



NAPPO

ORGANISATION NORD-AMERICAINE POUR LA PROTECTION DES PLANTES
NORTH AMERICAN PLANT PROTECTION ORGANIZATION
ORGANIZACION NORTEAMERICANA DE PROTECCION A LAS PLANTAS

PEST FACT SHEET

Ranunculus repens L.

Originating in Europe where it remains concentrated, *Ranunculus repens* is a low growing, perennial herb with a short swollen stem base, fibrous roots and delicate yellow flowers. It is common in pastures, fields and other areas with wet soils and is best suited to, and now widely naturalized in, many temperate regions of the globe including North America. It is a reported weed of 11 crops in 40 countries and is frequently reported in cereals in North America. The weed is well distributed in Canada and the US but is not known from Mexico.

Preferred Scientific Name *Ranunculus repens* L.

Other Scientific Names *Ranunculus repens* var. *degeneratus* Schur
Ranunculus repens var. *erectus* DC.
Ranunculus repens var. *glabratus* DC.
Ranunculus repens var. *linearilobus* DC.
Ranunculus repens var. *pleniflorus* Fern.
Ranunculus repens var. *typicus* G. Beck
Ranunculus repens var. *villosus* Lamotte

Common Names English - creeping buttercup, buttercup, creeping crowfoot
Argentine - boton de oro, ensalada de ranas
Belgium - kruipende boterbloem
Brazil - botao de ouro
Chile - boton de oro
Denmark - lav ranunkel
Finland - ronsyleinikki
French - Rénoncule rampante, bouton d'or, bassin d'or, bassinet, petite douve, pied-de- poule, rénoncule couchée, rénoncule flammette
Germany - Kriechender Hahnenfuss
Italy - Pie di nibbio, Ranunculo strisciante, cresione selvatico
Japan - hai-kinpoge
Netherlands - kruipende Boterbloem
Norway - krypsoleie
Portugal - Botao-de-ouro, erva belida
Spain - Boton de oro rastrero, Ranunculo rastrero
Sweden - Revsmoerblomma

Habitat

Ranunculus repens is a common weed of pastures, lawns and waste places as well as arable land and forage crops in Canada (Hughes 1971), tolerating most weather conditions in temperate latitudes, except for long, dry periods (Lovett-Doust *et al.* 1990). Under conditions of mild winters it will survive as a rosette with a caudex (short swollen stem) and roots or in areas of more severe winters, simply as a caudex and roots. It can tolerate heavy, wet soils and will withstand periods of water logging and thus can be a problem on well-watered lawns (Alex 2001). It grows particularly well in moist or poorly drained situations but it will also colonize sandy and gravel-based soils if sufficient moisture is present. Harper (1957) describes this species as one that is typically found in early successional communities and can form an important component of the following four major community types - disturbed soils, including arable lands; grasslands, where it will tolerate grazing and trampling; aquatic communities where it will establish along the edges of ponds, rivers and ditches and, having some tolerance to salinity is found along beaches, salt marshes and the margins of tidal estuaries; and woodlands where it is mainly restricted to clearings, forest margins and paths. It can be especially competitive with crops grown after old pastures are plowed (Holm *et al.* 1997).

Distribution List

Asia

- Armenia (USDA, ARS 2003)
- Azerbaijan (USDA, ARS 2003)
- Borneo (Holm *et al.* 1979)
- China (Holm *et al.* 1979)
- Georgia (USDA, ARS 2003)
- Iran (Holm *et al.* 1979)
- Iraq (USDA, ARS 2003)
- Japan (Holm *et al.* 1979)
- Mongolia (USDA, ARS 2003)
- Nepal (Holm *et al.* 1979)
- Russian Federation (USDA, ARS 2003)
- Turkey (Holm *et al.* 1979)

Europe

- Albania (USDA, ARS 2003)
- Austria (USDA, ARS 2003)
- Belarus (USDA, ARS 2003)
- Belgium (Holm *et al.* 1979)
- Bulgaria (USDA, ARS 2003)
- Czechoslovakia (USDA, ARS 2003)
- Denmark (USDA, ARS 2003)
- Estonia (USDA, ARS 2003)

