

The biology and non-chemical control of Hedge Bindweed (*Calystegia sepium* (L.) R.Br.)

W. Bond, G Davies, R Turner

HDRA, Ryton Organic Gardens, Coventry, CV8, 3LG, UK

Hedge bindweed

(bearbine, greater bindweed, larger bindweed, ropewind, withywind)

Calystegia sepium (L.) R.Br.

(*Convolvulus sepium* L.)

Occurrence

Hedge bindweed is a rhizomatous and stoloniferous perennial with long climbing stems that clamber up and over hedges (Long, 1938; Clapham *et al.*, 1987; Stace, 1997). It is often a weed of gardens where it climbs over fruit trees, vegetable crops and herbaceous plants (Copson & Roberts, 1991). It twines anti-clockwise (Salisbury, 1961).

Three subspecies are recognised in Britain (Stace, 1997). Subspecies *sepium* is widespread and native in hedges, the edge of woods and gardens. Subspecies *roseata* occurs locally near the coast and ssp. *spectabilis* was formerly naturalised at one site in Wales. Two closely related species, previously regarded as subspecies also occur in Britain. Large bindweed (*C. sylvatica*) was introduced but is now widely naturalised in hedges and waste places. Hairy bindweed (*C. pulchra*) was also introduced but is less common.

Hedge bindweed has medicinal uses as a laxative (Barker, 2001). When the plant is damaged it exude a milky sap.

Biology

Hedge bindweed flowers from July to September according to Clapham *et al.* (1987) and June to October according to Grime *et al.* (1988). The flowers are insect pollinated, self-incompatible and produce few seeds (Salisbury, 1961). Seed is set from September to October. The seed is contained in a dehiscent, 4-seeded capsule.

The seeds will germinate in the autumn and in spring (Grime *et al.*, 1988). Seedlings grow roots that extend rapidly within the first few weeks after germination (Long, 1938). The roots run deeply and spread in all directions. The rootstocks are often tuberous (Morse & Palmer, 1925). The shoots die down in autumn (Grime *et al.*, 1988). Hedge bindweed overwinters as rhizomes (Zimdahl, 1993).

Persistence and spread

Hedge bindweed seeds buried in soil can retain viability for at least 39 years (Salisbury, 1961). In Duvel's burial experiment, seed sown at 20, 55 and 105 cm gave 41, 51 and 43% germination respectively at 10 years, 20, 43 and 51% at 30 years and --, 34 and 53% at 39 years (Toole & Browne, 1946, Goss, 1924). Seed can be carried by water.

Vegetative spread is by a network of rhizomes (Grime *et al.*, 1988). The rhizomes are far creeping but seldom more than 30 cm deep (Clapham *et al.*, 1987). Stems that lay on the ground act as stolons that enter the soil and root at their tips (MAFF, 1957). These aerial runners can grow 3-4 m in length and penetrate the soil in autumn to establish new plants (Rask & Andreasen, 2007).

The weed was often dumped with garden waste. New plants can develop from fragments of root, rhizome or stem (Salisbury, 1961; Grime *et al.*, 1988).

Management

It is advisable to fork out and remove all pieces of rootstock and rhizomes before collecting and burning them (Long, 1938; Morse & Palmer, 1925). The food reserves in the underground organs can be exhausted by frequent hoeing. In some situations, mechanical cultivation is not possible and hand-weeding is the only option (MAFF, 1957). Seed production should be prevented.

Greenhouse studies have demonstrated that the minimum regenerative capacity of hedge bindweed occurs when plants reach the 5-6 leaf stage (Rask & Andreasen, 2007). Mechanical disturbance at this stage, when shoots are 38-50 cm long will give the maximum control. The shorter the rhizome fragment and the deeper the burial depth, the greater the reduction in above and below ground regeneration. Shoots from shorter fragments take longer to emerge above ground. Burial at 25 cm is needed to consistently reduce regrowth. Growth chamber studies have shown that a minimum of 48 hrs desiccation is needed to reduce the regenerative ability of 5 cm rhizome fragments left on the soil surface for different periods then reburied.

A ground cover of common chickweed (*Stellaria media*) has been used to suppress hedge bindweed in vineyards (Turkington *et al.*, 1980).

In the USA, studies have been made with the Argus Tortoise beetle (*Cheimorpha cassidea*) and its larva for the biological control of field and hedge bindweed in North America (Selleck, 1978). Members of the *Convolvulaceae* are considered to be the sole food source of the beetle. Biological control using applications of the spores of the fungus *Staganospora* spp. in combination with competitive cover crops has given promising results (Rask & Andreasen, 2007).

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.
- 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.
- Goss W L** (1924). The vitality of buried seeds. *Journal of Agricultural Research* **29** (7), 349-362.

- Grime J P, Hodgson J G, Hunt R** (1988). *Comparative Plant Ecology*, Unwin Hyman Ltd, London, UK.
- Long H C** (1938). Weeds of arable land. *MAFF Bulletin* **108**, 2nd edition. HMSO, London, UK.
- MAFF** (1957). Bindweeds. *MAFF Advisory Leaflet* **450**, HMSO, London, UK.
- Morse R & Palmer R** (1925). *British weeds their identification and control*. Ernest Benn Ltd, London, UK.
- Rask A M & Andreasen C** (2007). Influence of mechanical rhizome cutting, rhizome drying and burial at different developmental stages on the regrowth of *Calystegia sepium*. *Weed Research* **47**, 84-93.
- Salisbury E J** (1961). *Weeds & Aliens*. New Naturalist Series, Collins, London.
- Selleck G W** (1978). Biological control of perennial bindweeds with Argus Tortoise Beetle. *Proceedings of the 1978 British Crop Protection Conference – Weeds*, 499-502.
- Stace C** (1997). *New Flora of the British Isles*. 2nd edition. Cambridge University Press, Cambridge, UK.
- Toole E H & Browne E** (1946). Final results of the Duvel buried seed experiment. *Journal of Agricultural Research* **72**, 201-206.
- Turkington R, Kenkel N C, Franko G D** (1980). The biology of Canadian weeds. 42. *Stellaria media* (L.) Vill. *Canadian Journal of Plant Science* **60**, 981-992.
- Zimdahl R L** (1993). *Fundamentals of Weed Science*. Academic Press, Inc.