

The biology and non-chemical control of Creeping Bent (*Agrostis stolonifera* L.)

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Creeping bent

(creeping bentgrass, fiorin, marsh bent grass, running twitch, surface twitch, watergrass, white bent)

Agrostis stolonifera L.

(*Agrostis alba* var. *stolonifera*, *A. palustris*)

Occurrence

Creeping bent is a perennial stoloniferous grass, native in damp arable fields and grassland, in gardens, roadsides, ditches, on rough ground, and in many habitats by water. It is also found in maritime situations. Creeping bent is abundant throughout Britain (Stace, 1997). It has been recorded up to 1,500 ft in the UK (Salisbury, 1961). In early surveys of Bedfordshire, Hertfordshire and Norfolk, creeping bent was associated with all soil types (Brenchley 1911; Brenchley, 1913). It was common on chalk and gravel soils but less frequent on clay. Creeping bent prefers fertile soils (Grime *et al.*, 1988). It occurs on poorly drained soils of low or high pH, predominantly those of medium to heavy textures (Boyall *et al.*, 1981). It tolerates cold and shade. Creeping bent can withstand treading on dry soils but not on wet soil where it is destroyed by puddling (Bates, 1935). It is often associated with heavily-grazed short swards (Gibson, 1996).

In a study of seedbanks in some arable soils in the English midlands sampled in 1972-3, creeping bent seed was recorded in 41% of the fields sampled in Oxfordshire and 34% of those in Warwickshire but never in large numbers (Roberts & Chancellor, 1986). In a comparison of the ranking of arable weed species in unsprayed crop edges in the Netherlands in 1956 and in 1993, creeping bent had slipped from 11th to 27th place (Joenje & Kleijn, 1994).

Cultivated forms of creeping bent are used on golf courses and putting greens in the USA. Ecotypes have developed with tolerance to heavy metals and saline conditions. Creeping bent is said to hybridise with common bent (*A. capillaris*).

Creeping bent is relatively palatable to stock (Grime *et al.*, 1988). The cereal pathogen eyespot (*Cercospora herpotrichoides*) has been recorded on creeping bent (Moore & Thurston, 1970).

Biology

Creeping bent flowers from July to August (Clapham *et al.*, 1987). The flowers are wind pollinated (Grime *et al.*, 1988). Seed is set from August to October. The 1,000 seed weight ranges from 0.06 to 0.09 g.

Seeds germinate more rapidly at alternating temperatures within the range of 15 to 35°C than at constant temperature (Harrington, 1923). A 10°C amplitude alternation gave the best results.

In the field, creeping bent seedlings emerge in autumn or spring (Grime *et al.*, 1988). Seed sown in pans of field soil showed no periodicity of emergence (Brenchley & Warington, 1930). Most seeds had been cleared out after 18 months, germinating whenever conditions were favourable.

Creeping bent usually remains winter green. It has long creeping stolons that over winter (Boyard *et al.*, 1981). It can form a dense mat of semi-prostrate stems.

Persistence and Spread

Creeping bent does not appear to form a persistent seedbank.

Vegetative spread is important leading to the formation of large clumps made up of a single clone. In favourable conditions it can spread rapidly forming dense mats that smother other plants (Weber, 2003).

Management

Small infestations may be dug out to prevent further spread (Weber, 2003). The chief aim is the removal of the creeping stems. Detached shoots re-root following disturbance in arable fields (Grime *et al.*, 1988). Field cultivation with harrows must aim to gather up the roots and stems which should be burned (Morse & Palmer, 1925). Smother crops of maize, vetches or mustard will assist in choking out the weed.

In a ryegrass sward, high application rates of cow slurry increased the proportion of creeping bent and decreased the proportion of perennial ryegrass (Christie, 1987). The proportion of creeping bent increased further as the season progressed. In undergrazed pasture it was suppressed by taller growing grasses (Kydd, 1964). Creeping bent is favoured by rabbit grazing and it decreased in grassland when rabbit populations were decimated by myxomatosis in the 1950's (Thomas, 1963). In roadside verges, increasing the cutting frequency increased the frequency of creeping bent (Parr & Way, 1984; 1988).

In pot studies, corn gluten meal (CGM) applied pre-emergence and pre-plant incorporated at 324 and 973 g/m² reduced seedling survival by 85 and 96% respectively (Bingaman & Christians, 1995). Root development of survivors was reduced more than shoot length at the lower rate. Corn gluten hydrolysate (CGH), a water soluble derivative of CGM, applied as a powder at 1, 2, 4, and 8 g/dm² to the surface of pots sown with creeping bent seeds reduced seedling survival by 82, 97, 100 and 100% (Liu & Christians, 1997). Root growth of survivors was reduced much more severely than shoot growth. In laboratory tests, leachate from composted household waste decreased the germination of creeping bent seed (Ligneau & Watt, 1995). In greenhouse studies, covering the seeds with up to 3 cm depth of compost reduced seedling emergence.

Acknowledgement

This review was compiled as part of the Organic Weed Management Project, OF 0315, funded by DEFRA.

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