

The biology and non-chemical control of Rosebay Willowherb (*Chamerion angustifolium* (L.) Holub)

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Rosebay willowherb

(fireweed)

(*Chamerion angustifolium* (L.) Holub)

(*Chamaenerion angustifolium*, *Epilobium angustifolium*)

Occurrence

Rosebay willowherb is an erect rhizomatous perennial native on waste ground, embankments, rocky places, mountain scree and woodland clearings throughout the UK (Stace, 1997). It can be a problem weed in gardens (Copson & Roberts, 1991). It is recorded up to 1,850 ft in Britain. The remains of rosebay willowherb have been found in prehistoric deposits. Formerly uncommon it is now abundant in cleared forest areas, burned areas and bombsites (Salisbury, 1961; Broderick, 1990). On the Isle of Wight, rosebay willowherb suddenly appeared in abundance in an area of woodland wholly destroyed by fire around 1909 (Stratton, 1909). It had not been seen there previously and was not abundant on the island at that time. Rosebay willowherb is favoured by conditions after woodland clearance and in the early stages of coppicing but growth and flowering become restricted as the tree canopy develops again (Grime, 1981). In deep shade it fails to flower but the vegetative shoots persist (Tansley, 1949). In reclaimed bog in Ireland, it was an important early colonizer but became less frequent later as the vegetation cover matured (MacNaeidhe & Curran, 1982). Rosebay willowherb was a frequent colonist in unsown set-aside land in Scotland (Fisher *et al.*, 1992). It was less common where a cover crop had been sown. It may be a weed problem in perennial crops (Broderick, 1990).

Rosebay willowherb prefers a rich aerated soil and appears to be a calcifuge (Myerscough & Whitehead, 1966; Grime *et al.*, 1988). It is tolerant of acid and alkaline soils but does not grow in soils with poor mineral nutrition. It is usually absent from waterlogged soil but grows in wet conditions around ponds as well as on dry sandy heaths and chalk downs. Rosebay willowherb tolerates shade and a broad range of climatic conditions.

It is suspected by some botanists that the sudden spread of rosebay willowherb was due to the introduction of the North American form that has 72 chromosomes while the native form has 36 (Frankton, 1956). Considerable intraspecific variation has been observed in rosebay willowherb in North America (Broderick, 1990). Forms occur that differ in flower colour.

Rosebay willowherb is eaten by deer and range cattle in North America (Broderick, 1990). It was also used as a food plant by the native Indians. Goats and sheep eat it but not horses or pigs (Myerscough, 1980). The nectar is important to beekeepers in certain localities.

Biology

Rosebay willowherb flowers from June to September (Barker, 2001). Although plants are self-compatible, the anthers dehisce long before the stigma opens ensuring cross-pollination occurs, predominantly by insects (Myerscough & Whitehead, 1966). The sticky pollen is not readily shaken onto the flowers below. The wind blown seeds are dispersed from late July-August (Grime *et al.*, 1988). The average number of seeds per capsule is 300-500 and per plant is 80,000 (Salisbury, 1961).

Seed germination is more successful in a moist atmosphere. Seeds germinate best at or just beneath the soil surface. Burial below 2 mm markedly reduces germination. Germination is promoted by illumination but it does still occur in darkness depending on the temperature. At 30°C similar levels of germination occur in the light and dark (Myerscough, 1980). The light requirement disappears with time in dry storage and the level of germination also increases (Grime *et al.*, 1988).

Germination can occur at any time of year provided conditions are favourable. In Europe, germination in the field occurs mostly in late summer and autumn (Broderick, 1990). Seeds that do not germinate in the autumn after shedding, germinate the following spring (Grime *et al.*, 1988). Seedlings are unlikely to develop within mature stands of rosebay willowherb (Broderick, 1990).

Once established, seedlings soon send out shallow underground stems. These may extend 1 m per season. Seedlings initially form a rosette of leaves. The main root and its strongest branches become thickened and spread laterally for some distance (Myerscough & Whitehead, 1966). Rosebay willowherb perennates by means of the persistent fleshy root system. The roots are most abundant at 5 to 20 cm depth with some penetrating down to 40 cm (Myerscough, 1980). As the internodes elongate on the main shoot, side shoots may begin to form and adventitious buds develop on the roots. It is these buds that form the vegetative means of spread resulting in large clonal patches. New aerial shoots arise each spring from buds formed late in the previous year (Broderick, 1990). Root growth can be initiated at 4.5°C and commonly precedes shoot elongation in spring. Plants often flower within their first year (Myerscough, 1980).

Persistence and Spread

Thompson *et al.* (1993) suggest that based on seed characters, rosebay willowherb seeds are likely to persist for less than 5 years in soil. Seeds remain viable for 18 months but do not form a persistent seedbank (Myerscough & Whitehead, 1966). Seeds lose viability after about 18 months storage at room temperature but may persist for over 2 years stored dry at 5°C (Myerscough, 1980).

Seeds have a plume of hairs and are wind dispersed (Salisbury, 1961). It has been estimated that 20 to 50% of seeds could be carried 100 m and some seeds could potentially travel over 100 km (Broderick, 1990). Seed can also be carried by water (MacNaeidhe & Curran, 1982).

The plant colonies themselves may persist for long periods (Broderick, 1990). On sand dunes in Holland, stands 35 years old have been identified. Rosebay willowherb spreads by horizontal roots on which adventitious buds develop (Myerscough & Whitehead, 1966). The roots lengthen by up to 1 m per year and extend well beyond

the aerial stems (Broderick, 1990). Large dense colonies several metres across can develop in some habitats (Myerscough, 1980). The age of the roots of some colonies has been estimated at 27 years. Spread is limited where soil fertility has declined. Fragments of root can produce adventitious buds within 3 weeks (Broderick, 1990). The longer the fragment the more successful it is at regeneration. Lengths shorter than 8 cm are unlikely to produce new shoots. Even roots 20 years old can produce buds following soil disturbance.

Management

Rosebay willowherb is susceptible to shoot loss from trampling, cutting, burning and grazing (Grime *et al.*, 1988; Broderick, 1990; Myerscough, 1980). Liming inhibits establishment.

A wide variety of phytophagous insects are associated with rosebay willowherb in Britain (Broderick, 1990; Myerscough, 1980).

Acknowledgement

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

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