

The biology and non-chemical control of Garlic Mustard (*Alliaria petiolata* (M. Bieb.) Cavara & Grande)

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Garlic Mustard

(hedge garlic, jack-by-the-hedge, sauce-alone)

***Alliaria petiolata* (M. Bieb.) Cavara & Grande**

(*A. officinalis*, *Erysimum alliarica*, *Sisymbrium alliarica*)

Occurrence

Garlic mustard is a native winter annual, biennial or monocarpic perennial abundant in damp shaded areas, common in hedgerows and at the edge of woods (Cavers *et al.*, 1979; Stace, 1997). Although found in hedge bottoms it does not spread far into arable fields (Marshall, 1989). Garlic mustard is largely absent from agricultural land (Grime *et al.*, 1988). It is most abundant on phosphate rich and calcareous soils, particularly chalks (Barker, 2001). It is common on heavy soils (Long, 1938). It is considered invasive because it can quickly become dominant in understorey vegetation and will eliminate other species (Weber, 2003). Seedling density can be extremely high. Plants exhibit considerable plasticity in different habitats.

Garlic mustard seed is an important constituent in the diet of many farmland birds including linnets (*Carduelis cannabina*) (Moorcroft *et al.*, 1997). It is a food plant of the green-veined white butterfly and a site for egg laying (Cavers *et al.*, 1979). Garlic mustard is edible and has been used as a salad green. It has a characteristic odour of garlic and if eaten by cows it will taint their milk.

Biology

Garlic mustard flowers from April to June (Long, 1938). Peak flowering occurs in mid-May (Cavers *et al.*, 1979). Midges and bees pollinate the flowers. The flowers are self-compatible and may be self-pollinated automatically (Grime *et al.*, 1988). Seeds are shed from July onward. The seedpods contain 10-20 seeds. Patterns of seed maturation and abortion vary non-randomly within and among fruits (Susko & Lovett-Doust, 1998). Resource limitation is an important factor with pods nearest the base of the fruiting stem and seeds nearest the base of an individual pod being more likely to achieve maturity. Seed size (mass) is highly variable both between and within populations, and between and within individuals, and even within fruits (Susko & Lovett-Doust, 2000). Access to parental resources is one factor and seed size reduces with increased distance from the main stem. Smaller seeds germinate earlier but produce their first leaf later than larger seeds. However, the seedlings from smaller seeds often grow taller.

Moist storage at 5°C for up to 10 months did not promote seed germination (Grime *et al.*, 1981). Seed dormancy is broken by chilling (Grime *et al.*, 1988). Seedlings emerge between January and April and gradually form a long taproot.

Garlic mustard survives the winter as a rosette of leaves (Grime *et al.*, 1988). It may perennate from adventitious buds on the roots.

Persistence and Spread

The seeds can remain dormant for 18 months and are moderately persistent in soil (Grime *et al.*, 1988). Garlic mustard accumulates a soil seedbank and seedlings establish rapidly following soil disturbance (Weber, 2003). Garlic mustard can persist as adventitious buds on the roots (Clapham *et al.*, 1987).

Grooves along the seed coat trap air and enable the seed to float in water (Cavers *et al.*, 1979).

Management

Regular trimming along hedgerows and banks will weaken garlic mustard. Plants on the field margin should be cut down and those that encroach onto arable land must be hoed out (Morse & Palmer, 1925). Garlic mustard plants should be removed before seed is set (Weber, 2003). Cutting at ground level is effective but needs repeating over successive years to exhaust the seedbank. Garlic mustard is usually absent from grazed and trampled sites. Plants that are mown or trampled may produce new flowering shoots (Cavers *et al.*, 1979). Adventitious buds are said to form occasionally on the roots of damaged shoots, and lateral flower shoots may form on cut stem bases.

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