Finland (Holm *et al.* 1979)
France (Holm *et al.* 1979)
Italy (Holm *et al.* 1979)
Germany (Holm *et al.* 1979)
Greece (Holm *et al.* 1979)
Hungary (Holm *et al.* 1979)
Iceland (Holm *et al.* 1979)
Ireland (USDA, ARS 2003)
Italy (USDA, ARS 2003)
Latvia (USDA, ARS 2003)
Lithuania (USDA, ARS 2003)
Moldova (USDA, ARS 2003)
Norway (USDA, ARS 2003)
Poland (Holm *et al.* 1979)
Portugal (Holm *et al.* 1979)
Netherlands (Holm *et al.* 1979)
Soviet Union (Holm *et al.* 1979)
Spain (Holm *et al.* 1979)
Sweden (Holm *et al.* 1979)
Switzerland (USDA, ARS 2003)
Ukraine (USDA, ARS 2003)
United Kingdom (USDA, ARS 2003)
Yugoslavia (USDA, ARS 2003)

Africa

Algeria (USDA, ARS 2003)
Morocco (USDA, ARS 2003)
Portugal (USDA, ARS 2003)
Tunisia (Holm *et al.* 1979)

North America

Canada (Holm *et al.* 1979)
All provinces but not the Yukon and Northwest Territories (Lovett-Doust
et al. 1990)
USA (Holm *et al.* 1979)
All states except Arizona, Florida, Georgia, Kansas, Louisiana,
Mississippi, New Mexico, North Dakota, Oklahoma (USDA, NRCS. 2002)

South America

Argentina (Holm *et al.* 1979)
Brazil (Holm *et al.* 1979)
Chile (Holm *et al.* 1979)

Oceania

Australia (Holm *et al.* 1979)
New Zealand (Holm *et al.* 1979)

Distribution Notes

Most authors agree that, originating from continental Europe, *Ranunculus repens* has been introduced into North America where it has established in a broad band extending mainly between 38° and 50° N as it generally exists in other parts of the globe (Holm *et al.* 1997). However, it also occurs in the mountains of Algeria and Morocco from 70° N to the Nile River delta and from sea level to 1000 m above sea level (Harper 1957) and in Australia, Chile, Argentina, South Africa and New Zealand (Holm *et al.* 1997). In Canada, it is absent in the Yukon and Northwest territories but is found in all provinces, being most commonly distributed in the Maritime provinces, Quebec, Ontario and coastal British Columbia (Lovett-Doust *et al.* 1990). Although not recorded in 9 states, it is also well distributed in the U.S., including Alaska and Hawaii (USDA, NRCS. 2002). Creeping buttercup is found generally throughout its native Europe and has a history of spreading globally in the wake of pioneers (Lovett-Doust *et al.* 1990) perhaps even intentionally introduced as a garden plant or ornamental (Gilky 1957).

No records have been located for this weed in Mexico.

Biology and Ecology

A creeping, low growing perennial herb with fibrous roots, *Ranunculus repens* is common in pastures, fields and other areas with wet soils in temperate climates. It produces new individual plants (clones or ramets) and perennates through stolons which develop adventitious roots and daughter ramets at nodes along their length. In spring, lateral stolons are produced in the axils of leaves of overwintering rosettes and stolon production continues, peaking in late summer. One to two stolons per plant are common but some plants may have up to five and secondary branching can occur as well (Holm *et al.* 1997). In fall, when the ramets have become established, the stolon internodes wither and die, leaving physiologically independent rosettes (daughter ramets) to develop into flowering plants the following growing season while the original parent plants wither and die. The new plant may persist over the winter as a small rosette or, leaves may completely die back to ground level but in either case, the short caudex stores nutrients that allow an acceleration of growth in spring as evidenced by the sharply exponential growth that occurs between April and June (Sarukhan 1976). Stolon production appears to be especially responsive to environmental conditions: short stolons typically arise in dense turf and much longer ones appear in open fields or woodlands (Harper 1957). Additionally, the plant will respond to favorable habitats by forming more stolons through branching. If nitrogen is limiting, stolons tend to be longer and unbranched allowing longer-distance "sampling" of a number of potential sites until more suitable locations are found whereupon stolon branching begins, allowing rapid local colonization to take advantage of the available resources (Holm *et al.* 1997). In a study by Coles (1977) a single plant, without competition, amassed 28 m of stolons with 179 nodes in a single year.

