

## Intriguing World of Weeds

### Common Purslane (*Portulaca oleracea*)<sup>1</sup>

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*Common purslane becomes quite permanently established where they are once introduced and will doubtless become weeds wherever they escape from cultivation.*—William Darlington (1859)

#### INTRODUCTION

Common purslane (*Portulaca oleracea* L.), hereafter referred to as purslane, is a member of the purslane family, Portulacaceae, which comprises 25 widespread genera of often succulent herbs and shrubs (Hyam and Pankhurst 1995). The genus *Portulaca* contains about 40 tropical and warm climate species. *Portulaca oleracea* subsp. *sativa* (L.) Schuebler and Martens is cultivated as a potherb and a medic (Gledhill 1985). It is characterized by its taller upright growth habit and larger leaves and seeds (Gorske et al. 1979).



The site of origin of *P. oleracea* is not known. It has been reported to be a native of western Asia, and it was introduced into the U.S. from southern Europe (U.S. Department of Agriculture 1972). Others cite Europe as its native home; however, its succulent habit suggests that it is a desert or desert border plant that may have originated in North Africa (Holm et al. 1977).

Purslane was used as a vegetable by early Europeans, and it has been cultivated since the middle of the 17th century (Salisbury 1961). It was undoubtedly introduced into many parts of the world as a food plant, and it was reported in Massachusetts as early as 1672 (Montgomery 1964). Purslane now is used widely as a food for pigs (*Sus scrofa*) (Holm et al. 1977).

Purslane's growing season is limited to the hottest months of the year (Holm et al. 1977), and the plant is quite drought resistant (Zimmerman 1976); this is not

surprising, since it is a succulent plant with a water content of over 90% (Zimdahl 1989).

Purslane is one of the 12 noncultivated species that have been most successful in colonizing new areas (Holm et al. 1977). It has become naturalized as a weed



Common purslane (*Portulaca oleracea*).

in the warmer parts of the world (Britton and Brown 1898), infesting 45 crops in 81 countries, ranging from Argentina to Zambia. Its seeds are spread by wind, water, and with the seeds of crops; it is known also that some birds feed on them (Holm et al. 1977).

Purslane's average life span is approximately 3 mo; plants are usually killed by the onset of low temperatures in autumn (Kiyoko and Cavers 1980). Seed survival is excellent: up to 19 yr in dry storage and 40 yr if buried in soil (Darlington and Steinbauer 1961).

In 1914, Ada E. Georgia wrote, "The weed is most tenacious of life, often readjusting itself after having been torn up bodily, the fleshy stems, and leaves sustaining it while doing so, if not placed where the feat is impossible" (Georgia 1914).

A close relative of purslane is moss rose (*P. grandiflora* Hook.), a popular summer bedding annual, which may be a cultivar of hybrid origin. It has been bred for a wide range of colors as well as double flowers (Heywood 1993).

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## DESCRIPTION

Purslane's distinguishing characteristics are its almost prostrate, reddish, fleshy stems; watery sap; succulent leaves, which are broad-rounded at the tips; small yellow-petaled flowers, and spherical many-seeded capsules, which open around the middle (Holm et al. 1997).

It is an annual, succulent herb, with a thick taproot and many fibrous secondary roots; the prostrate stems may produce a mat up to 60 cm in diameter. The fleshy stems are from 10 to 30 cm long and are glabrous, thick, round, smooth, succulent, and branch on all sides from the central root. Leaves are alternate, obovate or spatulate, with rounded tips, glabrous, thick, and succulent, up to 2.8 cm long, often clustered at branch tips. Both stems and leaves often have a reddish tinge.

The pale yellow flowers, 3 to 10 mm broad, have either four to six broadly rounded petals, which are solitary, sessile, axillary and arranged in the leaf axils, or several together in the leaf clusters at the ends of the branches; they open only on sunny mornings. The fruit is an urn-shaped, one-celled, many-seeded capsule, 4 to 8 mm long, with many brownish-black and shiny seeds. The capsule opens transversely, with the top falling off like a lid; when near maturity, handling the plant will release hundreds of seeds (Georgia 1914; Kiyoko and Cavers 1980; U.S. Department of Agriculture 1970).

