The biology and non-chemical control of Common Fumitory (*Fumaria officinalis* L.)

W Bond, G Davies, R Turner
HDRA, Ryton Organic Gardens, Coventry, CV8, 3LG, UK

Common fumitory

(beggary, God's fingers and thumbs, waxdolls)
***Fumaria officinalis* L.**

Occurrence

Common fumitory is a native annual found on cultivated and wasteland throughout the UK (Clapham *et al*., 1987; Stace, 1997). It is a common garden weed (Copson & Roberts, 1991). It is not recorded above 1,000 ft in the UK (Salisbury, 1961). It is sometimes plentiful on light sandy, calcareous and loamy soils and chalk (Long, 1938). In early surveys of Bedfordshire, Norfolk and Hertfordshire it was characteristic of light and chalky soils, frequent on sand but absent to rare on clay (Brenchley, 1911: 1913).

Common fumitory was thought to be discouraged by cropping with peas and beans (Brenchley, 1920). It was relatively common in a survey of weeds in spring cereals in N E Scotland in 1985 (Simpson & Carnegie, 1989). Common fumitory seed was found in 5% of arable soils in a seedbank survey in Scotland in 1972-1978 (Warwick, 1984). In a seedbank survey in swede-turnip fields in Scotland in 1982, it was found in 27% of the fields sampled (Lawson *et al.*, 198-). It was most numerous in SE Scotland. In a study of seedbanks of some arable soils in the English midlands sampled in 1972-3, common fumitory seed was not recorded in any of the fields sampled in Oxfordshire and Warwickshire (Roberts & Chancellor, 1986).

Common fumitory has therapeutic and medicinal uses (Barker, 2001). It has been used to treat skin conditions and many other disorders (Mitich, 1997). The flowers were once used to make a yellow dye for wool.

Biology

Common fumitory flowers from May to October and is self fertile (Clapham *et al*., 1987; Stace, 1997). Seed number per plant is given as 300 to 1600 (Guyot *et al.*, 1962). The average number is 800 (Hanf, 1970). Common fumitory can be found in fruit for 6 months of the year (Salisbury, 1962).

In laboratory studies, seed that had been stratified in soil overwinter gave 6 to 29% germination in the light, in darkness with just a 5 second light flash or in complete darkness (Andersson *et al.*, 1997). There was no significant effect of the light treatment. Seed mixed in a 75 mm layer of soil in cylinders sunk in the field and stirred periodically, emerged from December to June with the main flush from February to May (Roberts, 1964). In plots dug into a grass sward and cultivated at monthly intervals, common fumitory seedlings emerged from September to June with a peak in February-March and a smaller one in October-November (Chancellor, 1986). Autumn-emerging seedlings continue to grow through the winter even at low temperatures (Mitich, 1997). Seedling emergence in Scotland recorded in field plots

dug at monthly intervals began in April and continued through until August/September with a peak in April/May (Lawson *et al.*, 1974).

In the field, 92 to 96% of seedlings emerged from the surface 40 mm of a sandy soil, with the odd seedling from down to 90 mm (Chancellor, 1964). In a sandy loam soil, field seedlings emerged from the top 90 mm of soil with the majority in the 5 to 25 mm layer (Unpublished information). There was a reasonable distribution of seedling emergence from depths down to 60 mm but very few seedlings emerged from the surface 0-5 mm.

Persistence and spread

Common fumitory seeds mixed with soil and left undisturbed had declined by 70% after 6 years but in cultivated soil the decline was 90% (Roberts & Feast, 1973). 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. Common fumitory had a mean annual decline rate of 21% and an estimated time to 95% decline of 10-21 years. The decline of seeds under a grass sward was monitored after 1, 2, 3, 19 and 20 years (Chancellor, 1986). Fumitory showed a mean annual decline of 1% and a half-life of over 20 years. Seed recovered from excavations and dated at 25 and 600 years old is reported to have germinated (Ødum, 1974).

Common fumitory seeds have been found as a contaminant in cereal and clover seed (Long, 1938). Seed has been found in cattle droppings (Salisbury, 1961). There is an elaiosome attached to the base of the seeds that is attractive to ants and this may aid seed dispersal (Pemberton & Irving, 1990).

Management

Control is by repeated surface cultivations in spring and early summer, and by the inclusion of root crops (Long, 1938; Morse & Palmer, 1925).

In a comparison of different tillage regimes in winter cereals, common fumitory was favoured by deep cultivations and ploughing and discouraged by shallow cultivations (Pollard & Cussans, 1981).

