

GENUS SCROPHULARIA IN KENTUCKY:

Scrophularia marilandica (L.) and *Scrophularia lanceolata* (Pursh)

Kentucky has two native species in the genus *Scrophularia* of the Scrophulariaceae/Figwort family – *Scrophularia marilandica* (L.) – Eastern/Late Figwort and *Scrophularia lanceolata* – Early Figwort (Pursh). *S. marilandica* (Figure 1) is infrequent and primarily in Kentucky's east-central and western counties. *S. lanceolata* (Figure 2) is to be expected as it had been reported in Carroll County in 1986 but no further collections have since been reported. *S. lanceolata* is found in six of the seven states bordering Kentucky – it is not documented in Tennessee. Both *S. marilandica* and *lanceolata* are similar in description, habitats, and usages. Close inspection of the flower's stamens is necessary to accurately identify which *Scrophularia* one is examining. *S. marilandica* has a purple-brown sterile stamen which is longer than wide while *S. lanceolata*'s sterile stamen is greenish/yellow and is wider than long. Minor differences as blooming times of June-October for *S. marilandica* and May-July for *S. lanceolata* can overlap and make identifying difficult from a distance. *S. lanceolata* has coarser, serrated, narrower leaves and larger seed capsules. These minor differences can be subject to interpretation which makes close examining of sterile stamens mandatory to identify the species. One reason Early Figwort (*S. lanceolata*) is overlooked may be due to the need to closely inspect flowers – distances/terrains may discourage one from getting to the plant to inspect accurately.

Both Early Figwort and Eastern Figwort are herbaceous dicot, perennials ranging from 3-8 feet tall with furrowed green stems. The stems do change to a woody texture and color in late summer and persist through winter. Opposite, petioled, and serrated leaves up to 8 inches long and 3.5 inches wide are triangular to lance shaped. Panicked irregular flower clusters are oppositely attached at end of the stems. Flowers are cylindrical/urn shaped 1/3 to 1/2 inch long with an opening 1/3 of the flower's length. The floral formula is $K(4-5)Co(5)A(5)$ and $6(\underline{2})$. Each flower has a green calyx with 5 blunt teeth. The corolla with 5 rounded lobes with normally a dull green exterior and a predominantly brown-purple interior depicts *Scrophularia marilandica* while a reddish-brown exterior and yellow-green interior exist in *Scrophularia lanceolata*. It is important to realize however that the corolla color may vary/overlap in shades/mixes of green, yellow, red, and brown. The corolla's 2 upper lobes that function as a hood keep rain/moisture from entering and diluting the rich nectar. The 2 lateral lobes help form the opening and the lower lobe curves downward serving as an excellent landing space for pollinating insects. Five stamens are present: 4 fertile and 1 non-fertile/sterile stamen. *Scrophularia marilandica* has a reddish/purple/brown infertile stamen while *Scrophularia lanceolata*'s stamen is yellow/green. These infertile stamen's color is the solid key to identifying the respective species. The infertile stamen is appressed against the upper interior posterior corolla. The 4 fertile stamens which may be fused are at the bottom of the anterior corolla. (See accompanying photos.)

A solitary pistil is in the flower's center. *Scrophularia* sexual organs are protogynous: pistil develops before the stamens which ensures cross-fertilization. Pollen laden insects brush against the pistil when entering the flower in search of nectar/pollen which increases the chance of fertilization. Once the pistil is fertilized it begins to wither and triggers the 4 fertile stamens to unfold and rise from the corolla and

present their anther's pollen to arriving insects. The pollen coated insects now may fertilize other plants whose pistil is still exposed/receptive to fertilization.

In 1900 U.S. naturalist/nature writer Neltje Blanchard DeGraff Doubleday (1865-1918), who used the pen name Neltje Blanchard, made the following observation of *Scrophularia* pollination in her book Nature's Garden (1900). She wrote:

“Bees and wasps evidently pursue opposite routes in going to work, the former beginning at the bottom of a spike or raceme, where the older, mature flowers are, and working upward; the wasps commencing at the top, among the newly opened ones. In spite of the fact that we usually see hive bees about this plant, pilfering the generous supply of nectar in each tiny cup, it is undoubtedly the wasp that is the flower's truest benefactor, since he carries pollen from the older blossoms of the last raceme visited to the projecting stigmas of the newly opened flowers at the top of the next cluster.”

