

Dock Management: a Review of Science and Farmer Approaches

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ABSTRACT

This participatory project began in 2002 and has adopted a new approach to weed management in which farmers, researchers and other organic stakeholders identify, prioritise, trial and develop solutions to weed problems. Organic farmers were asked 'What are your main weed management problems?' and over 60% (n=152) responded that docks caused them the greatest concern. The aim is to collate published literature and other information on dock control and to document current farmer management practice. Over fifty farmer weed-management interviews have been undertaken and written into case study information from different farming systems. This paper gives a summary of the scientific knowledge and outlines current farming practice from surveyed farmers in relation to dock management.

SUMMARY OF SCIENCE KNOWLEDGE

The two main 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. The hybrids produce less seed but may be more vigorous than the parents. Docks reproduce from seed and by vegetative regeneration of the underground organs. Dock seedlings are poor competitors and in standing vegetation can only establish in open or disturbed patches. 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.

It is reported that a single plant can produce up to 60,000 seeds that may become viable from the milk stage onwards. Viable seeds can develop on stems cut down just a few days after flowering. Intact plants can shed seed from late summer through to winter but the seeds may require a short after-ripening period before being ready to germinate.

Dock seed numbers in soil have been estimated at over 12 million per hectare. The seeds are capable of surviving in undisturbed soil for 50+ years. The seeds can germinate any time that conditions are favourable but the main flushes of emergence are in March-April and July-October. 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. The seeds are often shed around the parent plant but may be carried by animals, on 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. They can also survive long periods of immersion in slurry that is not aerated. Treatment temperatures for sewage sludge may not be high enough to kill dock seeds. Seed viability is low in silage where additives are used to aid fermentation.

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 9 cm of the underground parts of broad-leaved dock and upper 4 cm of those of curled dock will regenerate. Uprooted dock plants can regenerate if left on the soil surface even following a period of dry weather. A dock seedling takes 40 days from emergence to develop a rootstock that will regenerate after decapitation.

Docks are grazed off by cattle, sheep, goats and deer, but not by horses. It may be that cattle or sheep should be put to graze with horses to prevent a build-up of docks. 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 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 dock seed shed during the harvesting operation and denature this before disposal. Biological control of docks is being investigated. A number of native insects and fungi attack docks but none is likely to have a dramatic effect on dock populations at the levels at which these are found in nature.

SUMMARY OF FARMER INTERVIEWS

The following information summarizes comments from 52 farmers in England and Wales interviewed between April and September 2003.

Attitude to docks

A few farmers were very pragmatic about docks, felt they did not need to take any specific action and just accepted that they had to live with this weed in their system. Most had very strong negative feelings towards docks and, although very aware of the benefits of a diverse weed flora, thought of this weed as an exception and would prefer a zero tolerance policy. Many farmers were very impressed with the dock as a weed and its amazing resilience. Some commented on the positive benefits it could offer in herbage, e.g. enhancing selenium or zinc supply to livestock.

What encourages docks in your system?

Farmers have found when reseeding grassland that docks have germinated in quantity. Any form of poaching which opens up the land has provided sites for dock germination and growth; cutting up of the ground by horses has also been problematic. Dock patches have developed along hedge lines, fences, gateways, below trees (where it is difficult to mow) and where cattle shelter. Patches have also been noted to spread on compacted ground. Some farmers have correlated spreading dirty water on to fields has increased the problem. Open stored water has been a potential receptacle for wind blown dock seed. Some farmers have noticed patches around cattle feeder units and water troughs.

Many feel their farms have historic dock problems that have been suppressed during conventional farming and are now re-appearing. They also feel that seeds blown in from

surrounding fields and roadsides have increased the seedbank. Inappropriate or untimely cultivations were thought to have spread established docks.

What is your strategy for dock management?

Take no action

Several farmers had been surprised that in fields which had been covered with seeding docks, in the following year there had not been a real problem. Their conclusion was that if docks were left undisturbed there was a natural population fluctuation and not an exponential increase in population. In grassland it was felt that as the ley established and became more competitive the dock problem would diminish as the grass out-competed them.

Cultural controls

The policy of most farmers was to stop docks seeding and reduce the vigour of the plants they already had. Thus, attempts would be made to harvest arable crops before dock seed matured. In weedy fields a silage cut would be taken rather than making hay. If hay was taken from a weedy field then attempts were made to feed the hay back to stock only on those fields that already had a problem. The necessity to ensure that well cleaned seed was used was commented on, some farmers saving and cleaning their own seed.

