Plant Diversity Website

Toxicodendron radicans (L.) Kuntze

Common Names: poison-ivy, eastern poison-ivy, markweed, mercury, picry, poison creeper, poison vine, three-leaved ivy (10, 14).

Etymology: *Toxicum* in Latin is "poison," whereas *dendron* is Greek for "tree," hence, "poison tree," or *toxicodendron.* As for its previous name, *Rhus* is Latin for "sumac," and *radicans* means spreading roots. (6).

Botanical synonyms: *Rhus radicans, Rhus toxicodendron. Toxicodendron* is sometimes considered a sub-genus of the genus *Rhus*, but is relatively well established as a distinct genus (1, 6).

FAMILY: Anacardiaceae, the Cashew Family

Quick Notable Features (6, 8)**:**
¬ leaves trifoliate, often pubescent on veins below
¬ bruised plants release urushiol, a pale yellow oil responsible for the allergic reaction in humans
¬ low sprawling shrub or climbing vine
¬ fruits in clusters of hard drupes
¬ height incredibly varied: low carpet 15cm high, up to a 20m vine

Plant Height: can reach 20m; usually around 20-30 cm (1, 8).

Subspecies/varieties recognized (9, 14)**:** A long list of subspecies was found. For entire list, see end of webpage.

Most Likely Confused with: Other species of the genus Rhus (4 in Michigan alone), *Parthenocissus quinquefolia* and *P. inserta, Aralia nudicaulis,* and *Acer negundo.*

Habitat Preference: Does well in almost any habitat. From poor to rich soil to shade to full on sunlight, poison-ivy thrives on edge habitat and in disturbed areas. Rich soil and good drainage make for the best sites, but certainly not limited to just these areas (9, 11).

Geographic Distribution in Michigan: Known in every county (1).

Known Elevational Distribution: Poison-ivy grows in almost every habitat; however, it is not known to grow above around 1200-1500m (12).

Complete Geographic Distribution: Poison-ivy is found throughout the eastern U.S. and as far west as Kansas. It is known throughout southern Canada, Mexico, South America and some Asian countries. Poison Oak (*Toxicodendron diversilobum*) is found on the west coast of the U.S. Introduced in Great Britain and Australia as garden plants (11, 12).

Vegetative Plant Description: Distinguished by alternate compound leaves composed of three leaflets, the middle leaflet petiolule longer than the other two. The leaves of this woody plant are usually shiny, especially when new. Leaf margin varies greatly: smooth, toothed and lobed are all been observed. Leaf shape also varies: some leaves elliptic and others much more round in shape. Leaf color changes with season and age; young leaves in the spring often have a reddish tint, while mature leaves turn dark green, while leaves might change to orange yellow and red before falling in the fall. *Toxicodendron radicans* can grow as a vine, shrub, or sprawling plant; sometimes vine stems have a hairy appearance due to aerial roots that emerge from climbing stems (1,3,8).

Climbing Mechanism: Climbs by means of hairy-like adventitious roots produced along the stem.

Flower Description: Flowers are small (3-5 mm in diameter) and white to light green. Flowers are monoecious, borne in dense axillary clusters which can reach 7.5cm in length. Flowers have 5 yellow- green petals and sepals. Male flowers have 5 fertile stamens, females have a 3-parted style and may have vestigial stamens. The ovary is glabrous, globose, and superior (8, 9, 10, 16).

Flowering Time: Flowers appear from late spring to early summer in the northeastern United States (10, 11).

Pollinato: Small exposed nectar disks attract insects to the flowers (2).

Fruit Type and Description: Fruit is white to light green color, hanging in clusters. Each fruit is just over 5-6mm in diameter, ripening in late summer. "The outer skin of the berry is lined and resembles the segments of a peeled orange" (3, 11, 14, 16).

Seed Description: Each hard fruit contains one irregularly-shaped seed 1.0-1.2mm wide that is grey to grey-brown. The seed can germinate in a wide range of habits, even in bare mineral soil (3, 11, 16).

Dispersal Syndrome: White-tailed deer, birds, raccoons, and other edge habitat animals will eat poison-ivy, even goats can eat it without experiencing the dermatitis that affects humans. These animals may be the greatest dispersers of *T. radicans* fruits. However, a study in Illinois reported that yellow rumped warblers also eat the fruits. Besides animals, the rhizomes act as a vegetative means of reproduction by spreading underground, giving the sprawling appearance (9, 13, 17).

