The biology and non-chemical control of Fool's Parsley (*Aethusa cynapium* L.)

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

Fool's Parsley

(ass-parsley, dog-poison, dog's parsley, false parsley, fool's cicely, lesser hemlock)
***Aethusa cynapium* L.**

Occurrence

A native annual to biennial weed of cultivated ground, fool's parsley is common throughout the UK (Clapham *et al.*, 1987). It is a relatively frequent garden weed (Copson & Roberts, 1991). Fool's parsley prefers nutrient rich loams (Hanf, 1970). It is not recorded above 1,000 ft in the UK (Salisbury, 1961). Fool's parsley is a very frequent birdseed alien (Hanson & Mason, 1985).

In a survey of weeds in conventional cereals in central southern England in 1982, fool's parsley was found in 2% of winter wheat, winter barley and spring barley (Chancellor & Froud-Williams, 1984). In an assessment of weeds of conventional winter oilseed rape in 1985, fool's parsley was found in 3.5% of fields surveyed (Froud-Williams & Chancellor, 1987). In a study of seedbanks in some arable soils in the English midlands sampled in 1972-1973, fool's parsley was recorded in 66% of the fields sampled in Oxfordshire and 69% of those in Warwickshire (Roberts & Chancellor, 1986). A study of changes in the weed flora of southern England between the 1960s and 1997 suggests that fool's parsley has become more common (Marshall *et al.*, 2003). In a seedbank survey of arable fields in France in 1983-85, fool's parsley was common in the seedbank and relatively more frequent in the standing vegetation (Barralis & Chadoeuf, 1987).

Two subspecies of fool's parsley are found in the UK. Sub-species *cynapium* is 30 to 80 cm tall and occurs in gardens on roadsides etc, ssp. *agrestis* is 5 to 20 cm tall and occurs on arable land, mainly in southern Britain (Stace, 1997). The height difference is said to be an adaptation to avoid decapitation by combine harvesters in cereal crops (Salisbury, 1961).

Fool's parsley is poisonous when fresh but is not harmful when dried in hay (Salisbury, 1961). The poisons, coniine and cynapine, are denatured by the drying process (Tutin, 1980). Animals do not eat the plant in the fresh state even when grass was scarce (Forsyth, 1968). Fool's parsley is said to have homeopathic uses (Barker, 2001).

Biology

Fool's parsley flowers from July to August or June to September/October (Clapham *et al.*, 1987; Long, 1938; Tutin, 1980; Hanf, 1970). A garden plant may produce 5,000 to 6,000 seeds but plants growing in a cornfield will have far less (Salisbury, 1961). The average seed number per plant in ruderal situations is given as 15,488 (Pawlowski *et al.*, 1967). Hanf (1970) suggests a value of 500 seeds per plant.

The level of seed germination increased from 22 to 52% following a 1-month period of moist storage at 5^{o}C (Grime *et al.*, 1981). Freshly collected seeds were dormant

but burial over the winter increased the percentage germination (Roberts & Boddrell, 1985). Germination of intact seeds was always less than that of seeds from which the outer coat had been removed. Seed sown in a 75 mm layer of soil in cylinders sunk in the field and stirred periodically emerged mainly from March to May with odd seedlings emerging anytime from early spring through to the autumn (Roberts, 1979). Seedlings continued to emerge through the 5 years of the experiment and many viable seeds were recovered at the end of that period. Seed sown in pans of field soil emerged irregularly through the year but in the second year there was a peak of emergence in the winter period (Brenchley & Warington, 1930)

Around 85 to 99% of seedlings emerge from the top 30 mm of soil in the field (Chancellor, 1964). Just the odd seedling emerged from up to 90 mm deep.

Persistence and Spread

Seeds are able to remain dormant in soil for at least 10 years (Brenchley & Warington, 1936). Seeds recovered from excavations and dated at 25 years old have been found to germinate (Ødum, 1974). The decline of seeds under a grass sward was monitored after 1, 2, 3, 19 and 20 years (Chancellor, 1986). Fool's parsley showed a mean annual decline of 0.6% and a half life greater than 20 years. Seed sown in the field and followed over a 5 year period in winter wheat or spring barley showed an annual decline of around 40% (Barralis *et al.*, 1988). Emerged seedlings represented 8% of seeds in the seedbank. Seedlings from fresh seeds mixed with soil in the field and stirred periodically continued to emerge over a 5-year period of study (Roberts, 1981). Viable seeds were still present in the soil at the end of the study period. Seeds in dry storage remained viable for 8 years (Brenchley, 1918).

In cereal seed samples tested in 1961-68, fool's parsley was a contaminant in up to 0.7% of rye, 0.7% of oats, 0.8% of barley and 0.9% of wheat samples (Tonkin, 1968). In Denmark, samples of grass and clover seeds tested in 1927/28, 1939, 1955/57 and 1966/69 showed a low level of contamination with fool's parsley seeds but less than 1% of samples were affected (Olesen & Jensen, 1969). In a survey of weed seed contamination in 1960-61, fool's parsley was found in 2% of seed samples tested (Gooch, 1963).