## ETYMOLOGY

The Roman scholar Pliny the Elder (AD 23–79) used *portulaca* to designate common purslane and eventually Linnaeus used it as the name of the genus. The generic name is from Latin and alludes to the purging qualities of some species (Britton and Brown 1898). However, it took centuries before the name purslane became the standard English name for the plant. About 1387, *portulaca* was referred to as *purcelan* in *Sinonoma Bartholomei*, a 14th-century manuscript encountered in the Library of Pembroke College, Oxford. (This glossary was reprinted as *Anecdota Oxoniensia* in 1882.) Over the ensuing centuries, the spelling and pronunciation took on many forms: *purcelan*, *purcelane*, *purcelaine*, *pesseline*, *purse-lyn*, and *purselan*. Finally, in 1857, Asa Gray, in his *First Lesson in Botany and Vegetable Physiology*, wrote, "Sometimes the embryo is coiled around the outside, in the form of a ring, as in purslane." The modern spelling had entered the English language (Simpson and Weiner 1989).

The family name *Portulacaceae* was established by Antoine Laurent de Jussieu (1748–1836) in 1789 (Brum-

mitt 1992). Linnaeus described the genus *Portulaca* in *Species Plantarum*, 1753. The specific epithet *oleracea* also is from Latin and means "of cultivation" or "suitable for food" (Gledhill 1985).

## HISTORY

During the first century AD, Dioscorides of Anazarba in Cilicia penned the following: "*Portulaca Sylvestris [oleracea]* . . . grows in rocky places, some times also it is in Gardens. It hath leaues like those of the Oliue tree, but much smaller, yet more and tender. Red stalkes, many out of one roote, leaning to ye earthward, which being chewed (are found to be of good iuice, clammy, and somewhat saltish. It hath a warming sharpe, exulcerating facultie, and being applyed with Axungia [lard prepared for medicinal use], dissolving of ye Strumae [goiter]" (Gunther 1959).

The introduction of purslane to North America remains controversial. Chapman et al. (1974) are of the opinion that the spread of purslane is attributed in part to Native Americans; it grew in their gardens of corn and pumpkins. Purslane probably was imported by post-Columbian immigrants. However, pollen and seeds of this species found in the sediments of Crawford Lake, Ontario, probably were deposited as far back as AD 1350 (Byrne and McAndrews 1975). Seeds found in southern Kentucky, Illinois, and Louisiana date from between 1000 BC and AD 750 (Kaplan 1973), perhaps being imported during Stone Age immigration.

## DISTRIBUTION

Purslane thrives in cultivated fields and gardens, barren driveways, waste places, and eroded slopes and bluffs from sea level to 3,835 m. The plant prefers an open habitat, and although it thrives in a rich, moist soil, it does grow well on many soil types (Holm et al. 1977). Seeds have been found in soil samples obtained from deciduous woods, conifer plantations, tall-grass prairie, old pastures, and muck fields (Kiyoko and Cavers 1980).

Purslane is distributed throughout temperate and tropical areas of the world (Holm et al. 1977). In the U.S., it is most abundant in the northeastern states, least common in the Pacific Northwest (U.S. Department of Agriculture 1970). Not surprisingly, herbaria have few purslane specimens because they are difficult to dry. It is not found north of latitude 60°N (Byrne and McAndrews 1975).

## WEEDINESS

Few gardens are without purslane (Georgia 1914). It is a common weed among vegetable crops, annual flowers and nursery trees, field and sweet corn, strawberries, tobacco, spring wheat, and newly planted orchards. There are indications that the weed is spreading (U.S. Department of Agriculture 1972).

Purslane is well equipped for its role as an invader. Plants have relatively small stomata, specialized water storage tissues in the stem and leaves, thick cuticles, small surface area:mass ratios, and many-branched tap roots with many fibrous secondary roots that are spread close to the soil surface. And for efficient absorption, the root system may reach 153 cm in diameter. In addition, it produces adventitious roots that emerge only from the cut or broken surface of stem fragments. Most of the breakage, of course, results from human activities (Venigris et al. 1972).

