The biology and non-chemical control of Common Nettle (*Urtica dioica* L.)

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Common nettle
(stinging nettle)
***Urtica dioica* L.**

Occurrence:
Common nettle is abundant and generally distributed throughout the UK and is recorded up to 2,700 ft (Salisbury, 1961). A rhizomatous to stoloniferous perennial, it is native on river banks, in hedgerows, woods, grassy places, near buildings and where the ground is littered with rubble (Clapham *et al*., 1987; Stace, 1997). It can be a problem weed in gardens (Copson & Roberts, 1991). Common nettle is favoured by conditions in woodland clearings and at the early stages of coppicing (Grime, 1981). Growth and flowering are restricted as the tree canopy develops. Common nettle grows in deep, rich, undisturbed soils (Mitich, 1992). It likes a high nitrogen soil and can survive at relatively low light levels. It thrives best on open textured soils with a pH between 5.0 and 8.0. The rhizomes have difficulty penetrating compacted soil (Greig-Smith, 1948).

As a perennial weed, common nettle is troublesome around the margins of arable fields and in gardens (Long, 1938). In a survey of UK cereal field margins recorded as part of Countryside 2000, common nettle was one of the most frequent species recorded (Firbank *et al.,* 2002). In a 3-year set-aside, common nettle frequency declined with increasing distance from the field edge (Rew *et al.,* 1992). The dense canopy in summer and the persistent leaf-litter it produces help to exclude other plants (Grime *et al.,* 1988). It is also prolific on the rich land that borders meadows and pastures, often encroaching into the field (MAFF, 1948). However, it does not spread far into arable fields except perhaps as isolated seedlings (Marshall, 1989). In a study of seedbanks of arable soils in the English midlands sampled in 1972-3, common nettle was recorded in 13% of the fields sampled in Oxfordshire and 41% of those in Warwickshire but never in large numbers (Roberts & Chancellor, 1986). In a seedbank survey in swede-turnip fields in Scotland in 1982, it was found in 38% of the fields sampled (Lawson *et al.,* 198-). In a survey of seeds in pasture soils in the Netherlands in 1966, common nettle was frequent in the sward and in the soil seedbank (Van Altena & Minderhoud, 1972).

Common nettle is very variable in size, leaf shape and flower form (Greig-Smith, 1948). Several varieties have been described. There can be considerable variation in the abundance of stinging hairs (Pollard & Briggs, 1982). Some authors consider the overall variability to be sufficient to divide common nettle into a number of subspecies. Phenotypic plasticity is also a factor.

Dried nettles provide excellent fodder and are readily eaten by farm animals (Morse & Palmer, 1925). Common nettle has a high nutrient requirement and the leaves contain unusually high levels of N, Ca and Mg (Grime *et al.,* 1988, Wilman & Riley, 1993). The plant also accumulates iron (Salisbury, 1962). It has been and is still used as a food plant when young and tender (Mitich, 1992). In Scotland in earlier times it

was used as a rennet to curdle milk for cheese making (Basset *et al.*, 1977). It is also said to have medicinal and therapeutic uses (Barker, 2001). Fibres from the stem were used to make linen and ropes.

Common nettle is an important alternative host of carrot fly and removal of nettles from hedgerows has been suggested as a way to suppress the pest. However, it is also infested by a range of aphid species that are fed on by many beneficial predator insects. Common nettle is the main food plant for the caterpillars of several butterfly species including the Peacock butterfly. It sustains a diverse invertebrate fauna including many uncommon species (Crofts & Jefferson, 1999).

Biology:
Common nettle flowers from May to September (Long, 1938; MAFF, 1948). Populations may vary in the date of first flowering but individual plants exhibit protracted flowering lasting 3-4 months (Pollard & Briggs, 1982). The nettle plants bear only male or female flowers and are normally wind pollinated (Salisbury, 1961). Flowering is inhibited by drought and shade (Grime *et al.*, 1988). Common nettle is a long-day plant and needs up to 16 hours daylength to flower. The average seed number per plant in ruderal situations is given as 38,556 (Pawlowski *et al.*, 1967). Seeds are shed as early as June or as late as December (Greig-Smith, 1948). Plants cut down in flower did not produce viable seed (Gill, 1938). Plants cut when the perianths were green and with the seeds at the milk stage ripened seeds that germinated as well as fully ripe seed.

It is thought that both mature and immature seeds require after-ripening for 1 month. Diurnal fluctuations in temperature of 5.5^{o}C in amplitude promote seed germination in the light (Thompson *et al.*, 1977). Seeds are able to germinate immediately on a bare soil but germination is delayed in closed vegetation (Grime, 1981). Germination is greatest in full sun (Greig-Smith, 1948). Seed sown in a 75 mm layer of soil in cylinders sunk in the field and stirred periodically emerged sporadically through the year with a peak in April (Roberts & Boddrell, 1984). Plants do not flower in their first year.

It has been shown that the distribution of nettle is often controlled by the concentration of phosphate in soil at the time of seedling establishment (Pigott, 1971). Seedlings appear from March onwards and are restricted to bare soil. Seedlings exhibit relatively rapid growth and leaf expansion in the first 4 weeks to keep the young plants above the plants developing around them. A phosphate deficiency can restrict seedling growth in the early stages.

