



Branched Broomrape - Identification: State prohibited weed

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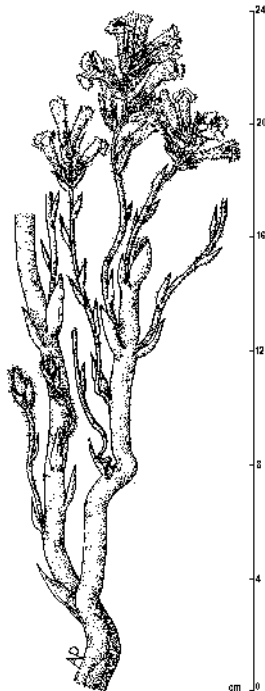
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*This Landcare Note describes the State Prohibited Weed branched broomrape, *Orobanche ramosa*, and other broomrapes present in Australia.*

Common and scientific names

Branched broomrape. *Orobanche ramosa* Linnaeus

Family Orobanchaceae (broomrapes).



Figures 1 and 2. Flowering branched broomrape.

Status

Branched broomrape has not yet been found in Victoria but poses an extremely serious threat to agriculture and our native flora. Branched broomrape is a declared exotic disease under the Victorian *Plant Health and Plant Products Act 1995* and a State Prohibited noxious weed under the *Catchment and Land Protection Act 1994*. The plant is likely to be introduced accidentally on vehicles and machinery, or as a contaminant of soil, livestock, fodder or other materials, from a large infested area near Murray Bridge in South Australia.

*It is an offence to import branched broomrape or any plant product affected by it into Victoria. Persons knowing, or having reason to suspect the presence of branched broomrape on land they occupy or in plant products in their possession or control, must notify an Authorised Officer of the Department of Primary Industries without delay and by the quickest means of communication available. Any *Orobanche* found attacking crops must be reported immediately.*



Figure 3. Branched broomrape outbreak area in South Australia.

Background

Broomrapes, *Orobanche* species, are parasitic plants that attack the roots of other plants. A wide range of crops are attacked including pulses, pasture legumes, oilseeds and vegetables.

There are about 140 species worldwide, mostly in northern Eurasia. Five are particularly weedy and cause heavy damage in Europe, Asia and America. These are Egyptian broomrape (*Orobanche aegyptiaca*), nodding broomrape (*O. cernua* var. *cernua*), crenate broomrape (*O. crenata*), sunflower broomrape (*O. cumana*) and branched broomrape, which is the most widespread and dangerous of the weedy species. Major crops are seriously affected when these weedy broomrapes become established. Yield reductions of 30 to 70% are not uncommon. International markets may reject broomrape-contaminated produce.

Origin and distribution

Native to Europe, North Africa and the Middle East. Introduced to the USA, Cuba, Central America, Argentina and South Africa. Currently restricted in Australia to the Murray Bridge area of South Australia.

Description

An upright, fleshy weed lacking green parts (no chlorophyll), parasitising the roots of many broadleaf plants. Often densely hairy with minute glandular hairs 0.2-0.7 mm long, particularly on the flowers and upper parts of the stems, but sometimes almost hairless.

Stems – erect, 5 to 30 cm high (commonly under 20 cm), single or many, irregularly curved, slender, often much branched from just above ground level, brown or straw-yellow in colour.

Leaves – few triangular dark brown or purplish scales, arranged alternately on the stem, sparse, mainly near the base of the plant.

lobes and the lower into 3 lobes; 2 short and 2 long stamens.

Fruits – a capsule with one compartment containing the seeds; enclosed by the persistent sepals and petal tube.

Seeds – minute, about 0.3 mm long, ovate, dull, like finely ground pepper, black, brown, or yellowish brown, net-veined; several hundred per capsule.

Roots – thick, fleshy, short; attached to the host plant.



Figure 4. Branched broomrape late in the flowering stage has a uniformly brown appearance.

