REDROOT PIGWEED
(*Amaranthus retroflexus*)

SEEDLING DESCRIPTION

The seed leaves (cotyledons) of redroot pigweed are narrow, pointed at the end, and about ½ inch (1.2 cm) long. They are dull green on the upper surfaces and reddish purple on the lower surfaces. Seed leaves have very short stalks joined together at the stem. The stem below the seed leaves (hypocotyl) is smooth, reddish purple, and erect but fragile.

True leaves of redroot pigweed alternate along the stem and are oval or long and narrow. Upper surfaces are green; lower surfaces vary from green with reddish tinges to completely red. From the third leaf on, hairs are visible along the veins and margins of leaves. The midvein extends as a short spine (bristle) into the notched leaf tip (apex).

Lateral leaf veins leave distinct depressions on the upper surfaces and ridges on the lower surfaces. Cross veins appear on the upper surfaces as dark green lines. The leaf stalk (petiole), which is roughly the same length as the leaf, is green with red tinges or entirely red. Stems are smooth and often red. Close examination of the stem reveals vertical ridges and curly hairs flattened against the stem.

BIOLOGY

A summer annual broadleaved weed, redroot pigweed usually grows about 2 to 3 feet (0.6 to 0.9 m) high, but sometimes as high as 6 feet (1.8 m). The reddish or pinkish taproot is shallow compared with the size of the weed. The erect stems are green to slightly reddish and have many branches. Lower portions of the stem are thick and relatively smooth; upper portions are very hairy.

The dull, dark green leaves of redroot pigweed are alternate, distinctly veined, and sparsely hairy. They are broadly

1. *Seedlings with purple stems.*
2. *True leaves.*
3. *Lower stems are thick and relatively smooth.*
4. *Upper stems are hairy.*
5. *One spiny flower cluster can produce thousands of seeds.*
6. *Mature plant in flower; note red stems.*

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lance-shaped, narrowing to a point at the tip, and have prominent white veins on the lower surfaces.

Redroot pigweed flowers from July to September. Flowers are pollinated mainly by wind but also by insects. Flowers are small, green, and crowded into dense fingerlike spikes that form long, terminal clusters. Each flower is surrounded by three stiff, awl-shaped bracts. Bracts are twice as long as the flowers and have spiny tips that protect developing seeds from predators. If the terminal clusters are removed, redroot flowers can initiate from the axils (crooks) of lower leaves.

A single redroot pigweed plant can produce up to one million seeds, 95 percent of which are viable. The round, flat seeds are dispersed by wind, by animals, and by contaminants in crop seed. Redroot seeds turn from reddish to shiny jet-black as they mature. The maturation period, from August to October, is much shorter than that of other pigweed seed.

Redroot seeds are dormant in the fall. The percentage of dormant seeds that survive varies with depth and microclimate; seed-longevity studies show they can remain viable in the soil up to forty years. Seed germination is influenced by temperature, soil type, and day length. Seeds germinate throughout the summer if moisture is adequate. The optimum temperature for germination is 86° to 104°F (30° to 40°C). This high temperature requirement prevents seeds from germinating during late summer and fall in many locations.

Pigweed species grow on a wide variety of soil types. In a study of soil pH, pigweeds were the only weed species that survived in all test plots. The soil pH of these plots ranged from 4.2 to 9.1. However, pigweed does not grow well on acidic soils, such as those in the southeastern United States. This species is associated with rich soils: the higher the levels of potassium and phosphorus in the soil, the better redroot pigweed grows.

A competitive species, redroot pigweed is metabolically similar to "tropical" plants such as corn, sorghum, and johnsongrass. Optimum growth temperatures are 85° to 100°F (30° to 37°C). Because redroot pigweed germinates rapidly and has reduced seed dormancy in early summer to midsummer, two generations per year are common.

SIMILAR SPECIES

Several species of the Amaranth family resemble redroot pigweed. Spiny amaranth *(A.spinosus)* has a pair of spiny projections at the base of each leaf stalk; redroot does not have these projections. The flowers of tumbleweed *(A. albus)* and prostrate pigweed *(A. blitoides)* form in very small clusters in the leaf axils, not in terminal spikes like redroot. Tumbleweed also has long, spiny projections (bracts) at the base of the flowers.

Redroot pigweed has short, thick flower clusters, whereas smooth pigweed *(A. hybridus)* and green amaranth *(A. powelii)* have long, thin flower clusters. These three species are difficult to distinguish in their vegetative stage, because pigmentation varies within populations and because the growth form is quite variable under different environmental conditions. Seedlings of redroot pigweed and smooth pigweed are hard to tell apart.

NATURAL HISTORY

Redroot pigweed belongs to the genus *Amaranthus,* which includes the domesticated grain, amaranth. A native of the mild, moist riverbank regions of eastern North America, redroot also grows in the temperate regions of the northern and southern hemispheres, as well as in North Africa, Europe, the Middle East, and the Far East. It is also known as green pigweed, rough pigweed, green amaranth, wild beet, Chinaman's green, careless weed, and amaranth pigweed.

Redroot is common along roadsides and in waste places and other disturbed open habitats, including cultivated fields and gardens. Redroot is one of the principal weeds in corn and is also found in beans, sugar beets, sugarcane, and most row crops. It has recently become a problem in small grains such as wheat and barley.

Pigweed is so named because pigs like the taste of it. The genus name, *Amaranthus,* is Greek for "the plant that never fades." The species name, *retroflexus,* which refers to the drooping leaves, means "to turn down or toward the stem."

Depending on its developmental stage and nitrogen fertility, redroot pigweed can accumulate enough nitrates to be poisonous to livestock. Nitrates are stored primarily in the stems and branches, and accumulation increases as the plant matures. Nitrate levels are the highest just before redroot flowers.

A host of the green-peach aphid, redroot pigweed has been found in peach and apple orchards in the state of Washington. *Amaranthus* species reportedly cause allergic reactions in some people.

CONTROL

Both cultural and chemical methods are effective in controlling redroot pigweed. Because redroot is an annual and has a relatively shallow root system, its seedlings are easily destroyed by cultivation. Seedlings are most susceptible to cultivation during the first four weeks after germination, when growth is fairly slow, especially if the weather is cool.

Once it is well established, redroot pigweed is difficult to control. It can recover from extreme disturbances, such as clipping and trampling, and can rapidly produce axillary flower clusters. Redroot is quite competitive with crops; it grows rapidly and uses water very efficiently. Control at early growth stages is essential to prevent reductions in crop yield. Redroot pigweed can be controlled by most preemergence herbicides used for broadleaved weeds. Postemergence applications of 2,4-D, dicamba, mecoprop, bromoxynil, or atrazine are also effective on redroot in various crops. Treatment with 2,4-D has been shown to upset the N_2 metabolism in the plant, an imbalance which increases the palatability of pigweed but which also may cause accumulation of nitrates to toxic levels.

Both green amaranth and smooth pigweed are triazine-resistant. In recent years, resistant populations of redroot pigweed have been reported in Maryland, Pennsylvania, and Washington.

For specific recommendations, consult your county extension agent or the most recent *Weed Control Manual and Herbicide Guide,* available through Meister Publishing Company, 37841 Euclid Avenue, Willoughby, Ohio 44094. Follow label instructions for all herbicides and observe restrictions on grazing and harvesting procedures.

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