

## Species Productivity Schedule: *Caulophyllum thalictroides*

### Taxonomy:

Scientific family: Berberidaceae

Scientific name: *Caulophyllum thalictroides*

Common English names: blue cohosh, papoose root, squawroot

Anishinabek name: Bezhigojiibik

### Description:

*Caulophyllum thalictroides* is an herbaceous perennial plant in the Berberidaceae family (Barberry). While not a spring ephemeral, this medium-sized herb and its inconspicuous flowers are an usher of spring, blooming in mid April. Conversely, the ripened brilliant blue fruits signify the dwindling of summer and the onset of fall; they are usually visible from September through the winter (Voss, Resznicek 2012, PFAF 2012).

*C. thalictroides* is found in the rich, mesic woods and meadows of eastern North America (USDA 2012). It ranges in height from 30-95cm and has a single, glabrous, or hairless, stem with 3 leaves (occasionally 5) comprised of 3-5 leaflets, one at the terminal end (Voss, Reznicek 2012). These leaves seem to make a platform of foliage and have a slightly waxy feel to them. Both the stem and leaves have a bluish-green to even purple color caused by a slight blue film that coats the plant (Foster, Duke 2000). The rounded, obovate-oblong (egg-shaped) leaflets, reaching 5-8 cm at maturity, generally have 2-5 lobes that occur past the midpoint of the leaflet (Gleason 1991).

The inflorescence, or flower cluster, of blue cohosh is a small panicle-like terminal cluster of yellowish-green or greenish-purple flowers that emerge from the elongated stem (Fig. 1); the number of flowers per plant can range from 5-70 (Gleason 1991). These subtle bisexual flowers are comprised of 6 petal-like sepals that surround 6 very small petals that resemble glands. The six stamens are very small, 0.1-0.7 mm. (Voss, Reznicek 2012). Although blue cohosh is a dicot, it is unique in that it has floral parts in multiples of three, which is often characteristic of monocots (AAFC 2012). Once pollinated, the flowers develop into conspicuous blue fruiting bodies (Fig. 3); these "fruits" are actually exposed seeds that have ripened too quickly and have caused the ovary wall to break and shrivel away (Gleason 1991, Voss, Reznicek 2012). There are two seeds per fruit and are toxic to humans when raw (Chevallier 1996). *Caulophyllum thalictroides* has a knotty rootstock with several-dozen elongated rhizomes, which are used in traditional medicine for a variety of ailments (see **Cultural and Medicinal Uses** below) (Chevallier 1996).



Figure 1, above left: *Caulophyllum thalictroides* inflorescence

Figure 2, above right: leaf morphology of *Caulophyllum thalictroides*

Figure 3, below left: Exposed fleshy seeds, or "fruits", 1-2 cm in diameter

Figure 4, below right: rootstock and rhizomes of *C. thalictroides*. Used medicinally



Another distinct *Caulophyllum* species, *C. giganteum* (giant blue cohosh), is frequently misidentified as *C. thalictroides*, and vice versa (AAFC 2012). They

overlap in distribution and morphology, but are distinguished by a few subtle characteristics. *Caulophyllum giganteum*, as its name suggests, is an overall larger species and has consistently dark purple flowers. The style of *C. giganteum* is larger, 1-1.5mm, whereas *C. thalictroides* is only 0.1-0.7mm. (Rabeler 2007, Voss, Reznicek 2012). *C. giganteum* also flowers two weeks before *thalictroides*, which is helpful in the beginning of April/May for identification (AAFC 2012).

The foliage of the *C. thalictroides* also resembles that of the *Thalictrum* family, or Meadow rues (Voss, Reznicek 2012). They both have three leaves with several compounded leaflets and 3-5 lobes per leaflet. It is quite difficult to distinguish them without flowers, which are very distinct from one another, but generally the *Thalictrum* family has longer petioles, especially on the terminal leaflets, and tends to bloom later in the year (Voss, Reznicek 2012). *Thalictrum* generally have umbel shaped inflorescences, while *C. thalictroides* has a panicle-like cyme (Voss, Reznicek 2012).

### **Habitat and Ecology:**

*Caulophyllum thalictroides* can generally be found in in the understory of rich, mesic habitats (Voss, Reznicek 2012, Northwoods 2012). Ranging from swamps, meadows, deciduous woodlands to woodland edges, this plant prefers North-facing slopes with plenty of shade and moist soil (Chevallier 1996). It can be found in these types of habitats across eastern North America, from Georgia to the tip of Northern Quebec (Fig. 4) (USDA 2012). However, since these types of cool, moist habitats are less common in the South, *C. thalictroides* is more scarcely distributed in its Southern range compared to its Northern boundaries. In Michigan specifically, blue cohosh can be found in the majority of counties (63/83) in both the Lower and Upper Peninsula, (Fig. 5) (Michigan Flora Online). Although overharvesting has made *Caulophyllum thalictroides* only an occasional plant in these deciduous habitats, it is only considered endangered in Rhode Island (USDA 2012).