Common fumitory is eaten by cattle and sheep but horses avoid it (Mitich, 1997). Goats dislike the plant when it is fully grown.

Acknowledgement

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

References

Andersson L, Milberg P, Noronha A (1997). Germination response of weed seeds to light of short duration and darkness after stratification in soil. *Swedish Journal of Agricultural Research*, **27**, 113-120.

Barker J (2001). *The medicinal flora of Britain and Northwestern Europe*, Winter Press, West Wickham, Kent, UK.

Brenchley W E (1911). The weeds of arable land in relation to the soils on which they grow. *Annals of Botany* **25**, 155-165.

Brenchley W E (1913). The weeds of arable soil III. *Annals of Botany* **27**, 141-166.

Brenchley W E (1920). *Weeds of Farm Land.* Longman, Green & Co., London, UK.

Chancellor R J (1964). The depth of weed seed germination in the field. *Proceedings 7th British Weed Control Conference, Brighton*, UK, 607-613.

Chancellor R J (1986). Decline of arable weed seeds during 20 years in soil under grass and the periodicity of seedling emergence after cultivation. *Journal of Applied Ecology* **23**, 631-637.

Clapham A R, Tutin T G, Moore D M (1987). *Flora of the British Isles*, 3rd edition, Cambridge University Press, Cambridge, UK.

Copson P J & Roberts H A (1991). Garden weeds – a survey in Warwickshire. *Professional Horticulture* **5**, 71-73.

Guyot L, Guillemat J, Becker Y, Barralis G, Demozay D, Le Nail Fr (1962). *Semences et Plantules des Principales des Mauvaises Herbes.* Association de Coordination Technique Agricole, Paris.

Hanf M (1970). *Weeds and their seedlings.* BASF UK Ltd.

Lawson H M, Waister P D, Stephens R J (1974). Patterns of emergence of several important arable weed species. *British Crop Protection Council Monograph No.* **9**, 121-135.

Lawson H M, Wright G McN, Smoktunowicz N T (198-). Weed seed populations in swede turnip fields in Scotland. *Proceedings VIIIeme Colloque International sur la Biologie, L'Ecologie et la Systematique des Mauvaise Herbes*, 33-42.

Long H C (1938). Weeds of arable land. *MAFF Bulletin* **108**, 2nd edition. HMSO, London, UK.

Lutman P J W , Cussans G W, Wright K J, Wilson B J, McN Wright G, Lawson H M (2002). The persistence of seeds of 16 weed species over six years in two arable fields. *Weed Research* **42**, 231-241.

Mitich L W (1997). Intriguing world of weeds – Fumitory (*Fumaria officinalis* L.). *Weed Technology* **11**, 843-845.

Morse R & Palmer R (1925). *British weeds their identification and control*. Ernest Benn Ltd, London.

Ødum S (1974). Seeds in ruderal soils, their longevity and contribution to the flora of disturbed ground in Denmark. *Proceedings of the 12th British Weed Control Conference*, Brighton, UK, 1131-1144.

Pemberton R W & Irving D W (1990). Elaiosomes on weed seeds and the potential for myrmecochory in naturalized plants. *Weed Science* **38**, 615-619.

Pollard F & Cussans G W (1981). The influence of tillage on the weed flora in a succession of winter cereal crops on a sandy loam soil. *Weed Research* **21**, 185-190.

Roberts H A (1964). Emergence and longevity in cultivated soil of seeds of some annual weeds. *Weed Research* **4** (4), 296-307.

Roberts H A & Chancellor R J (1986). Seed banks of some arable soils in the English midlands. *Weed Research* **26**, 251-257.

Roberts H A & Feast P M (1973). Emergence and longevity of seeds of annual weeds in cultivated and undisturbed soil. *Journal of Ecology* **10**, 133-143.

Salisbury E J (1961). *Weeds & Aliens*. New Naturalist Series, Collins, London.

Salisbury E (1962). The biology of garden weeds. Part I. *Journal of the Royal Horticultural Society* **87**, 338-350 & 390-404.

Simpson M J A & Carnegie H M (1989). Dicotyledonous weeds of spring cereal crops in north-east Scotland. *Weed Research* **29**, 39-43.

Stace C (1997). *New Flora of the British Isles*. 2nd edition. Cambridge University Press, Cambridge, UK.

Warwick M A (1984). Buried seeds in arable soils in Scotland. *Weed Research* **24**, 261-268.