The biology and non-chemical control of Lesser Celandine (*Ranunculus ficaria* L.)

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Lesser celandine
(pilewort)
***Ranunculus ficaria* L.**
(*Ficaria verna, F. ranunculoides*)

Occurrence

Lesser celandine is a native perennial common throughout the UK in damp meadows, woods, lawns, hedgebanks and beside streams and ditches (Stace, 1997). It thrives in nutrient rich soil and is a troublesome garden weed (Copson & Roberts, 1991). Lesser celandine occurs in grassland of various types. Lesser celandine is a shade tolerant species and in woodland it forms part of the pre-vernal community (Taylor & Markham, 1978). However, it is not found in deciduous woodland on very acid soils. Lesser celandine tolerates a wide range of soil types and in Britain it is associated with pH levels from 4.4 to 6.9. In the urban situation it occurs in shaded areas (Benvenuti, 2004).

In both woodland and open habitats, early growth takes place in short days when temperatures and light levels are low. The onset of senescence is at a time when daylength is long and temperature and light levels are high. Lesser celandine is more resistant to drought after the plant senesces. Growth is poor in areas that remain dry and plants also senesce earlier. Lesser celandine occurs on land that is seasonally wet or flooded but is absent from permanently waterlogged sites.

Lesser celandine is variable in leaf shape, size and number (Clapham *et al.,* 1987). Even on a single plant, leaf shape shows a continuous range (Taylor & Markham, 1978). Four subspecies are recognised in Britain (Stace, 1997). Two are native and two are garden escapes. Of the two native subspecies, spp. *ficaria* develops seeds (achenes) but does not form bulbils, while ssp. *bulbifera* produces few seeds but develops bulbils in the leaf axils after flowering. The former is diploid and has a rather erect habit, the latter is tetraploid and is more spreading (Salisbury, 1962; Taylor & Markham, 1978). The two subspecies occasionally hybridise (Grime *et al.*, 1988).

Lesser celandine has therapeutic and medicinal uses including the treatment of piles (Barker, 2001). It is poisonous to stock and is said to have caused death in cattle and sheep (Forsyth, 1968).

Biology

Lesser celandine flowers from (Februrary) March to May (Barker, 2001, Grime *et al.*, 1988). Plant size is an important factor in flower production (Taylor & Markham, 1978). The flowers are self or insect pollinated, self-pollination occurs in the absence of insects. However, much of the pollen of ssp. *bulbifera* is non-viable. There is an average of 73 seeds per flower in ssp. *ficaria* but only 2 per flower in ssp. *bulbifera*.

Seeds are shed between late May and early June by which time the plant is senescing. Subspecies *bulbifera* dies back earlier than ssp. *ficaria*.

The embryos of freshly shed seed are not fully differentiated and require a period of after-ripening (Taylor & Markham, 1978). Following a period of chilling, germination can take place in the light or in the dark. In the field, seed germination begins in spring and continues into the summer. Lesser celandine is unusual for a dicotyledon in having seedlings with a single cotyledon. A rudimentary root tuber develops after 2-3 months and 1 or 2 foliage leaves will have formed by the end of the first year.

Lesser celandine has fibrous roots and numerous root tubers (Clapham *et al.*, 1987). The first basal tubers develop as adventitious roots on the axillary buds of the basal leaves (Taylor & Markham, 1978). Later subterranean tubers are formed by the appearance of new root initials and buds on the existing tubers. The tubers enter a 6-month resting phase at the end of May. After the aerial parts of the plant die down a distinct white bud develops and gradually enlarges on the newly formed group of root tubers. Other smaller buds may also develop. Tuber dormancy is broken by chilling (Grime *et al.*, 1988). Maintaining tubers of ssp. *bulbifera* at 15-20^{o}C prolonged the resting phase indefinately (Taylor & Markham, 1978).

The resting buds on the root tubers turn green and begin to elongate about December and a number of adventitious roots begin to develop. The foliage leaves of the basal rosette begin to unfold in January (Grime *et al.*, 1988). A further series of roots develop that will become the new tubers. The bulbils or tubercles that develop in the leaf axils are similar to the basal tubers (Taylor & Markham, 1978). They are formed from an adventitious root initial, the root swells and the bud remains near the point of attachment to the plant. The first few leaf initials may develop as scale leaves

Persistence and Spread

Fragmentation of the groups of basal tubers into individual units each with a single bud is an efficient means of vegetative propagation (Taylor & Markham, 1978). Both native forms can spread by the root tubers following ploughing or digging. In addition, in subspecies *bulbifera*, the leaf bulbils separate off as the leaves die down. It can develop up to 24 bulbils per plant. Subspecies *bulbifera* is considered to be the weedier form by Salisbury (1962). However, according to Grime *et al.* (1988) it is more of a woodland plant and it is ssp. *ficaria* that is found in open and disturbed habitats and gardens.

Management

Meadows should be well harrowed in spring to drag out the plants with their roots and tubers (Morse & Palmer, 1925). If lesser celandine is very abundant it may be better to plough up a meadow and put it down to root crops for 1-2 years before sowing down to grass again.

Lesser celandine survives grazing and trampling by horses, cattle and sheep, but the plants are much reduced in size (Taylor & Markham, 1978). In open habitats it is a poor competitor with other plants but in the shade it can form a continuous carpet.

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