weed (Smith 1933). The leaves were ground up to create a paste that could be applied topically to various skin diseases and bodily injuries. It was used for infected sores, swelling, burns, beestings, and pains caused by arthritis. The leaves can be chewed in order to stop a bloody nose (Aiken et al. 2007). Grinding and drinking parts of the root as a tea was also used to treat whooping cough, asthma and intestinal complications (Granica et al. 2014).

## **II. CROP SPECIES**

### **A. History and Potential Uses.**

The published information on *Epilobium latifolium* does not provide a clear origin for this species. When looking at its dispersal throughout the northern hemisphere, it may be inferred

that it originated in an area with wet and well-drained soils. There is no record of breeding associated with this species.

Many different online retailers sell “Fireweed” seed or *Epilobium angustifolium*, but none offer the dwarf species of *Epilobium latifolium*. No online seed retailers were identified. The website with the most information was associated with “Outsidepride Seed Company”. They chose to market this plant as a beautiful medicinal herb (Fireweed). Another website, “American Meadows”, promotes *Epilobium angustifolium* as a native wildflower (Fireweed Seeds).

Potential uses for this crop would include producing it for sale as a flowering potted plant, annual or perennial bedding plant (depending on the region), as well as a cut flower.

### **III. PRODUCTION INFORMATION**

#### **A. Anticipated Cultural Requirements.**

*Epilobium latifolium*, will flower in full or partial shade, and blooms for the duration of June to August providing wonderful color to any landscape. The plant can be grown within a container or placed naturally within a landscape, given that it has good drainage and regular exposure to water. It could also be grown as a flowering potted plant for Easter or Mother’s Day sales as well as being produced as a cut flower. An approximate USDA Hardiness Zone ranges from 3 to 6, and an estimation of zone 2 to 6 may be possible for Heat and Drought tolerance. Since this plant requires a consistent amount of water, the Heat and Drought tolerance zones might be inaccurate.

*E. latifolium* can be propagated from seed indoors. The seeds must undergo a cooling period or be stratified. Seeds should be placed within a cooler in temperatures between 5 and 15 degrees Celsius for four to five weeks in a sealed container. Once seeds are stratified, the seeds can be sown into a 288 plug tray flat with a germination mix of t of 2:1:1:1.5 v/v (peat

moss:sand:coarse perlite:vermiculite). Seeds need to be hand watered and kept moist through the entire germination period. They can be kept within a mist house during germination. The seeds should germinate within ten days, and then be moved into the greenhouse. After hypocotyl emergence but still within the cotyledon stage, transplant seedlings into D40 pots filled with the same germination mix used as before. It is specifically important to transplant at this stage in order to prevent root deformation. It will take two to four weeks for the plant to become established.

There is the potential for this to be a vegetatively-propagated crop. Our observations are that nearly 100% rooting can be achieved with softwood cuttings taken during the growing season. Cuttings were treated with 1,000 ppm indole butyric acid (IBA) powder and placed into mist systems (21C day/night; 16 HR photoperiods,  $150 \mu\text{mol m}^{-2} \text{sec}^{-1}$ ).

Young plants (seedlings or cuttings) are very fragile and can easily suffer from breakage, so hand watering and handling must be done with care. Watering can be delayed until containers are almost dry to promote hardening off. Once seedlings/cuttings mature, they can be transplanted into other larger containers or placed outside. If the plant gets higher than 18 inches, it is recommended to pinch the top of the plant to promote lateral shoot growth.

At this time, it is unknown whether this crop is photoperiodic. However, since it flowers during the summertime of long day photoperiods, particularly in northern latitudes, this may be a long day plant.

## **B. Market Niche.**

*E. latifolium* could be marketed to consumers during the early spring, as well as be in production for holidays such as Easter and Mother's Day. Consumers could purchase seedlings or cuttings to transplant into their own garden once it's warm enough in the spring. This product could be started indoors towards the end of the year, in the later months, so that the seedlings

would be ready for spring, or they could continue to grow them and sell them through the summer. Since they're a perennial, if they were bought towards the end of the summer months, the plant can remain in the landscape and return the next season. Once consumers have enjoyed this crop as a flowering potted plant, it could be transplanted outdoors into containers or landscape beds for reflowering later in the season.

