The biology and non-chemical control of Creeping Soft-grass (*Holcus mollis*)

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Creeping soft-grass
(Soft fog)
***Holcus mollis* L.**

Occurrence
Creeping soft-grass is a creeping, rhizomatous perennial grass native in woods, hedgerows and in open grassland, mostly on acid soils (Stace, 1997). It is absent from areas of calcareous or base rich soil. Creeping soft-grass occurs on moist, freely drained soils, normally of light to medium texture and high in organic matter. It is common through most of Britain and is recorded up to 1,900 ft (Salisbury, 1961). It is often a relict of former woodland vegetation, surviving woodland clearance despite being a shade lover (Fenton, 1948). Creeping soft-grass is favoured by conditions in woodland clearings and the early stages of coppicing but growth and flowering are restricted as the tree canopy develops (Grime, 1981). It occurs on grassy heaths and is often found growing in association with bracken.

Creeping soft-grass is a troublesome weed on light, acid arable soils (Ovington & Scurfield, 1956). In a survey of weeds in conventional cereals in central southern England in 1982, creeping soft-grass was found in 1% of winter barley but not in winter wheat or spring barley (Chancellor & Froud-Williams, 1984). It occurs as a weed at the edges of arable fields (Grime *et al.,* 1988). In a comparison of the ranking of arable weed species in unsprayed crop edges in the Netherlands in 1956 and 1993, creeping soft-grass moved from 24th to 21st place (Joenje & Kleijn, 1994).

Six varieties have been reported but their status is doubtful (Ovington & Scurfield, 1956). A pentaploid variant is common in Britain; it is sterile but spreads vegetatively (Clapham *et al.,* 1987). Natural hybrids are formed with Yorkshire fog (*H. lanatus*) (Beddows, 1961). The hybrids tend to resemble creeping soft-grass strongly in morphology and could easily be confused with it in the wild (Carroll & Jones, 1962). A backcross of the hybrid and creeping soft-grass has also been recorded (Harberd, 1967). Within a natural stand, relatively few genotypes may be represented and many plants appear to have been derived from an individual colonizing seedling. A clonal patch may reach 100 m across.

There have been suggestions that creeping soft-grass can reduce barley growth allelopathically (Horne, 1953).

Biology
Creeping soft-grass flowers from June to July (Clapham *et al.,* 1987). The flowers are wind pollinated and this favours cross-pollination (Ovington & Scurfield, 1956). Seed is set from July to September (Grime *et al.,* 1988). A plant may flower in its first year from seed (Ovington & Scurfield, 1956). The seeds germinate from March to June.

Creeping soft-grass has rhizomes that have dormant buds (Boyall *et al.*, 1981). In arable soil, the roots and rhizomes are in the upper 10 cm of soil (Ovington & Scurfield, 1956). In woodland they occupy the litter layer. The horizontal length of the rhizomes varies with habitat and can range from 7 to 494 cm. Rhizome growth occurs from late March to October but is greatest in mid-June. The rhizomes extend at the apex, the proximal lateral buds remain dormant while the apical bud is active. The branched rhizomes generally grow horizontally for a year before turning erect following a seasonal trigger in August to form an aerial shoot (Ovington, 1953). Exposure to light will also cause the rhizome to turn erect. The following year the new shoot will initiate rhizomes. Young rhizomes do not develop roots until early June. Scale leaves enclose the young rhizomes but these are lost in the first 3 years and the rhizomes turn yellowish brown. The colour darkens to deep brown as the rhizomes age further. The average internode length of the rhizome is 20 mm. Most lateral buds remain dormant unless the rhizomes are disturbed and then fresh aerial shoots may arise. Even the buds on older rhizomes retain the ability to grow when separated from the rest of the rhizome system.

Tillers form from September to April at the base of erect rhizomes but the young shoots are produced mainly in autumn (Grime *et al.*, 1988). The new aerial shoots overwinter and begin to grow actively in March and April (Ovington, 1953). Tillering is more or less complete by April. The leaves and shoots wither by August before new shoots appear again in the autumn (Ovington & Scurfield, 1956). Creeping soft-grass cannot tolerate prolonged, hard frosts presumably because of the relatively shallow rhizome system.

Persistence and Spread

The rhizomes can generally survive for 7 to 9 years (Ovington, 1953).

Creeping soft-grass is spread by seed and through fragmentation of the rhizome. In natural habitats the spread is mainly vegetative which limits the colonization of new areas (Ovington, 1953). In woodland, vegetative reproduction predominates. Young rhizomes generally grow in the direction of spread of the main patch and single shoots appear in July and October some distance from the parent plant. The rhizomes extend by an average of 12-15 cm per year. The plant also spreads by prostration of old tiller-bearing shoots. Straight lines of groups of tillers occur where the old shoots have fallen.

Management

The introduction of creeping soft-grass as an impurity in crop seed should be avoided, particularly when laying land down to grass (Morse & Palmer, 1925). The weed should not be allowed to set and shed seed. Mowing the flower heads in pasture will prevent further seeding. Once established, creeping soft-grass is difficult to eradicate (Fenton, 1948). It is tolerant of a range of soils but is suppressed on grazed pasture being slower to recover compared with other grasses and with clover. Creeping soft-grass does not persist under heavy grazing (Grime *et al.*, 1988). Productivity is limited by low soil fertility and growth becomes more luxurious when soil is improved. Creeping soft-grass survives moderate treading and disturbance.

Ploughing to 30 cm should bury rhizomes and cover them with 15-20 cm soil. Deep tine cultivations such as chisel ploughing cause more fragmentation of the rhizome

than ploughing. In stubble, thorough cultivations to disturb and fragment rhizomes should be carried out soon after crop harvest. Rotary cultivations are best for this. Subsequent regrowth should then be killed off by further cultivations that prevent the foliage persisting for more than 2-3 weeks. Putting land down to a temporary ley has been suggested as a method for reducing the weed (Ovington & Scurfield, 1956).

The developing inflorescences of creeping soft-grass may be attacked by the fungus *Dilophosphora alopecuri* and fail to emerge (Ovington, 1953). Slugs feed on the rhizomes (Ovington & Scurfield, 1956). Pigs are fond of the rhizomes too. Creeping soft-grass is rarely grazed by rabbits (Fenton, 1940).

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