

## **The biology and non-chemical control of Common Poppy (*Papaver rhoeas* L.)**

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### **Common poppy**

(blindy-buffs, bledewort, canker rose, cheesebowl, cockrose, copper-rose, corn poppy, corn rose, cuprose, field poppy, redweed, soldiers, thunder flower, yedwark)

*Papaver rhoeas* L.

### **Occurrence**

An annual or overwintering plant native in arable land, roadsides and waste places throughout the UK (Stace, 1997). A weed of cornfields on light, dry, sandy and gravelly soils, and to a lesser extent on heavy land (Long, 1938). It is found in disturbed habitats and prefers light, friable and sandy soils. It is less frequent on clay and peat soils (McNaughton & Harper, 1964). Not recorded above 1000 ft in Britain (Salisbury, 1961). In the UK, it is common in England and SE Scotland but rarer in Wales and much of Scotland. In an early survey of Bedfordshire and Norfolk, common poppy was one of the commonest weeds. It was found chiefly on sand, and was frequent on light loams and chalk (Brenchley, 1913).

Numerous forms and varieties have been recognised. Leaf shape and hairiness are very variable (Clapham et al., 1987). Albino and tricotyledonous seedlings occur occasionally at a ratio of 1 in 63,000 and 1 in 4,000 respectively (Brenchley & Warrington, 1936)

### **Biology:**

It flowers June-October (Clapham et al., 1987). Flowering begins in mid-June with flushes in late-June and early-July and then intermittent flowering continues to October. *Papaver rhoeas* is normally the last of the poppies to start flowering and to finish. A common poppy may produce 1 to 400 flowers and seed capsules depending on the soil fertility and density of vegetation (McNaughton & Harper, 1964). Poppies are normally insect pollinated, honey and bumble bees being the main pollinators (McNaughton & Harper, 1960). The different poppies often occur together but few natural hybrids have been found. Bees tend to keep to one species of poppy which restricts inter-species pollination. Also, the species is more or less self sterile and the anthers dehisce before the flowers open so self-pollination can occur ahead of cross-pollination.

Although it is generally the last poppy to flower the seed capsules ripen faster than the other poppies. Common poppy also produces the largest number of seeds per capsule, commonly over a thousand (Harper, 1966). The average seeds per capsule is given as 1300 (Salisbury, 1961) 1360 (McNaughton & Harper, 1960). The average seed number per plant is quoted as 14,500 to 19,500 (Salisbury, 1961), 10,000 to 60,000 (Long, 1938). Seed ripens and is shed 3-4 weeks after flowering. The seed is quickly shed from pores round the cap of the seed capsule.

Common poppy seeds are highly dormant when shed (Holm *et al.*, 1977). In freshly ripened seeds the embryos are underdeveloped and physiologically dormant, and would not germinate in light or darkness at a range of alternating temperatures. Light,

even a short flash, was needed for germination to occur at other than a very low level in seed exhumed after burial in soil (Milberg & Andersson, 1997). Dormancy was lost during 12 weeks burial in moist soil at alternating temperatures of 15/5, 20/10 and 25/15°C (Baskin *et al.*, 2002). After 12 weeks burial at 25/15°C, seeds germinated 100% in the light at 25/15°C. Seeds of common poppy seeds not only require high temperatures to lose dormancy, they also need to be imbibed. Dormancy was not broken in seeds stored dry for 12 weeks at room temperature. Seed scarification did not improve germination (Holm *et al.*, 1977).

Poppy seedlings emerge in autumn in autumn cereals and in spring in spring cereals (McNaughton & Harper, 1964). Frost may kill newly germinated seedlings. Seeds of common poppy sown in closed communities such as woodland or grassland failed to establish. Most seedlings emerge from February to April with a secondary flush in August-October (Holm *et al.*, 1977).

Seed sown in pans of field soil emerged from summer through autumn and into winter (Brenchley & Warington, 1930). Seeds showed long periods of dormancy. Seed sown in 7.5 cm layers of soil in cylinders sunk in the field and stirred periodically, emerged in spring and autumn (Roberts & Boddrell, 1984). There were peaks in March-April and September-October but the main emergence was in spring unlike the other poppies. Seedling numbers declined over the 5 year study but some seeds were still viable after 5 years in cultivated soil.

In the field, 94% of seedlings emerged from the surface 2 cm of a sandy soil and 100% from the top 3 cm (Chancellor, 1964). In a sandy loam soil, field seedlings emerged from the top 25 mm of soil with most coming from the top 15 mm (Unpublished information). Seed sown in soil at different depths, cultivated and not in pots and boxes out in the field did not emerge when sown at 25 mm cultivated or not, when left on the soil surface or when buried at 75 mm and cultivated in February (Froud-Williams *et al.*, 1984). There was some emergence in autumn when seeds sown at 75 mm were cultivated in June. In a second experiment, a few surface sown seeds emerged in the spring of the first year and in the spring and summer of year 2 after cultivation. Seed sown at 50 mm also emerged in low numbers at this time after cultivation in year 2. The optimum depth of emergence was 5-10 mm and the maximum was 20 mm.

### **Persistence and Spread:**

Soil seedbank numbers for common poppy of between 2.5 and 20 million seeds/ha have been recorded in vegetable fields in the UK (Holm *et al.*, 1977). Seeds have a half-life of 11 years in undisturbed grassland. The decline of seeds broadcast onto the soil surface and then ploughed to 20 cm or flexible tine cultivated to 10-15 cm was followed over a 6 year period of cropping with winter or spring wheat grown as commercial crops. The experiment was made on a clay and a silty loam soil. Every effort was made to prevent further seed return to the soil. Common poppy had a mean annual decline rate of 9% and an estimated time to 95% decline of 17-50+ years (Lutman *et al.*, 2002). Seedbank decline was studied in a succession of autumn sown crops (winter wheat and W. OSR) in fields ploughed annually for 3-4 years with seed return prevented (Wilson & Lawson, 1992). Time to 99% decline was estimated at

8.7 years, the annual rate of loss was 35%, and the annual seedling emergence represented 1.5% of the soil seedbank.

Seeds are shaken from ripe capsules by the wind, travelling up to 3 m initially (Long, 1938). The seeds are small enough to be further wind dispersed. Seeds germinate in spring.

Seedlings have been raised from bird excreta (Salisbury, 1961).

### **Management**

Where seeding has occurred, spring germination should be encouraged by keeping seed at or near the soil surface (Long, 1938). Harrowing in dry weather will destroy seedlings. Growing a root crop may help to reduce overwhelming populations. Control is by ensuring only clean crop seed is sown.

Fallowing decreases seedbank numbers (Holm et al., 1977). Seed numbers in soil showed a gradual reduction during a 1 or 2 year fallowing resulting in a 50% reduction after 2 years (Brenchley & Warington, 1933). The land was ploughed, disked and harrowed during this period. The prolonged dormancy of the seed prevented a greater reduction. During cropping with winter wheat for the same period there was a small reduction in seed numbers initially but numbers then remained stable. Fallowing every 5<sup>th</sup> year over a 15 year period reduced seed numbers progressively by 40% in the first fallow year, 75% in the second and over 90% in the 3<sup>rd</sup> fallow year. There appeared to be little recovery in seed numbers in the intervening years cropped with winter cereals (Brenchley & Warington, 1945).

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