According to the literature, *Epilobium latifolium* is tolerant to many growing conditions, as long as it is in an area that has well drained soil and can be watered frequently. A limitation for growing this plant would definitely be in warmer areas and places that don't have a lot of extra water for irrigation. Other plants within the evening primrose or *Onagraceae* family would be the competition for this species, although there isn't a lot of market pressure. The major reasons the other plants in this family would be competition on the market is because they offer different stress tolerances.

In order to stand out in a market, a trending approach is to highlight the fact that *E. latifolium* is a perennial wildflower and can contribute to pollinator and ecosystem services. Another feature of this species is that since it is a dwarf species, it won't need to be pruned or cut down for a controlled and bushy appearance. This is attractive to consumers since it is convenient and low maintenance to have this plant. Once it is purchased, it can be placed relatively anywhere within a yard as long as it is watered frequently. The plant produces wonderfully colored flowers and returns every spring once it begins to get warm out. In addition to the plants beautiful and showy flowers, all parts of the plant can be culinarily enjoyed. In comparison to the close relatives of *E. latifolium* that are taller and grow more aggressively, this species is said to be better tasting. The flowers, buds, leaves, shoots, roots and seed pods can be savored.



A marketing story could be:

“As spring nears and everything begins to grow again, nothing feels better than to upgrade your landscape. Within a few weeks, *Epilobium latifolium*, or “River Beauty”, can be the next stunning item on your lot. This is an herbaceous perennial that requires low maintenance, produces gorgeous fuchsia-colored flowers, and provides the same ecosystem services as native prairie plants. Being a natural wildflower, the River Beauty can be planted almost anywhere as long as it’s situated in a place with well-drained soils and has adequate water throughout the growing season. It blooms from June to August and being a dwarf plant, grows close to the ground while still holding beautiful pink to purple colored flowers. These flowers are fan favorites of pollinators, as well as beneficial insects that are important for ecosystem functions. Wildflowers are great for improving soil health and preventing erosion, and sometimes hold a history for culinary purposes. *Epilobium latifolium* is entirely edible. The leaves, buds, and flowers can be eaten as a salad. The dried leaves and flowers can also be made into a tea, that is very popular and enjoyed in Russia, called “Kaporie tea”. Even if you’re not feeling that adventurous, you are still able to enjoy the beauty that this plant has to offer.”

#### **IV. CROP SCHEDULE**

When considering the schedule for this crop, the target week of this plant will be for Easter and Mother’s Day sales. This would put the target week at week 16. Prior to week 1, there will need to be a stratification period of 4-5 weeks. Sow seeds in a 288-plug tray with germination mix soil and place in the cooler at a temperature between 5 to 15 degrees Celsius. After cooling, place in the mist house for germination at an ideal temperature of 22 degrees Celsius. Seeds should germinate within ten days. After

hypocotyl emergence, transplant into D40 pots using Professional Blend soil. After 2-4 weeks of hand watering and the seedlings become established, regular watering can be incorporated. Fertilizing isn't required as the plant grows well by itself. No plant growth regulators are recommended at this time. Since this is a dwarf species, the plant will provide short plant habit. To get a bushier appearance, deadheading can occur as soon as flower buds appear. After 6-7 weeks of growing in the greenhouse, the plants should be ready and in bloom for the holidays. Total production time is 17 weeks in the greenhouse, with 4-5 weeks of seed stratification.

Week 1:	
Week 2:	
Week 3:	
Week 4:	Remove plants from cooler and place in mist house
Week 5:	Emergence, move plants from the mist house into the greenhouse, transplant into D40 pots
Week 6:	Hand watering until plant becomes more established
Week 7:	Hand watering
Week 8:	Hand watering
Week 9:	Hand watering
Week 10:	
Week 11:	
Week 12:	
Week 13:	
Week 14:	
Week 15:	
Week 16:	Target Week

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