Distinguished by: Poison Sumac and Poison Oak, *Rhus vernix* and *Rhus diversiloba* can be confused with Poison-ivy. *Rhus vernix* grows more in the southern U.S., even in boggy areas. It is distinguished from poison-ivy by its 7-13 smooth edged leaflets. *Rhus diversiloba* is found more often on the west coast of the U.S. and its leaves look more like oak leaves than poison-ivy leaves. Poison oak also has yellow berries as opposed to poison-ivy's white berries. The related species *Rhus aromatica* could also be confused with *Toxicodendron radicans* due to its trifoliate leaves, red petioles and red petiolules. If the plant has flowers, note where they are borne. If the inflorescence is axillary then it is most likely poison-ivy; if it is terminal then it is a member of the genus *Rhus*. The same applies for fruit position (since fruits are the ripened ovary of the flower), but if the fruit is red, it is most likely *Rhus aromatica*, not the white-fruited *Toxicodendron radicans*.
In Michigan the most commonly confused understorey plant is Virginia creeper (*Parthenocissus quinquefolia* and *P. inserta*), which have five leaflets, not three. However, if no leaves are available, and the two vines can often be found growing side by side, they can be confused. Both have adventitious roots; *T. radicans'* roots are more fine and hair-like,

whereas *P. quinquefolia's* roots are thicker (spaghetti size). *T. radicans* also has a distinctive terminal bud, and *P. quinquefolia* has no terminal bud. The images here should better illustrate these distinctions. On the left is Parthenocissus and on the right is Toxicodendron. The adventitious roots and twig on the left are of *Toxicodendron radicans* and those on the right are of *Parthenocissus quinquefolia*.
Wild Sarsaparilla (*Aralia nudicaulis*) can also have three leaves, but is herbaceous (no woody stem). Another trifoliate plant is *Acer negundo*, the box-elder. Voss explains that "seedlings, with 3 leaflets can easily be confused with poison-ivy until one notices that the leaves are opposite" (1, 3, 6, 10,11).

Other members of the family in Michigan: Of the twenty-two genera of Anacardiaceae, only four species in the genus *Rhus* are found in Michigan (1).

Ethnobotanical Uses: *Toxicodendron* species have been used in treatment of herpetic eruptions, palsy, paralysis, acute rheumatism and particular stiffness (7). It is believed that Native Americans used the oil from *Toxicodendron* for many medicinal uses, which may or may not be true. Some people see poison-ivy as a natural "human repellent" so that natural habitats might be left alone (11). It is interesting that so many topical ethnobotanical citations can be found for a plant that often causes a topical allergic reaction.

Phylogenetic Information: Anacardiaceae is part of the Sapindales, which also contains Meliaceae (the Mahogany family) and Simaroubaceae. The Sapindales are found in Eurosids II of the Rosid clade (5).

Interesting Quotations or Other Interesting Factoid not inserted above:

- A potential side effect of global warming may be more virulent, bigger, and more efficient poison-ivy production (15).
- A recent study at Duke University showed that increased levels of CO_2 were beneficial to poison-ivy because of increased photosynthesis rates. They also found that the ratio of urushiol was higher in the plants exposed to higher concentrations of CO_2, which means that it is more "poisonous" to humans (4). Subsequent studies clarified that urushiol was produced at the same rate, but because leaf production was faster, individual plants were capable of producing more (15). Either way, this is not good news for hikers!
- "Leaflets of three let it be. Berries of white a poisonous sight". This is a way to remember poison-ivy.

Full List of Subspecies/varieties recognized (9, 14)**:**

Toxicodendron radicans (L.) Kuntze ssp. divaricatum (Greene) Gillis
    Toxicodendron radicans (L.) Kuntze var. divaricatum (Greene) Barkl.
Toxicodendron radicans (L.) Kuntze ssp. eximium (Greene) Gillis
    Toxicodendron radicans (L.) Kuntze var. eximium (Greene) Barkl.
Toxicodendron radicans (L.) Kuntze ssp. negundo (Greene) Gillis
    Toxicodendron radicans (L.) Kuntze var. negundo (Greene) Reveal
Toxicodendron radicans (L.) Kuntze ssp. pubens (Engelm. ex S. Wats.) Gillis
    Toxicodendron radicans (L.) Kuntze var. pubens (Engelm. ex S. Wats.) Reveal
Toxicodendron radicans (L.) Kuntze ssp. radicans
Toxicodendron radicans (L.) Kuntze ssp. verrucosum (Scheele) Gillis
    Toxicodendron radicans (L.) Kuntze var. verrucosum (Scheele) Barkl.

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