

The biology and non-chemical control of Scented Mayweed (*Matricaria recutita* L.)

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Scented mayweed

(dog's chamomile, German chamomile, horse gowan, maithe, mather, maudlin, whitewort, wild chamomile)

Matricaria recutita L.

(*M. chamomilla* L., *Chamomilla recutita* (L.) Rauschert, *Tripleurospermum recutita*)

Occurrence

Scented mayweed is a common native annual or biennial weed of cornfields on a variety of soils (Long, 1938). It is a locally abundant weed of sandy or loamy arable soils and waste places throughout England and Wales (Clapham *et al.*, 1987; Stace, 1997). It is also a common garden weed (Copson & Roberts, 1991). It prefers nitrogenous soils that are poor in lime and will tolerate saline conditions (Tucakov, 1957). Scented mayweed appears to dislike chalky soils (Morse & Palmer, 1925). On light soils it is often restricted to arable land. In early surveys of Bedfordshire, Hertfordshire and Norfolk, scented mayweed was mainly confined to light sandy soils but was also found on heavy loams (Brenchley, 1911; 1913). It was not recorded on chalk. Scented mayweed is considered to be an indicator of loam (Hanf, 1970).

In cereals, scented mayweed can benefit from the control of more competitive weeds (Rademacher *et al.*, 1970). In a survey of weeds in conventional cereals in central southern England in 1982, scented mayweed was found in 1, 0.5 and 0.8% of winter wheat, winter barley and spring barley respectively (Chancellor & Froud-Williams, 1984). In a similar survey of weeds in conventional winter oilseed rape in 1985, scented mayweed was present in 8% of fields (Froud-Williams & Chancellor, 1987). It was most frequent in the headlands, possibly due to herbicide application in the crop itself. In a comparison of the ranking of arable weed species in unsprayed crop edges in the Netherlands in 1956 and 1993, scented mayweed moved from 14th to 10th (Joenje & Kleijn, 1994).

Scented mayweed has been shown to increase the incidence of both beneficial and pest arthropods (Bosch, 1987; Ruppert, 1988). It is highly attractive to ladybirds that prey on aphids (Schmid, 1992).

While scented mayweed is considered a widespread weed of cultivated crops, particularly winter cereals (Hanf, 1970; 1983), it is also of increasing importance internationally as a medicinal and industrial crop (Das *et al.*, 1998; Mann & Staba, 1986). Scented mayweed was brought into cultivation as early as the neolithic period (9000-7000 BC) for use as a medicinal plant. It is faintly aromatic and is widely used as a substitute for the true chamomile (*Chamaemelum nobile*). The deep, ink blue oil is steam distilled from the flower heads or extracted with solvents. Extracts have found uses in the pharmaceutical, food and cosmetic industries, and for the biological control of pests. When it is grown commercially, scented mayweed may appear as a volunteer weed in following crops if it is allowed to set seed. The species exhibits a

high degree of variability and selections have been made to improve the oil yield of the commercial crop.

Scented mayweed will taint milk and butter if eaten by cows in any quantity (Morse & Palmer, 1925).

Biology

Scented mayweed flowers from May to September but the main flowering period is June-July. It is usually the first mayweed to flower. Seedlings that emerged from January to June took progressively shorter times to reach flowering, the minimum being 40-50 days (Roberts & Feast, 1974). Plants that emerged after August overwintered as rosettes that flowered in early spring. Daylength was the controlling factor and flowering was delayed at shorter daylengths.

The insect pollinated flowers are visited by flies and small bees. The time from first flowering to seed dispersal is 20-35 days. Seed number per plant is 5,000 according to Hanf (1970). The average seed number per plant is given as 17,000 by Salisbury (1961) and 21,684 by Pawlowski *et al.* (1970).

In the laboratory, dry-stored seed gave more than 90% germination under constant temperature and alternating temperatures with or without light (Wagenvoort & Van Opstal, 1979). There was some indication that stratification for 2 days at 5°C increased the level of germination. Klein (1956) found the minimum germination temperature to be around 1°C. After burial in soil, the seeds develop a light requirement for germination (Andersson *et al.*, 1997). The light requirement decreases overwinter and with time in soil (Holm *et al.*, 1997). Dry-stored seed was sown outside in pots and exhumed at monthly intervals to test germination in the light and dark (Milberg & Andersson, 1997). In full light there was 100% germination at anytime. With just a flash of light, germination was high in spring but much lower from May to November. In the dark, germination was low until the spring of year 2.

Seed sown in a 75 mm layer of soil in cylinders sunk in the field and stirred periodically, emerged mainly in April-May and August-September (Roberts & Neilson, 1981). However, odd seedlings emerged throughout the spring, summer and autumn when conditions were favourable. Most seedlings emerged in year 1 of the 5-year study with a decline through to year 5 when a small number of viable seeds were recovered.

In the field, 96-97% of scented mayweed seedlings emerged from the surface 10 mm of sandy soil, and 100% from the top 20 mm (Chancellor, 1964). The optimum depth of emergence was 5 mm and there was no germination below 20 mm (Holm *et al.*, 1997). Emerged seedlings represent only 4% of the viable seeds in the soil seedbank (Roberts, 1966).

Persistence and spread

Chancellor (1986) reported a half-life for seed in the soil of 6.5 years. Seed buried in soil for 1, 2, 3, and 11 years gave germination levels of 89, 81, 77, and 73% respectively (Holm *et al.*, 1997). Seeds dry-stored in the laboratory gave 100% germination after 3 years.

After cereal harvest, scented mayweed seed is found in large numbers in the chaff. In laboratory studies, only 8% of scented mayweed seeds offered to earthworms were ingested but 63% of these were recovered in wormcasts (McRill, 1974). Over 25% of scented mayweed seeds eaten by grazing cattle passed through the digestive system unharmed (Holm *et al.*, 1997).

Management

Control is through the prevention of seeding by surface cultivations in spring and summer and the inclusion of root crops in the rotation (Long, 1938). As a taprooted annual weed, scented mayweed is susceptible to hoeing and other methods of mechanical weed control but seedlings have demonstrated some tolerance to flame weeding. A reduction in seedling emergence has been achieved by cultivating in darkness (Hartmann & Nezadal, 1990).

Scented mayweed is attacked by several insects. It is a food plant for the Silver Y moth (*Autographia gamma* L.) in Finland and for *Aethes margaritana*. Thrips have been shown to infest the flowers (Nagy & Tetenyi, 1986). The root mining weevil, *Diplapion confluens*, attacks scented mayweed in Europe. Biological control may not be appropriate for scented mayweed as it is a medicinal herb and a potential economic crop.

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