In its ecosystem, blue cohosh keeps a fairly low-key position. *C. thalictroides* is normally fairly solitary and it is unlikely to encounter large stands of this plant within the forest. The leaves contain toxic alkaloids and glycosides and are generally avoided by herbivores (Hilty 2012, PFAF 2012). However, white-tailed deer and some other small herbivorous mammals will browse the bitter-tasting leaves when other choice foliage is absent (Hilty 2012). Slug species would normally be significant herbivores of this leafy plant, but the tall slender stems prevent slugs from reaching the foliage (Northwoods 2012). While the fleshy blue seeds are toxic to humans, they are more delectable to birds and very rarely mammals. Woodland birds are attracted to the vibrant color and large storage of carbohydrates in the seed and are thus the primary dispersers of the *C. thalictroides* seeds (Hilty 2012, Northwoods 2012). The seed of blue cohosh is relatively difficult to germinate, and is a double-dormant variety, meaning it requires two exposures of winter before it is able to germinate (Diboll 2004). However, once this plant is established it is very long lived (Duncan, Duncan 1999).

### **Time of harvest and life cycle:**

The flowers develop anytime from April-May, one of the earlier spring flowering events, with the fruits reaching maturity in September (Foster, Duke 2000). However, the culturally utilized and medicinal part of *Caulophyllum thalictroides* is the knotty root and rhizomes. These below growth structures are harvested in autumn, dried, broken apart, and made into either a decoction (extraction of compounds via boiling) or tincture (alcohol extract) (Chevallier 1996, Diboll 2004). Propagation of this plant is achieved through seed sowing or root transfer, also in autumn (Chevallier 1996).

The 6 stamens of each *Caulophyllum thalictroides* flower generally mature asynchronously from the pistil, ensuring cross-pollination (Native Plant Database 2012). However, sometimes both are mature at the same time, allowing some slight self-pollination (Hannen, Prucher 1996). Both self and cross pollination are facilitated mostly by Dipteran species (e.g. flies, mosquitoes) and less so by Hymenoptera species (e.g. bees, wasps). Dipterans tend to eat from one flower until satiated thus initiating self-pollination, when developmentally possible, whereas Hymenoptera bounce from flower to flower causing cross-pollination of *C. thalictroides* (Hannen, Prucher 1996).

Once pollinated, the two ovules in each ovary develop into seeds and vibrant blue fruits. The seeds grow so quickly however, that they burst through the ovary wall and continue to develop exposed (Duke 1985). Thus, the “fruit” is not actually the ovary, it is the exposed, fleshy, blue seed; the ovary wall shrivels away during seed maturation (Voss, Reznicek 2012). Birds are the major distributors of these mature seeds (Northwoods 2012, Hilty 2012). Since *Caulophyllum thalictroides* is a perennial plant, the aboveground leaves and stems die back during the winter and re-sprout from the rootstock in the spring. These plants are long-lived and have been known to live as long as 50 years (Duncan, Duncan 1999).

### **Cultural Meaning and Medicinal Uses:**

The most traditional and well-known medicinal use of blue cohosh was as a woman’s herb (Chevallier 1996). One of its common names, squawroot, is indicative of the strong female association that it has, unfortunately through a very negative word. The word “squaw” is an, incorrectly, Algonquian-derived English word used in a derogatory sense to describe a Native American woman, or female reproductive anatomy (Redish, Lewis 2009). There are many internet sources claiming that this is not the case and that squaw does not have this negative connotation, but take each of those sites with a grain of salt—Native Americans never refer to women with this word (Redish, Lewis 2009). The other common name, papoose root, is term for a young Native American child or baby (Merriam-Webster 2012). This could be due to the fact that a baby is often the product and cause of blue cohosh use.

The Ojibwe language also has a specific name for *Caulophyllum thalictroides*: Bezhigojiibik. “Bezhig” means one, but the alteration to “bezhigo” in this word has a more specific meaning of “one that stands alone” or “one that is separated from the rest”; this name could have been given to blue cohosh due to its uncommon occurrence or its tendency to not produce large stands in the forest. The second part of the word, “jiibik” means root. Since the root of the plant was utilized

medicinally, it makes sense that “jiibik” would be incorporated into the Ojibwa word for *C. thalictroides*.

The primary function of blue cohosh in many Native communities of North America was to induce childbirth, ease the pain of labor, rectify delayed or irregular menstruation, and to alleviate heavy bleeding and pain during menstruation (Naegele 1996, Chevallier 1996, Duguo et al 2008). Menstrual problems would be treated with a decoction of the root and rhizomes, while a tincture would be used to begin or ease labor (Chevallier 1996). The taste of the root is rumored to be very acrid and bitter, yet warming (PFAF 2012). However, since the roots contain a uterine stimulant, a pre-term pregnant woman, or one hoping to become pregnant, should avoid ingesting this plant due to the possibility of an unwanted miscarriage. From a different perspective, blue cohosh has been routinely used as an abortive to end pregnancies or as a contraceptive to prevent pregnancy from happening initially (Duke 1985). Chippewa women have historically used blue cohosh tea as a contraceptive (Duke 1985).

