

## The biology and non-chemical control of Dove's-foot Crane's-bill (*Geranium molle* L.)

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### Dove's-foot Crane's-bill *Geranium molle* L.

#### Occurrence

Dove's-foot crane's-bill is native on dry grassland, dunes, waste places and cultivated ground (Clapham *et al.*, 1987; Stace, 1997). It is widely distributed on pasture, scree, roadsides and railways. Dove's-foot crane's-bill is a winter or more rarely summer annual and is common throughout the UK (Grime *et al.*, 1988). It is most frequent on limestone. In early surveys of Bedfordshire, Hertfordshire and Norfolk it was characteristic of light and chalky soils (Brenchley, 1911; 13). Dove's-foot crane's-bill is rare in shaded sites and wetlands but is often found in habitats subject to drought. It is recorded up to 1,750 ft in Britain (Salisbury, 1961).

Dove's-foot crane's-bill was often associated with temporary grass or clover grown for seed (Brenchley, 1920). It was often found in grass and clover crops after having been introduced with the crop seed (Morse & Palmer, 1925). It was less common in oats than in other cereals.

The seeds of dove's-foot crane's-bill are scheduled as injurious under the 1951 Regulations made under the Seeds Act, 1920 (Chancellor, 1959).

#### Biology

Dove's-foot crane's-bill flowers from April to August according to Clapham *et al.* (1987) and April to September according to Grime *et al.* (1988). The flowers are visited by insects but probably self-pollinate. Seed is set from June to October. There are 5 seeds in each dehiscent fruit. The average seed number per plant is 1,500 to 2,000 (Salisbury, 1961).

Seed may germinate in the autumn after shedding but some seeds exhibit hard-coat dormancy (Grime *et al.*, 1988). Germination is enhanced by dry-storage. Scarification increased the level of seed germination from 20 to 100% (Grime *et al.*, 1981). Seedlings from seed sown in a 75 mm layer of soil in cylinders sunk in the field and stirred periodically emerged mainly from May to September (Roberts & Boddrell, 1985). Very few seedlings emerged at other times. Seed sown in May emerged within 7 days (Long, 1938). Autumn germinating plants overwinter as a rosette (Grime *et al.*, 1988). The plant develops a long taproot.

#### Persistence and Spread

Dove's-foot crane's-bill is thought to form a persistent seedbank but in one study, seed buried in peat or mineral soil was not viable after 1 year (Lewis, 1973). Seed recovered from excavations and dated at 30 years old is reported to have germinated (Ødum, 1974). Seed held in granary conditions gave 98% and 15% germination after 1 and 20 years respectively (Lewis, 1973).

Dove's-foot crane's-bill seed was a common impurity in white clover seed, especially home grown seed (Long, 1938; Salisbury, 1961). In seed samples tested in 1960-61 in the UK, dove's-foot crane's-bill seed was a contaminant in 2-12% of red clover seed samples of English origin and 4% of New Zealand samples (Gooch, 1963). In white clover seed samples it was found in 23% of English and up to 68% of Danish seed samples. The percentage of samples of grass and clover seeds tested in Denmark and showing contamination with dove's-foot crane's-bill seeds in 1927/28, 1939, 1955/57 and 1966/69 was 15.6%, 40.8%, 38.8 and 14.1% respectively (Olesen & Jensen, 1969). In 1966/9, 85% of white clover seed samples were contaminated.

Dove's-foot crane's-bill seed is dispersed several feet by an explosive dispersal mechanism (Salisbury, 1961). Seed has been found in cattle droppings and seedlings have been raised from bird droppings.

### Management

Control is by hoeing to prevent seeding (Morse & Palmer, 1925). In row crops the weed is easily dealt with but in leys plants may need to be hand pulled (Long, 1938). Only pure crop seed should be sown.

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### References

- 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** (1959). Identification of seedlings of common weeds. *MAFF Bulletin No. 179*. HMSO, London.
- Clapham A R, Tutin T G, Moore D M** (1987). *Flora of the British Isles*, 3<sup>rd</sup> edition, Cambridge University Press, Cambridge, UK.
- 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, Hodgson J G, Hunt R** (1988). *Comparative Plant Ecology*, Unwin Hyman Ltd, London, UK.
- 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.
- Lewis J** (1973). Longevity of crop and weed seeds: survival after 20 years in soil. *Weed Research* **13**, 179-191.
- Long H C** (1938). Weeds of arable land. *MAFF Bulletin* **108**, 2<sup>nd</sup> edition. HMSO, London, UK.
- 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 12<sup>th</sup> 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.
- Roberts H A & Boddrell J E** (1985). Seed survival and seasonal emergence in some species of *Geranium*, *Ranunculus* and *Rumex*. *Annals of Applied Biology* **107**, 231-238.
- Salisbury E J** (1961). *Weeds & Aliens*. New Naturalist Series, Collins, London.
- Stace C** (1997). *New Flora of the British Isles*. 2<sup>nd</sup> edition. Cambridge University Press, Cambridge, UK.