

**The biology and non-chemical control of broad-leaved dock
(*Rumex obtusifolius* L.) and curled dock (*R. crispus* L.)**

W Bond & RJ Turner

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

Summary

The two main weedy dock species are the broad-leaved dock (*Rumex obtusifolius*) and the curled dock (*Rumex crispus*). They are common throughout the UK both as the true species and as hybrids. First generation hybrids produce little seed but may be more vigorous than the parents. Natural backcrossing with the parents has produced plants with a range of intermediate characters and higher seed viability. These hybrids may occupy whole fields.

Docks reproduce from seed and by vegetative regeneration of the underground organs. Curled dock can produce up to 40,000 seeds per plant, broad-leaved dock up to 60,000. There are differences in the germination response of seeds produced from different plants, from different panicles on the same plant and from different parts of the same panicle. The seeds vary in size, seed-coat thickness and dormancy status and therefore respond differently to external factors, contributing to the opportunist ability of docks. Dock seed numbers in soil have been estimated at 5 million per acre. The seeds are capable of surviving in undisturbed soil for 50+ years.

Viable seeds have developed on stems cut down just 2-6 days after flowering and left heaped in the field. Seeds that developed from inflorescences cut down and left in the field at the 'milk stage' around 14-18 days after flowering were 100% viable. Defoliated plants that continued to flower or flowered on later emerging stems had seeds with thinner coats that germinated more readily than normal seed.

The seeds are often shed around the parent plant but may be carried by animals, on harvesting machinery and in water. The main method of long distance dispersal is as a contaminant in seed, animal feed, straw and manure. The seeds can pass through cattle unharmed and will survive for several weeks in manure.

Dock seeds can survive long periods of immersion in cattle slurry unless it is aerated. Survival in pig slurry is shorter especially when aerated. Seed viability in silage is low particularly when fermentation is improved. Sewage sludge requires treatment at relatively high temperatures to destroy viability completely.

The seeds can germinate any time that conditions are favourable but the main flushes of emergence are in March-April and July-October. Germination and seedling emergence is greater when seed is left on the soil surface but is inhibited by a leafy canopy of vegetation. Seedlings often emerge in open areas of arable crops and in pasture where the turf has been damaged.

In pasture and established crops vegetative reproduction is more important than seed. The underground parts of a dock consist of a vertical stem and a branched tap-root with a transition zone between them. The underground stem may reach 5 cm in length and is kept below ground by root contraction. There is considerable confusion

about the ability of docks to regenerate from their underground organs. Some authors maintain that true roots do not regenerate and only the stem and transition zone can regenerate. Others insist that all parts will form new shoots if detached from the parent. At present it is 'generally agreed' that only the upper 7.5 cm of the underground parts of broad-leaved dock and upper 4 cm of those of curled dock will regenerate. Dock plants that have been uprooted can regenerate if left on the soil surface even following a period of dry weather. A broad-leaved dock seedling takes 40 days from emergence to develop a rootstock that will regenerate after decapitation, a curled dock takes 50 days.

In pasture, plants of broad-leaved dock can be very long lived, forming compound crowns with multiple tap-roots. Curled dock often dies after flowering but will persist if repeatedly cut down. Mowing has little effect on established docks but will prevent seeding. In a pasture heavily infested with docks the best option may be to plough and reseed with grass but not immediately. The docks are likely to regenerate both vegetatively and from seed and a period of fallowing or arable cropping may help to reduce re-establishment of the docks.

In grassland, the presence of docks is associated with uneven application of slurry or manure that leaves bare patches. The openness of a sward after cutting for silage is also linked with dock establishment. Poor grass management leading to overgrazing and poaching also allow dock seedlings to emerge and grow. Soils high in nitrogen or low in potassium are also said to favour docks.

Docks are grazed off by cattle, sheep, goats and deer but not by horses. It may be that horses should be put to graze with cattle or sheep to prevent a build-up of docks. There are some who would argue that docks in grassland contribute to the herbage and do not need to be controlled. Docks provide valuable minerals to the diet and in cattle may prevent bloat. In the USA, studies of the forage quality of curled dock have shown that at early vegetative stages it is of comparable quality to cultivated forages but the quality and palatability rapidly declines as the plants mature.

In arable land and elsewhere it is important to prevent the introduction of dock seed in straw, seed, manure, slurry and on machinery. In combinable crops the aim should be to collect up dock seed shed during the harvesting operation and denature this before disposal. A range of ploughing and other mechanical cultivations are and have been used to reduce dock numbers in arable crops. A series of operations is more effective rather than a one-off treatment that allows rapid regrowth. Timing is also important.

Biological control of docks is being investigated. A number of native insects and fungi attack docks but at the levels that these are found in nature none is likely to have a dramatic effect on dock populations.