*C. thalictroides* is still used in several Western homeopathic remedies and commercial products for gynecological and other female ailments, even though this plant is not currently approved by the FDA (Chevallier 1996, Kaniecki 2011). A decoction of the root can be taken by a pregnant woman 2-3 weeks prior to the scheduled birth in order to ensure an easy labor process (Duguo 2004, PFAF 2012). In 1999, approximately 64% of the U.S. Certified Midwives claimed to use a tincture of blue cohosh during labor (Duguo 2004). Although the active ingredients in blue cohosh are not well known, there are recorded cases of the herb causing perinatal (around the time of birth) stroke, blood clots and congestive heart failure in the baby (Duguo 2004).

Beyond being used as a woman’s herb, blue cohosh has many other medicinal qualities. There are many claims that the root has anthelmintic (expels parasitic worms), antispasmodic (relieves muscle spasms), expectorant (clears mucus), analgesic (pain relieving) and several other medicinal properties (Duke 1985). A decoction of the blue cohosh root has been traditionally used to treat rheumatism, bronchitis, asthma, fevers, colic, inflammation and constipation (Chevallier 1996, Galvin 1919).

The seeds of *Caulophyllum thalictroides* are toxic when raw, but are edible and an effective coffee substitute if heated thoroughly; however, it does not contain caffeine (Northwood 2012). This heating process denatures the poisonous compounds: alkaloids, and some glycosides (Naegele 1996, Hilty 2012).

The only sufficiently studied compound found in *Caulophyllum thalictroides* is a saponin found in the root, specifically caulosaponin (Kanieski 2011). This saponin is known to stimulate the uterus, but some of the other compounds could also be active (Chevallier 1996). It is this compound that allows *C. thalictroides* to be an effective female medicine

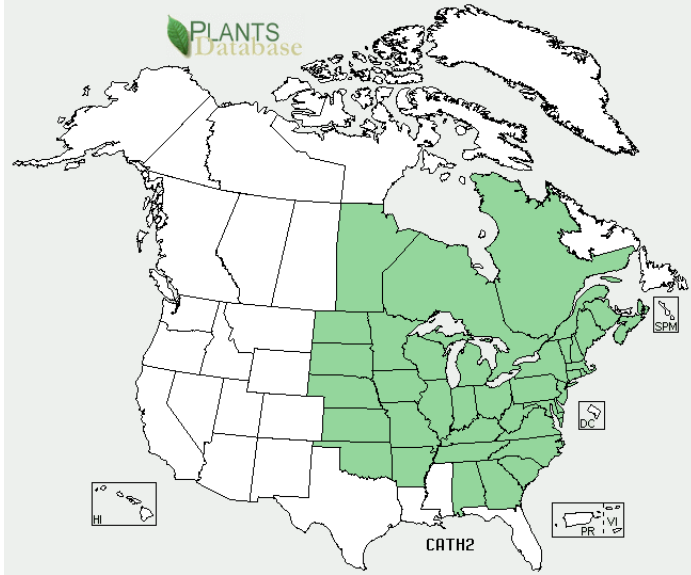


Figure 5: North American distribution of *Caulophyllum thalictroides* (USDA 2012)

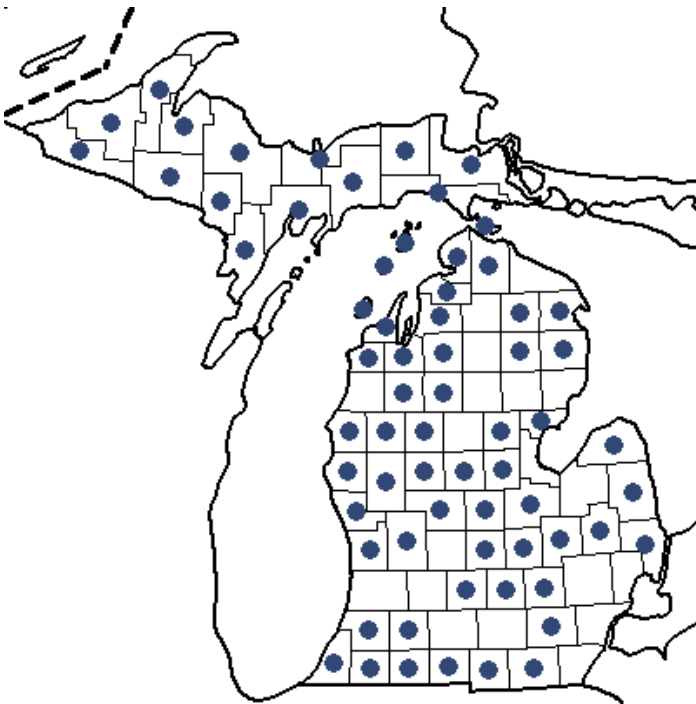


Figure 6: State of Michigan distribution of *Caulophyllum thalictroides* (Michigan Flora Online)

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