Perennation is also achieved via seeds; more than half the plants studied by Sarukhan (1974) producing a single flower and no plant producing more than five. Investigation revealed that each flower produced 20 or fewer seeds and the maximum number of seeds found on a single plant was 77 although Hanf (1983) reports that in Europe, seed production averages 100 - 150 seeds per flowering shoot. In Ontario, flowering takes place from April to July (Alex 2001) and this early summer flowering peak is followed by fruiting within about 2 weeks. Lovett-Doust *et al.* (1990) reported that only about 25 % of flowering plants set seed and that grazing reduced seed production even more. The small seeds may be dispersed by wind, in the dung of birds, farm animals and rodents and when adhering to animals with the hooked spine. The seed coat is non wettable and water surface tension is sufficient to allow the seeds to float (van der Pijl 1982). Recruitment within more established woodland and grassland communities is unlikely to be significantly achieved via seeds, regardless of a large, viable seedbank and in all but the most highly disturbed sites, population increase is vegetative (Lovett-Doust 1981). To some extent though, the variable response by the plant in directing energy to seeding relative to the heavy investment in vegetative growth is offset by the extended longevity of seed when buried.

Various researchers have concluded that seeds of *Ranunculus repens* can become well represented in the soil seed bank surviving longer under acid or water-soaked conditions and having an “extremely long half-life” (Holm *et al.* 1997) although mature plants will remain poorly represented in a turf situation because of relatively few opportunities for emergence. Seeds will remain viable in the soil for many years and in studies by Lewis (1973), after 20 years of soil burial, germination was equal to that at 4 years burial (54 %) and the seedlings were as vigorous as freshly harvested seed. Following another study, Odum (1974) estimated the minimum age of *R. repens* seed present in the soil for at least 20 years to be 80 years old. Thus the number of viable seeds in infested soils, particularly within stable, relatively undisturbed ecosystems such as long-term pastures and woodlands ecosystems, can be immense compared to the number of plants present.

Ranunculus repens is frost tolerant, will survive moderate droughts (Holm *et al.* 1997) and seeds germinate and seedlings grow under water-logged conditions (Harper 1957). Intercellular spaces that form air canals located in the roots and basal stem regions aids the plant’s survival in wet soils (Korsmo 1954). Another potential dispersal mechanism for this species is the human activity of growing, and moving seed for planting in new locations. Wellington (1957) has observed that up to 9% of the forage grass seed lots sampled were contaminated with the seeds of *R. repens*.

Economic Impact

Ranunculus repens is a reported weed of 11 crops in 40 countries and is most frequently reported in pastures, cereals and temperate plantation crops. It is a serious weed of barley and wheat in Finland, cereals in England and pastures in Belgium, England, Italy, Norway, Scotland, Sweden and the United States. It is considered a common weed of cereals in Canada, Iran, Poland, Tunisia and Turkey, legumes in Tunisia, orchards in the Netherlands and

Spain, pastures in Australia, Bulgaria, Hungary and the Netherlands, rye in Finland, sugar beets in Poland and vegetables in Iceland (Holm *et al.* 1997). *R. repens* is also recorded as an unranked weed of a wide variety of crops in Europe, South Africa, North America, South America, Australia and India.

This species has a bitter, acrid juice that contains a small amount of toxic cardiac glycosides, collectively known as Ranunculin, which can cause salivation, diarrhoea and abdominal distress in sheep and cattle for up to 14 days after onset (Shearer 1938). Generally though, grazing animals will avoid the plant if more palatable forage is present and if affected forages are first dried into hay the effects of Ranunculin are rendered harmless. Poisoning will only occur if fresh plants are eaten (Holm *et al.* 1997). There are also suggestions that this weed can compete with desired crops for potassium but generally, this is a weed of pastures and waste places. Apparently, populations of *Ranunculus repens* and other buttercups in both grasslands and open woodlands follow a similar pattern, remaining remarkably stable from year to year, suggesting “self-regulation at a carrying capacity that varies according to environmental factors” (Lovett-Doust *et al.* 1990).