Scrophularia flowers are strongly scented to attract the many insect pollinators especially moths which visit at night. Brown two-celled seed capsules form and contain many tiny shriveled seeds. At maturity these seed capsules split in two and are dispersed by gravity, water or by being trapped in mud and adhering to feet/ legs/paws/skin/fur/feathers or clothing: Threads and Treads!

Eastern/Late and Early Figwort prefer partial/full sun to 70%shade. They thrive in moist/dry well-drained, loose, rich, sandy soils in zones 5-8. Habitats include rich woods, ravines, thickets, stream banks, woodland borders, and grasslands as savannahs. Plants can tolerate minor to moderate disturbances. Ideal plant spacing is 2-3 feet apart.

The genus *Scrophularia* is in the Scrophulariaceae family which has approximately 200 genera (28 in Kentucky) and approximately 3000 species. Both the genus and family name are derived from late Latin word *Scrofula(e)* meaning a painful medical condition “swelling of the neck glands” or literally “little pigs” from the Latin word *Scrofa* meaning “breeding sow”. The connection may be because pigs were thought to be prone to scrofula. *Scrophularia marilandica* and *lanceolata* were used to treat scrofula based on the Doctrine of Signatures – a belief that a plant's appearance/characteristics could divine/dictate its medical usages. (Dioscoride first described a Signature in 65 A.D. and Doctrine was made popular by Paracelsus in the 15th Century.)

Scrophularia marilandica and *Scrophularia lanceolata* have fleshy knobby tubers on their roots which appear like the swollen neck glands of *Scrofula*. Doctrine of Signatures associated these root tubers on *Scrophularia* plants as a useful treatment for scrofula. The genus name, *Scrophularia*, was first by a Danish botanist Olaus Borrich in 1690. *Scrofula* was also known as King's Evil in the 18th Century where the touch of royalty was believed to cure it! We now know scrofula is a form of extrapulmonary tuberculosis caused by the bacteria *Mycobacterium tuberculosis* (Dr. Robert Koch 1882). *Scrofula* is now known as *mycobacterium cervical lymphadenitis*. With the discovery of the antibiotic streptomycin by Dr. Waksman in 1943, tuberculosis and its related sequelae remarkably declined.

The Scrophulariaceae family and genus *Scrophularia* have the same common name of Figwort which is also derived from the Doctrine of Signatures. Hemorrhoids were once called figs from the Latin word *Ficus* as hemorrhoids resembled the fig fruit by being round and red inside. The Doctrine of Signatures

divined the usage of figs and scrophularia plants with their hemorrhoid appearing fleshy-knobby root tubers as a fig (hemorrhoid) treatment. The word Figwort literally means a plant used to treat the ailment, figs.

Scrophularia marilandica binomial species' name is an epithet of Maryland where the plant is frequent. This species name was given by Linnaeus in 1753. The English common name of Eastern Figwort reflects its prevalence in eastern North America while the common name, Late Figwort, refers to its blooming later than *Scrophularia lanceolata* – Early Figwort. Another common name is Carpenter's Square which is derived from the stem's square shape and/or the appearance of a "fluid bubble" typically found in levels/carpenter squares when the stem is bisected. *Scrophularia lanceolata*'s (Early Figwort) binomial name was given by a German botanist, Frederick Pursh, who first collected the species in 1814. Pursh is best known as the botanist who categorized/described plants brought back from the Lewis and Clark expedition. *Lanceolata* is derived from the Latin word meaning lance in reference to its leaf shape. The common English name Early Figwort applies to its blooming period about one month earlier than *S. marilandica* (Late Figwort). Both plants blooming periods can overlap. The common name lance-leaf figwort is used in reference to its leaf shapes and the common name hare figwort describes the flower's appearance of a hare sitting in an alert pose with its large ears fully erect.

Both early and late figwort share common names: *Scrofula*/*Scrophularia* for their use in treating scrofula; square stem from the stem's shape; and heal-all for their numerous medical/folklore usages. Around 1400 the term piles from the medieval Latin word *Pili* (piles) and from the Latin *Pilae* (balls) surfaced into the medical jargon as another name for hemorrhoids, which looked like "piles of balls". Plants such as *Scrophularia* used to treat piles were now called pileworts. Ironically/coincidentally as the term piles was gaining popularity, the term hemorrhoids also appeared and was made the official medical name for the malady. The term hemorrhoids is from the Greek word *Roos* meaning flowing. Hippocrates, who had written many extensive papers on hemorrhoids, was given credit with its naming in approximately 460 B.C. One other common name shared by Early and Late Figwort is Bee Plant. This is one of the most appropriate names as it reflects these plants need for bees/wasps as their main pollinators and the bees relying heavily on the plant's rich nectar and pollen for their own survival. Truly a natural mutualistic/symbiotic relationship.