If possible, established leys were not ploughed up, to avoid germinating new docks. Many farmers felt docks had spread from hedges and headland. Some now employed strict policies to keep field boundaries clean by mowing next to hedges or even establishing Stewardship strips which could be easily managed (although some commented on problems with Countryside Stewardship Schemes in organic systems: mowing field margins only after 15th July was too late to prevent weeds seeding).

Many farmers thought about their rotation and crops specifically in terms of dock management and were constantly thinking about when opportunities could be created to control docks, whether this was with suppressive cover crops, use of stock or direct mechanical action.

Direct action

In grassland systems the main control policy was integrated topping and grazing. These systems had the least options for control, particularly permanent systems where there was no cropping break in which to employ mechanical cultivation.

All farmers used some method of topping in grassland, typically to 10 cm sward height at least once in the growing season. It was commented that topping just encouraged a lower level of dock seeding down the stem. Some farmers felt topping was gradually reducing the vigour of their dock patches, whilst others thought they were just maintaining the same level. Some farmers specifically cut the dock patches in a field to give the grass a chance to out-compete the weed.

Sheep were felt to be more useful for dock management than cattle. Some farmers commented they used dry cows for mopping up docks. There was a range of methods to integrate topping and grazing, and grazing with different stock, e.g. fields grazed alternate years with cattle and sheep, or grazed one year then cut for hay the next. With cattle and sheep, cattle would graze first and sheep would be grazed tighter afterwards. Some farmers thought intensive grazing when docks were young stopped the spread. Some swards have been tightly grazed in spring with non-productive sheep to keep docks down.

Farmers with an arable phase used below-ground cultivations for dock management, often using bastard fallows and cultivation to desiccate the dock roots. The broad strategies are outlined below;

- On newly established docks: plough, cultivate several times with decreasing size of spring tines to bring roots up to desiccate, rake off with a heavy duty harrow. Drill a suppressive crop, e.g. red clover.
- Break ley early e.g. June, use heavy ducksfoot wide bladed tines (e.g. Terradisc) to 7-10 cm depth (needs to be done at end of ley so docks are held in position and machine can slice cleanly through). Could use a heavy duty rotovator. Leave roots to desiccate, follow up with a cultivator to rake and dry roots out. Plough everything down and sow a cereal. If still a problem take a Terradisc through again, or a heavy duty cultivator, then plough down and maybe another pass before sowing suppressive crop, e.g. field beans.
- On well established docks, rotovate to 10 cm to cut off crowns, disk and harrow.
- Plough in summer, rotovate at 2-week intervals to gradually deeper depths 5 cm, 8 cm, 12 cm. Sow winter cereal, e.g. triticale.
- After a winter cereal rotovate the top 5 cm before sowing a catch crop. Then plough in the spring.
- Leave overwinter cereal stubble, cultivate for 6 weeks in spring with rotovator (2/3 passes) with tines rather than blades. Sow quick growing suppressive crop e.g. fodder rape or stubble turnip in late spring. In autumn graze, reseed, then tightly graze.
- Use sub-soiler after ploughing in compacted areas in spring which aids dock control.

A farmer with heavy land did comment that rotovation had not worked on their clay soil, and regardless of how much cultivation was undertaken dock roots never fully dried out and were able to regenerate.

Many farmers were still using some form of manual dock removal with spades, adapted forks or specialist hand-held dock removal tools. This was done when the ground was soft, e.g. in establishing leys or in cereal crops. This was felt to be the most cost-effective technique but time consuming, expensive and damaging to the backs of staff. One farmer used the forks of his lifter close together to dig out docks to a depth of about 60 cm. If there is not time for complete removal farmers will strim docks before seeding as an intermediate measure.

One biodynamic farmer was using a weed pepper to treat infested fields. Dock seed ash was potentized in a biodynamic preparation with water, this was then spread over the entire field in a thin covering applied with a hand held sprayer or spread with a dairy brush. The intention was to reduce the vigour of existing docks with repeated application. Some farmers commented on seeing rust on leaves and also beetles eating the dock leaves. Few felt this was reducing dock vigour significantly and none knew how to encourage the rust or insects, but all were keen to investigate the potential biocontrol agents.

No farmer thought they had all the answers to dock management and all were very keen to support and participate in the research project.

(A fully referenced science review is available on request from the authors and further information from www.organicweeds.org.uk).