Flowers – numerous; arranged along upright spikes up to 15 cm long that terminate the branched stems; with a lance-shaped bract beneath the flower which is about one third the length of the flower; two purplish or yellowish bracteoles at the flower base; sepals 6 to 7 mm long (about the same length as the bract), brownish, joined at the base into a tube and with 4 equal pointed lobes; petals white, yellow or pale blue to purplish or violet, united into a slender tube much longer than the bracts and sepals and about 15 mm long, with 2 lips, the upper divided into 2



Figure 5. Branched broomrape in the fruiting stage.



Figure 6. Population of branched broomrape.



Figure 7. Branched broomrape parasitising stemless thistle.

Life cycle

Seeds germinate in moist soil at 18 to 23° C and require moist soil for one week to become established. The roots parasitise the roots of host plants for 40 to 50 days. Stems emerge in spring and are visible for only about 3 weeks from the end of September through to October. Flowering is rapid, within 6 to 9 days after stem emergence, with a similar period between the cessation of flowering and the ripening of fruit. An infestation may contain many plants that do not produce above-ground parts.

Similar species

Two other *Orobanche* species occur in Australia. Colour and hairiness of the petal tube, along with the shape of lateral calyx segment are important in separating these species. Unlike branched broomrape they have a split (fully divided) calyx (i.e. sepals that are separate rather than joined), a stout petal tube and lack bracteoles.

Clover or lesser broomrape, *O. minor*, usually grows to between 10 and 40 cm high, has slender or stout, unbranched, straight, brown stems tinged with purple or reddish. Most plants are moderately densely hairy (hairs 0.2 to over 1 mm long) but some are hairless. The flowers appear in dense spikes 2.5 to 3 cm in diameter, covering the upper half of the stem, and are 9 to 18 mm long, pale blue to whitish with purple veins. The lip of the petal tube has fine, dense crenulations. The flowers are usually densely covered in short glandular hairs. The capsular fruit is 5 to 9 mm long. Each flower has a purplish brown bract beneath it, which is as long as or slightly longer than the flower. There is a narrow calyx segment on each side of the flower that is usually divided in two for approximately half its length. The anthers, when dried, are purple-black. The purplish brown, ovate, scale-like leaves are 1 to 3 mm wide, up to 20 mm long, numerous or overlapping near the base of the plant but becoming sparse higher up the stem.

Clover broomrape is native to Europe, North Africa, and parts of East Africa and western Asia and has spread to North America, southern Africa and New Zealand. It is naturalised in all States of southern Australia and has been found widely across Victoria with concentrations of records from the far north-east (Yackandandah-Corryong) and the area between Robinvale, Echuca and Sealake.

Clover broomrape is parasitic on a range of garden and pasture plants and weeds, preferring legumes such as clovers (*Trifolium* spp.), but also attacking capeweed, flatweed, creeping boobialla, nasturtiums and petunias. It can cause severe reduction in subterranean clover stands and has been reported in alsike, berseem, crimson, hop, red and white clovers and black medic.

The impact of common broomrape is usually minor and efforts to control to it are unlikely to be worthwhile.

Australian broomrape, *O. cernua* var. *australiana*, is usually 15 to 45 cm high, brown, covered by glandular hairs, with straighter, thicker, more robust stems than branched broomrape and leaves 8 to 20 mm long and 2 to 5 mm wide. The capsule is 8 to 10 mm long. The hairs on the stems and flowers can be up to 3 mm long (to 1 mm in clover broomrape) but are frequently short (to 0.2 mm) or

may be lacking. The bract beneath the flower is much shorter than the petal tube. The sepals (calyx segments) are 10 to 15 mm long, and about as wide as the petal tube which is 15 to 20 mm long and purple in colour, at least on the lobes. The lip may have coarse crenulations/undulations. The dried anthers are white. Australian broomrape is a very rare native species known in Victoria from only 3 sites. It parasitises native daisy bushes (Asteraceae) such as *Senecio* species.

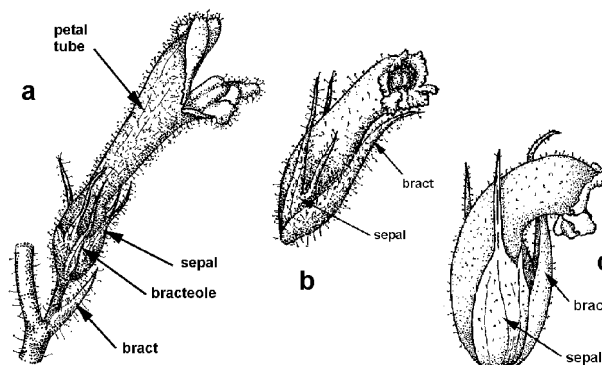


Figure 8. Flowers of (a) branched broomrape, (b) clover broomrape and (c) Australian broomrape.