The *Scrophulariaceae*/Figwort family has undergone numerous taxonomic changes. This family was also called the Snapdragon family. But in 2001 the Snapdragon genus *Antirrhinum* was moved from the *Scrophulariaceae* family to the *Plantaginaceae* (Plantain) family based on DNA sequence variation. Many more changes are anticipated. The *Scrophulariaceae* family name was credited to the French botanist Antoine-Laurent de Jussieu in 1789. Antoine with his son Adrien and uncles Bernard and Antoine de Jussieu significantly enhanced and expanded the Linnaeus classification system. The genus species name *Scrophularia marilandica* was first used in print by Linnaeus in 1753 and this binomial name was accepted worldwide. *Scrophularia lanceolata* was named by Pursh in 1814 and both binomial names persist to this day.

Early and Late Figworts contain identical iridoid glycosides with wound healing properties, cardiac glycosides which improves the heart's pumping capability, antioxidants/antibiotic agents, and anti-

inflammatory phenolic acids. The chemical similarities allow interchangeable Scrophularial medical usages. Their use in treating Scrofula and hemorrhoids for 1000 years plus is well documented and many other medical/folklore usages exist. *Scrophularia marilandica* and *lanceolata* roots, tubers and leaves have been used in tonics, poultices, teas, tinctures and solutions both internally and externally. Liquid preparations as teas and solutions made from these *Scrophularia* plant parts are steeped in water, milk, or wine. They are taken orally or used in poultices. Galen and Hippocrates steeped Figwort dried leaves in wine then were given orally or used in poultices for hemorrhoids. Both Early and Late Figwort are said to be an alternative (a medicine added to a medical regime to favorably alter an ailment's course), a diuretic, an emmenagogue (increases menstrual flow), and a discutient (agent that disperses morbid matter as tumors, purulent lesions, and edema). They are also used as a vulnerary (wound healing), an emetic (induce vomiting), and as a cathartic (laxative). Iroquois women used a root tea for irregular menses and to allay pain associated with pregnancy. This tea was so effective it was dubbed the "woman's friend". *Scrophularia* tea was also used for fevers, hemorrhoids, urinary infections, and as a general tonic that treated restlessness, anxiety, insomnia, muscle spasms, and used as an analgesic – a "make you feel better" medicine. Poultices made from tinctures (alcohol added) of dry leaves or an entire plant before it flowered were used to treat inflamed hemorrhoids, wounds, burns, and skin ailments. Other specific usages of *Scrophularia marilandica* and *lanceolata* include ringworm, secondary syphilis, and dropsy (congestive heart failure). Numerous anecdotal/folklore treatments mention *Scrophularia* being included in mixtures with other medicinal plants as cancer therapy.

Early and Late Figwort were never listed in the U.S. Pharmacopoeia or the National Formulary despite their many reported usages. Homeopathy practitioners and herbalists do utilize *Scrophularia* in their practices. *Scrophularia* plants are currently being researched for promising antibiotic and anti-cancer usages. Due to their acidity, these plants are extremely bitter and unpalatable and not used for culinary purposes. There are no reports or evidence of toxicity.

Scrophularia marilandica and *S. lanceolata* are one of the best nectar species for attracting butterflies, moths, honeybees (native and non-native), bumble bees, halictid sweat bees, carpenter bees, long-horned bees, wasps, flies, ants, and birds as ruby-throated hummingbirds. With the numerous/various daylight visitors and moths at night, *Scrophularia* is a 24/7 nectar dispenser! Most visitors to the flowers also collect pollen – especially bees/wasps, the primary pollinators of *Scrophularia*. The Xerces Society gives *Scrophularia* a special rating for their value to insects – "A plant that attracts predatory or parasitoid insects that prey upon pest insects". Figworts are prolific nectar producers and the flower's corolla is often described as a "honey pot".

If one is not fond of the name Figwort, you can also call them "Simpson's honey plant", as they were known in the Midwest in the 1800's by beekeepers who reported that an acre could produce 400-800 pounds of a light, clear, and aromatic honey. Though not adorned with "showy" flowers, Figworts are pollinating magnets due to their rich/abundant nectar. Insects that feed destructively on *Scrophularia* are gallfly larvae (*Lestodiplosis scrophulariae*), stink bugs (*Cosmopepla lintneriana*), aphids (*Myzus scrophulariae*), flea beetles (*Capraita thymoides*), chalcid midge larvae (*Elaphria chalcidonia*), and numerous weevils, slugs, and caterpillars. Early and Late *Scrophularia*'s bitter foliage is avoided by

mammalian herbivores as deer and rabbits. Folklore has these Figwort poultices being used for skin diseases, sores, and wounds in cows, swine, and dogs.