Seedlings first emerge fairly late in the season after temperatures have exceeded 30 C and after rain or irrigation, and they continue to emerge whenever land is cultivated and cleared of existing vegetation. Purslane is a poor competitor with other plants. Plants flower 4 to 6 wk after emergence, and the flowers are without nectar, so few insects visit the plants. Flowers are generally self-pollinated or cross-pollinated by wind (Mulligan 1972). The seeds ripen in 14 to 16 d (Kiyoko and Cavers 1980). They are small and numerous; almost 10,000 seeds have been counted on one plant (Holm et al. 1977). Even under widely varied conditions, plants are still able to produce abundant capsules (Zimmerman 1976). Though purslane is chill sensitive, its seeds survive frigid temperatures. Seeds continue to ripen on senescent purslane plants commonly falling to the ground under the dehiscent capsule. But seeds are also dispersed by animals and humanity's cultural activities (Kiyoko and Cavers 1980).

The life cycle is completed in 2 to 4 mo in both tropical and temperate regions. Plants bloom and set seeds rapidly, and some fresh seeds germinate immediately; therefore, several generations per year are possible (Kiyoko and Cavers 1980).

## USES

Aboriginal Americans used purslane as a potherb and for medicinal purposes (Byrne and McAndrews 1975). *Portulaca oleracea* L. var. *sativa* DC. is cultivated in southern Europe, the Mediterranean countries, and Asia for salads or as a potherb. Eventually, other plants such

as kale (*Brassica oleracea acephala* DC.), lettuce (*Lactuca sativa* L.), and spinach (*Spinacia oleracea* L.) displaced it as a popular food because they were deemed more flavorful and perhaps more nutritious (Spencer 1968).

For human consumption, young purslane plants with roots removed are cooked like spinach. They have a pleasant, slightly sour flavor with a somewhat mucilaginous texture. Because of this mucilaginous quality, young stems are used for thickening soup. They can be mixed with other greens. The succulent young stems and leaves can be pickled in vinegar and sugar. Since purslane sometimes grows abundantly in isolated areas, it has value as an emergency food. And because of the high water content, the plants can be eaten raw to quench thirst. Additionally, plants can be harvested all summer (Harrington and Matsumura 1967).

At one time, Native Americans and Mexicans dried large quantities of this plant by spreading the young stems out in the hot sun on roofs. Later, the desiccated plants were hydrated and boiled as a potherb. Purslane seeds also have been used as food, particularly by Native Americans. Mature plants can be placed on a flat rock or canvas to dry in the sun, or they can be placed in a paper or cloth sack to dry. Then the seeds can be gathered, winnowed or sifted, and ground into a meal or flour (Harrington and Matsumura 1967).

Traill (1885) mentioned purslane for use as an application for inflammatory tumors and as a source of a blue dye. Its succulent, rapidly growing nature makes it a good soil builder and an excellent hog feed (Spencer 1968).

## POISONOUS PROPERTIES

Even though under most conditions purslane is a palatable and nutritious livestock food, nitrate poisoning and oxalate poisoning have been reported in livestock feeding on the plant (Schmutz et al. 1968). However, Cantella et al. (1968) did not observe any symptoms of poisoning in cattle (*Bos* spp.) fed substantial amounts of purslane leaves and stems. Interestingly, *Portulaca* has not been reported toxic in North America (Kingsbury 1964).

In Australia, potentially toxic amounts of oxalate and nitrate have been isolated from purslane. Cases of poisoning have been reported in sheep (*Ovis aries*) and cattle starved for a time and then allowed to graze large amounts of the plant while the plant was in a succulent state. Suspect plants usually grow on soils rich in nitrogen, such as that found in stockyards or in bare clay

soils, where there has been a flush of growth after a good rain, then a dry period. Cattle should not be permitted to graze on large amounts of these plants without adequate amounts of roughage (Everist 1974).

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