Figures 9, 10, 11. Branched broomrape (left) clover broomrape (centre) and Australian broomrape (right).

Properties

Broomrape seeds are triggered to germinate by the presence of roots of host plants. The seedlings can only establish if they contact a suitable host. Broomrapes attach to the roots of the host via a specially adapted root system and deprive it of nutrients and water. They severely affect the physiology of the host plant, reducing its carbohydrate and protein content. Affected canola plants may not flower at all, so there is nil yield. Even if yield is not greatly affected, produce may not be saleable. Parasitised celery and cabbage, for example, are discoloured with large yellow blotches. Contaminated produce will normally be rejected from sale. The flowers are pollinated by bumblebees (not present in mainland Australia) but self fertilise in the absence of pollinators.

Branched broomrape appears to prefer well-drained, alkaline, sandy soils, but will grow on other soil types. The

heaviest infestations and the greatest crop losses are on poorer soils. The plant is found in at least 45 countries and attacks at least 25 different crop species.

A single plant can produce over 50,000 seeds. Seeds may persist in the soil for 1 to 12 years and remain viable in storage for 3 to 5 years. Once they have flowered, broomrapes can produce seed even after they have been pulled out.

Hosts

Broomrapes usually parasitise only broadleaved plants but there are a few records of attacks on monocots (grasses, etc.). Branched broomrape attacks many crops and common weeds. Non-host crops can support infestations because of their weed component, and the produce of such crops may carry broomrape seeds.

Some broomrape species have specialised biotypes or races. Plants of the same species attack different sets of hosts in different geographic areas. Susceptibility to attack also depends on the cultivar or genetic characteristics of a particular crop. The plants attacked by branched broomrape around the world include:

Crops and pasture plants – bean, broad bean, cabbage, capsicum (peppers), canola, carrot, cauliflower, celery, chickpea, clovers, eggplant (aubergine), flax, hemp (cannabis), hops, lentil, medics, onion, parsnip, paprika, pea, pyrethrum, sunflower, tobacco, tomato, potato.

Weeds – amaranths (*Amaranthus*), Bathurst burr (*Xanthium spinosum*), black nightshade (*Solanum nigrum*), capeweed (*Arctotheca calendula*), cretan weed (*Hedynopsis rhagadioloides*), dandelion (*Taraxacum*), deadnettles (*Lamium* species), Mexican poppy (*Argemone ochroleuca*), skeleton weed (*Chondrilla juncea*), stemless thistle (*Onopordum acaulon*), wild turnip (*Brassica tournefortii*), yellow hawkweed (*Tolpis barbata*).

Australian native plants - poached egg daisy (*Polycalymma stuartii*), variable daisy (*Brachyscome debilis*), variable groundsel (*Senecio pinnatifolius*).

It cannot be assumed that a broomrape plant is parasitising another plant just because it is growing close to it. The roots of potential hosts may extend for several metres and the broomrape may be connected to an outer root section. Plants with aerial parts no longer present can also be parasitised by broomrapes.

Dispersal

Dispersal from property to property and within properties in the infested area in South Australia appears to be mainly by carriage on vehicles and machinery. Seeds stick to equipment and animals that contact the plant and can also be dispersed by wind and water (including irrigation water/sprinklers), in animal manure, soil, fodder, on livestock and on footwear and clothing. Seeds attach to crop seeds and other produce. Seedlings imported from infested areas can carry seeds stuck to their leaves or in the soil. Seeds remain viable after passage through the digestive tracts of animals including cattle and goats.



Figure 12. Branched broomrape parasitising poached egg daisy.

See the Landcare Note, Branched broomrape: State Prohibited Weed – management, for measures to prevent the introduction to and spread of this weed in Victoria.

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