Ranunculus repens can also be considered a valuable component of waste places if only because of its ability to help stabilize sandy soils (Harper 1957).

Morphology

The key features of *Ranunculus repens* include creeping, hairy stolons, alternately compound leaves with toothed margins, bright yellow flowers with six to nine petals and beaked achenes with beveled margins (Holm *et al.* 1997). This perennial herb has a short caudex bearing up to 25 long and stout adventitious roots. Stolons are formed in the leaf axils, readily rooting at nodes and forming compact rosettes (ramets). Basal and lower stem leaves are usually dark green and stalked with three lobes, the middle lobe having a long-stalked petiole and projecting beyond the other two. Stems range from growing prostrate to sometimes nearly erect and 20 - 30 cm high and surfaces can vary from smooth to densely hairy. Leaves are alternate and often clustered, mostly on long stalks, the leaves 3-lobed, the central lobe with a short stalk and each lobe, lobed also and toothed along the margin.

Flowers, 2 - 3 cm diameter, are produced on erect stalks (peduncles) with few leaves, often originating from the axial of the penultimate leaf, the pedicels 2 - 10 cm long. Six to nine petals are produced on golden yellow flowers, the fruit in globular heads as clusters of 20 to 50 dehiscent fruit or achenes, each 2.5 - 3.5 mm long beveled margin, short hooked beak .7 - 1.2 mm long at the tip and light brown to blackish brown with an unevenly pitted surface.

Similarities to other species/conditions

Ranunculus repens is a relatively variable species in North America and Fernald (1950) recognizes five varieties although Lovett-Doust *et al.* (1990) admit to seeing little support for this distinction. According to Coles (1977), *R. repens* can be distinguished from all other

members of the section *Ranunculus* in Europe by its large number of creeping stolons that root from the nodes and this appears to be generally true in Canada as well but Frankton and Mulligan (1987) reveal that *R. repens* var. *erectus* DC. lacks stolons and thus is difficult to separate from *R. acris* (tall buttercup).

In Ontario, *Ranunculus repens* is easily distinguished from the more common and otherwise similar, Tall buttercup - *Ranunculus acris* L., by its prostrate stems which root at the nodes and by the 3-parted leaf blade in which the central lobe has a distinct stalk (Alex 2001).

Control

Cultural Control

Plants of *Ranunculus repens* may be weakened by cultivation or discing but severed sections of the caudex (swollen stem base) and sections of stolons are capable of regenerating and causing a population increase (Fryer and Makepeace 1977, Lovett-Doust 1981). Ploughing and deep discing often stimulates an increase of this pest by allowing germination of seed and subsequent rapid spread especially if the plant can establish before the crop species (Lovett-Doust *et al.* 1990). Grazing and/or cutting (eg. haymaking) can also lead to an increase in the local presence of this weed (Bakker 1987). Kolbe (1987) found that, in apple orchards, repeated cutting of turf (eight times per year) significantly reduced populations of *R. repens* whereas mulching with straw led to higher populations. Top dressing of turf to stimulate grass growth will usually result in a reduction of local populations of this buttercup (Fryer and Makepeace 1977).

Chemical Control

Good guidelines exist for the control of this perennial weed in North America (Lovett-Doust *et al.* 1990). North American research reveals *R. repens* to be very sensitive to translocated herbicides such as 2,4 D (Peabody and Swan 1976) although MCPA is more generally recommended. See Lovett-Doust *et al.* (1990) for a comprehensive review of North American and European recommendations for control of *R. repens* which, according to Fryer and Makepeace (1977), is resistant to chloroxuron, chlorprophamphus fenuron, 2,4-DES, lenacil, terbacil, bromacil, trietrazine with simazine, and is moderately resistant to dichlobenil, chlorthiamid, diuron, simazine and atrazine when these are used for weed control among ornamental crops.

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¹Although many references were reviewed for this Pest Fact Sheet, the primary basis for it's construction has been modeled upon an "outline datasheet" as provided by CABI (2002) and referenced below.

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