Management

As an annual weed, two successive root crops ought to reduce it substantially but fool's parsley is difficult to control because the seedlings emerge at irregular intervals (Long, 1938). Even a bare fallow has sometimes failed to reduce it effectively. The most important thing is to prevent fresh seeding (Morse & Palmer, 1925).

Seed numbers in soil were reduced by 75% after a 1-year fallow and by over 90% if the fallow was extended into a second year (Brenchley & Warington, 1933). The land was ploughed, disked and harrowed each year. Seed numbers were also reduced by cropping with winter wheat for the same period. Fallowing every 5th year over a 15-year period reduced seed numbers successively after each fallow year (Brenchley & Warington, 1945). The greatest reduction came after the first fallowing, the reduction then became progressively less and after 15 years seed numbers were 15% of the starting level.

Small seedlings of fool's parsley are susceptible to flame weeding (Ivens, 1966).

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

References

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

Barralis G & Chadoeuf R (1987). Weed seed banks of arable fields. *Weed Research* **27**, 417-424.

Barralis G, Chadoeuf R, Lonchamp J P (1988). Longevity of annual weed seeds in cultivated soil. *Weed Research* **28**, 407-418.

Brenchley W E (1918). Buried weed seeds. *Journal of Agricultural Science* **9** (1), 1-31.

Brenchley W E & Warington K (1930). The weed seed population of arable soil. I. Numerical estimation of viable seeds and observations on their natural dormancy. *The Journal of Ecology* **18** (2), 235-272.

Brenchley W E & Warington K (1933). The weed seed population of arable soil. II. Influence of crop, soil and method of cultivation upon the relative abundance of viable seeds. *The Journal of Ecology* **21** (1), 103-127.

Brenchley W E & Warington K (1936). The weed seed population of arable soil. III. The re-establishment of weed species after reduction by fallowing. *The Journal of Ecology* **24** (2), 479-501.

Brenchley W E & Warington K (1945). The influence of periodic fallowing on the prevalence of viable weed seeds in arable soil. *Annals of Applied Biology* **32** (4), 285-296.

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.

Chancellor R J & Froud-Williams R J (1984). A second survey of cereal weeds in central southern England. *Weed Research* **24**, 29-36.

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.

Forsyth A A (1968). British poisonous plants. *MAFF Bulletin No.* **161**, HMSO, London.

Froud-Williams R J & Chancellor R J (1987). A survey of weeds of oilseed rape in central southern England. *Weed Research* **27**, 187-194.

Gooch S M S (1963). The occurrence of weed seeds in samples tested by the official seed testing station, 1960-1. *The Journal of the National Institute of Agricultural Botany* **9** (3), 353-371.

Grime J P, Mason G, Curtis A V, Rodman J, Band S R, Mowforth M A G, Neal A M, Shaw S (1981). A comparative study of germination characteristics in a local flora. *Journal of Ecology* **69**, 1017-1059.

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

Hanson C G & Mason J L (1985). Bird seed aliens in Britain. *Watsonia* **15**, 237-252.

Ivens G W (1966). Flame cultivation experiments 1965. *WRO Technical Report No.* **7**, Weed Research Organisation, Oxford, UK, 6pp.

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

Marshall E J P, Brown V K, Boatman N D, Lutman P J W, Squire G R, Ward L K (2003). The role of weeds in supporting biological diversity within crop fields. *Weed Research* **43**, 1-13.

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.

Olesen M & Jensen H A (1969). (Occurrence of weed seeds in seed samples of grasses and clover). *Soertryk af statsfrøkontrollens beretning* **98**, 91-112.

Pawlowski F, Kapeluszny J, Kolasa A, Lecyk Z (1967). Fertility of some species of ruderal weeds. *Annales Universitatis Mariae Curie-Sklodowska Lublin-Polonia* **22** (15), 221-231.

Roberts H A (1979). Periodicity of seedling emergence and seed survival in some Umbelliferae. *Journal of Applied Ecology* **16**, 195-201.

Roberts H A (1981). Seed banks in soils. *Advances in Applied Biology* **6**, 1-55.

Roberts H A & Boddrell J E (1985). Temperature requirements for germination of buried seeds of *Aethusa cynapium* L. *Weed Research* **25**, 267-274.

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

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

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

Tonkin J H B (1968). The occurrence of broad-leaved weed seeds in samples of cereals tested by the official seed testing station, Cambridge. *Proceedings 9th British Weed Control Conference*, Brighton, UK, 1199-1205.

Tutin T G (1980). Umbellifers of the British Isles. *BSBI Handbook No. 2.* Botanical Society of the British Isles, London, UK.