Common nettle has tough yellow roots and creeping stems that root at the nodes and give rise to erect shoots in spring (Clapham *et al.*, 1987). The horizontal shoots develop a short distance below the soil surface (Salisbury, 1961). New rhizomes are formed in late-summer or autumn from older rhizomes or from the stem bases of aerial shoots (Greig-Smith, 1948). They continue to grow until the death of the aerial shoots and they then turn upwards to form new shoots. The shoot tips may die back if frosted. Under prolonged drought conditions vegetative growth is inhibited (Boot *et al.*, 1986). The plants respond to dry conditions by closing the stomata to limit water loss. The plants overwinter as rhizomes with short green shoots (Zimdahl, 1993).

Persistence and Spread:
Abundant seed is produced and is said to form a relatively persistent seedbank (Greig-Smith, 1948). Thompson *et al.* (1993) suggest that based on the seed characters, common nettle seed should persist longer than 5 years. Seeds have been recorded in large numbers in the soil beneath pastures even though the plant may be poorly represented in the vegetation (Champness & Morris, 1948). In seedling emergence studies, most seeds were short lived but some viable seeds remained after 5 years (Roberts & Boddrell, 1984). Dry storage did not reduce seed viability in the first 2 years.

The rootstock is tough, creeps extensively and enables the plant to spread rapidly. Rhizomes broken up by cultivation readily re-root (Grime *et al.*, 1988). However, reproduction by seed is also important (Long, 1938; MAFF, 1948).

In English grass seed samples tested in 1960/61, common nettle seeds were found in 5% of Timothy samples but there were only trace amounts in samples of other grasses (Gooch, 1963). The seed enclosed in its perianth can catch on clothing and animal fur to aid dispersal (Greig-Smith, 1948). Common nettle seeds are ingested by worms and excreted in wormcasts (McRill, 1974). Seeds are also dispersed in the droppings of cattle, deer and magpies (Greig-Smith, 1948). The seeds float in water for 1 week.

Management:
Control is by removing the rootstocks as thoroughly as possible when nettle patches are small. The collected material should be burnt. Repeated hoeing will exhaust the rootstocks eventually. Seedlings may be destroyed by frequent surface cultivations in spring and autumn (Long, 1938; Morse & Palmer, 1925). Cutting is not the most effective means of control for stinging nettle (Crofts & Jefferson, 1999). In grass, regular cutting beginning when the shoots appear in spring and repeated each time shoots reach 15-30 cm should effectively destroy it (MAFF, 1948; Morse & Palmer, 1925). Common nettle can be wiped out by the regular trampling of cattle. Salt licks around nettle clumps will attract stock to trample the weed. In grassland grazed by horses, the animals droppings are usually confined to one area of the field and this leads to ingress by common nettle according to Wells (1985) but not according to Gibson (1996; 1997). Overgrown areas of common nettle are best cut in dry conditions to allow the surface roots to dry out in the sun and wind.

The 'Eco-puller' has been developed to mechanically remove perennial weeds such as common nettle from grassland (Soil Association, 2002). It has a working width of 1.5 m and a ground speed of 5 kph at 540 rpm. Weeds should be at least 30 cm tall. It works best with a height difference between the weed and the grass. The weeds are fed between rollers that pull vertically to lift out the upright stems with many of the creeping, rooted stems attached and deposits them into a collecting hopper for disposal. Stinging nettles should be pulled early, as soon as the stems are robust enough (Crofts & Jefferson, 1999).

On grazing land, stock will readily eat cut and wilted nettles but avoid the growing plant. It is not grazed by rabbits (Tansley, 1949). While rabbits generally avoid it they are reported to eat the young shoots in spring (Thomas, 1960). If cut before flowering and thoroughly dried, nettles make excellent hay with a protein content

equivalent to lucerne/clover. Despite the stalky nature it is well digested by stock animals even pigs, fowl and rabbits.

In a grazing trial with grass and wild white clover mixtures it was noted that where the grasses were dominant common nettle did not become established. The nettle was, however, associated with areas where clover made up 60% of the cover (Ivins, 1952). It was not determined whether the nettle was encourage by the nitrogen enrichment of the soil by clover or deterred by an allelopathic effect of the grasses. Where the clover was dominant, the main grass species were rough-stalked meadow-grass (*Poa trivialis*) and crested dogstail (*Cynosurus cristatus*). In unimproved grassland, common nettle increased under annual cutting for hay (Pywell *et al.*, 2003).

Common nettle cannot tolerate regular cultivations (Håkansson, 1995). The shallow creeping rhizome does not regenerate well after repeated fragmentation.

Common nettle is often infested with the stinging nettle aphid (*Microlophium carnosum*), populations of which increase in April-May (Perrin, 1975). A wide range of beneficial insects feed on this aphid. The time that the nettles are cut down may be important in diverting the beneficial predators onto nearby crop plants. Cutting in May could reduce predator numbers by removing their main food source, cutting in July may be too late to be effective. Mid-June would appear to be the best time for cutting to allow predators to build up and then be moved on to nearby pest infestations.

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

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