Scrophularia marilandica and *S. lanceolata* are spread by rhizomes, division, and by seeding. Seeding can be done in late Fall by pressing the seeds into the soil surface as they require heat to germinate. Spring planting requires seeds mixed in moist sand and stored in a refrigerator for 30-60 days before sowing. Seeds, seedlings, and young plants must be kept moist until plants are well established. *Scrophularia* are perennials but may not bloom for 2-3 years or thrive in poor growing conditions/habitats. The prolonged drought of 2019 has markedly reduced Figwort flowers maturation and their numbers. Plants should be spaced 2-3 feet apart to prevent overcrowding which can lead to their demise within a year. Rhizomal spread and hundreds of seeds produced by healthy plants can usually ensure new plants emerging in the Spring. Damage from diseases as leaf spot and downy mildew does occur but serious problems or other diseases are rarely encountered.

Scrophularia marilandica (Eastern/Late Figwort) and *Scrophularia lanceolata* (Early Figwort) seed/plants are not often available through horticultural outlets as these plants are not deemed “showy”, glamorous, or desirable by most gardeners. On your next walk in the woods be observant and you may be lucky to spot one of the figworts. Take time to closely observe the flower’s non-fertile stamen. If the stamen is red/purplish brown, it is the infrequent *Scrophularia marilandica*. If the non-fertile stamen is yellow/green you have come across a rare wildflower in Kentucky, *Scrophularia lanceolata*! Document with pictures, count the number of Early Figworts seen, and get a detailed location and GPS setting. Send data to The Rare Plant Conservation and Recovery – Kentucky Energy and Environment Cabinet at <https://eec.ky.gov/biodiversity-rareplantprogram>.

Upon finding either Figwort, pause and view the entire plant. Reaching up to 8 feet tall, possessing hundreds of buds/flowers/seeds and attracting various/numerous pollinators, the plant(s) present an impressive sight and provides a wonderful nature experience. Early and Late Figwort are not only useful/vital to pollinators, but they are beautiful. Their esthetic value is evident by closely examining the small colorful flowers. Do add these figworts to your garden. Seeds/plants can be occasionally found on search engines. This amazing mutualistic/symbiotic relationship that exists between pollinators and figworts is amazing. The figworts with their rich nectar and copious pollen plus the sweet scent they produce attracts pollinators, especially bees and wasps. In return for the nectar/pollen the pollinators spread pollen to receptive figwort plants ensuring germination. Botanists have known for years how important the mutual symbiosis between bees and wasps and plants such as *Scrophularia* affects both their survival rates. Neltje Blanchan (U.S. naturalist) wrote in the preface of her book, Nature’s Garden (1900) the following profound observation:

“Because bees depend absolutely upon flowers, not only for their own food but for that of future generations for whom they labor; because they are the most diligent of all visitors, and are rarely diverted from one species of flower to another while on their rounds collecting, as they must, both nectar and pollen, it follows they are the most important fertilizing agents. It is estimated that, should they perish, more than half the flowers in the world would be exterminated with them!”

We are currently seeing and experiencing the adverse effects of bees/wasp shortages on plant pollination. What do we get from the mutual symbiosis relationship between Scrophularia/Figwort plants and their pollinators? We get the benefit of the pollinators, which are attracted to our gardens/plants by the figwort's nectar, ensuring overall garden productivity. Equally rewarding is having the opportunity to observe this symbiosis firsthand. Being able to witness Scrophularia marilandica (Early Figwort) being utilized 24/7 primarily by bees/wasps by day and moths at night is priceless. Remember to look and respect the plants and pollinators. Do not cut, pull, or pick plants. They only last about an hour. Observe pollinators and plants for their esthetic value – outdoors and naturally.

This article is dedicated to Berl Meyer, a major force in the KSNH family. Through his efforts, this organization is still active. Berl, you will be missed, but never forgotten. Prayers for you, Pat and your family.

Chris Bidwell – Naturalist – Past President KSNH

Mary Alice Bidwell – Typist

Susan Wilson – Photographer

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Figure 1. *Scrophularia marilandica* - Late-Eastern figwort



Figure 2. *Scrophularia lanceolata* - Early-Lance leaf figwort.