

The biology and non-chemical control of Red Dead-nettle (*Lamium purpureum* L.)

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Red dead-nettle

(badman's posies, day nettle, deaf nettle, dog nettle, purple deadnettle, rabbit meat deadnettle, red archangel, red henbit)

Lamium purpureum L.

Occurrence

Red dead-nettle is a native winter to summer annual common on cultivated land and waste places throughout the UK (Clapham *et al.*, 1987; Stace, 1997). It occurs on all soils and is a weed of gardens as well as arable and horticultural land (Salisbury, 1961, Grime *et al.*, 1988; Copson & Roberts, 1991). Red dead-nettle prefers loose, nutrient-rich loamy or sandy-loam soils (Hanf, 1970). In an early survey of Bedfordshire and Herefordshire it was characteristic of light sandy soils (Brenchley, 1911).

Red dead-nettle is found in cornfields, field margins and on roadsides (Dunn, 1903). It can also be a weed of pasture and turf (DeFelice, 2005). In a survey of weeds in conventional cereals in central southern England in 1982, red dead-nettle was found in 4, 2 and 7% of winter wheat, winter barley and spring barley respectively (Chancellor & Froud-Williams, 1984). It is common in winter cereals but is not very troublesome (DeFelice, 2005). Red dead-nettle has benefited from the control of more competitive weeds in cereals and other arable crops (Rademacher *et al.*, 1970). In a comparison of the ranking of arable weed species in unsprayed crop edges in the Netherlands in 1956 and 1993, red dead-nettle moved from 26th to 18th (Joenje & Kleijn, 1994). In 1993, a survey of the most important weeds according to European weed scientists ranked red dead-nettle among the most important weeds in winter cereals and winter rape (Schroeder *et al.*, 1993).

Red dead-nettle can become infected with cucumber mosaic virus which is transmitted by the aphid *Myzus persicae* (Tomlinson & Carter, 1970). Studies have shown that the virus can also be carried in the seeds. In infected plants 4% of seeds may carry the virus. It is also a host of the potato leafroll virus (Patron *et al.*, 1998).

The closely related cut-leaved dead-nettle (*L. hybridum*) is sometimes found growing alongside the red dead-nettle but is much less common (Hanf, 1970).

Biology

Red dead-nettle flowers from March-October but mainly from April to June (Clapham *et al.*, 1987) and sometimes into the winter (Hanf, 1970). Flowers are self- and insect pollinated (Grime *et al.*, 1988). Seed is set from May to July and into November. The average seed number per plant is 640 according to Pawlowski *et al.* (1970). Viable seed number per plant when grown in isolation was estimated at 27,634 (Wilson *et al.*, 1988). In competition with winter wheat the number of seeds per plant ranged from 1,075 to 4,594 with decreasing crop density. Seed numbers were well

correlated with plant dry weight. Red dead-nettle can be found in fruit for 8 months of year (Salisbury, 1962).

Seed germination occurs throughout the year (Salisbury, 1961). Germination increases after a period of dry storage (Grime *et al.*, 1988). Seed mixed in a 75 mm layer of soil in cylinders sunk in the field and stirred periodically emerged mainly in March-May and July-October with odd seedlings throughout the year (Roberts & Boddrell, 1983). Most seeds germinate in the upper 5 to 20 mm of soil (Hanf, 1970).

In Kentucky USA, emergence was generally restricted to autumn (Baskin & Baskin, 1984). Seed shedding from these plants occurs in spring and fresh seeds are dormant. The dormancy cycle of the seeds plus the hot dry summers ensures germination occurs only in autumn. Seeds that do not germinate become dormant again. Laboratory studies showed that under different climatic conditions seed could germinate in spring or autumn. Light was required for germination. The reason that red dead-nettle seeds germinate only in autumn in Kentucky may be due to plants having a different genotype from those in the UK, or there may be winter and summer races in the UK, or it may simply be a difference in climate (Baskin *et al.*, 1986). The hot dry summers in the USA prevent plants continuing to set and shed seed through the summer and it is perhaps these potential seeds that would have emerged in the spring.

Seedlings are frost tolerant. Over the winter the prostrate shoots may root at the nodes (Salisbury, 1962).

Persistence and Spread

Seed recovered from excavations and dated at 20 and 30 years was reported to germinate (Ødum, 1974).

The decline of seeds broadcast onto the soil surface and then ploughed to 20 cm or flexible tine cultivated to 10-15 cm was followed over a 6 year period of cropping with winter or spring wheat grown as commercial crops (Lutman *et al.*, 2002). The experiment was made on a clay and a silty loam soil. Every effort was made to prevent further seed return to the soil. Red dead-nettle had a mean annual decline rate of 20% and an estimated time to 95% decline of 13-14 years. Seedbank decline was also studied in a succession of autumn-sown crops (winter wheat & winter OSR) in fields ploughed annually for 3-4 years with no seed return (Wilson & Lawson, 1992). The annual rate of loss was 55% and time to 99% decline was calculated at 5.4 years. Annual seedling emergence represented 3.5% of seedbank.

Some local seed dispersal by ants has been observed (Grime *et al.*, 1988). There is an elaiosome attached to the base of the seeds that makes them attractive to the ants (Pemberton & Irving, 1990).

Management

Control is by surface cultivations in spring and autumn (Long, 1938). Seedlings are largely destroyed by spring cultivations and constant use of the hoe (Morse & Palmer, 1925). In moist conditions, detached shoots can re-root after spring cultivations (Grime *et al.*, 1988).

In winter wheat, crop density is an important factor in limiting seed production by red deadnettle through its effect on weed biomass (Wright, 1993). Seed production may be halved as crop density is doubled up to 200 crop plants per m².

Acknowledgement

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

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