

Organic Weed Management Project OF0315  
**Organic Weed Management Open Day**  
**Dock Management in Organic Arable Systems**  
12<sup>th</sup> May at Abbey Home Farm/Down Farm

## Summary of the day

### Outline

- Background of the weeds project explained
- Overview of knowledge gathered on docks presented together with initial results of dock management trials, information including dock species, dock growth habits, viability of seed, regeneration of cut roots. Outline of on-going monitoring trials and biological control research presented.
- Farm walks with discussions held at both Abbey Home and Down Farm
- Dock management lessons learned include; use as many different techniques as possible to tackle docks over seasons, animals can have a large impact in dock management programmes (positive and negative), records and notes of farm operations (including weather conditions) can be important to learn what works best. Some practical research avenues were suggested to build on ongoing research.
- Future open days confirmed, Organic weed management at Duchy College - 21st September a joint Open Day with Duchy College Organic Studies Centre, Stakeholder Day at HDRA - 8<sup>th</sup> December.

### Action Points

- If you have any comments on the report of the day please send them to us and we will incorporate them into the report.
- Researchers need to investigate how long dock roots can remain viable when left buried, also need to evaluate survival times under more realistic conditions (i.e. outside with rain etc.), investigate the role of apical dominance in roots.
- Everybody try and keep records of dock control operations along lines noted in report
- Farmers need to return survey forms on dock beetle, allelopathy and minimum tillage.
- Put DEFRA logo and links on front page of website

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## Notes from the day

### Aims of the Day

The aims of the day were to stimulate discussion on dock management in predominantly organic arable systems, discuss progress in the organic weed management project and to summarise the on-going research work of the project as specifically relates to dock management. Notes were taken during the talks and these are presented in a summary form as a record of the day below. Whilst they are as accurate a summary as possible we recognise that we might not have captured all details and we intend that they should be used for recollection and as a source of ideas.

### Talks

An overview of the project was given and progress briefly outlined. Details are available at [www.organicweeds.org.uk](http://www.organicweeds.org.uk).

Current on-going work on dock management was presented in a summary form, which is outlined below:

- a fully referenced review of dock management has been produced (*available on [www.organicweeds.org.uk](http://www.organicweeds.org.uk) website*)
- farmer case studies have documented current management methods (*see website*)
- existing farmer management strategies are being evaluated (*see trial 1 on website at [http://www.hdra.org.uk/organicweeds/farmer\\_trials/show\\_project.php?id=1](http://www.hdra.org.uk/organicweeds/farmer_trials/show_project.php?id=1)*)
- farmer open days to discuss docks have been organised
- farmer led trials are underway this year (*see trial numbers 1, 2 and 9 on website at [http://www.hdra.org.uk/organicweeds/farmer\\_trials/projects.php?id=0](http://www.hdra.org.uk/organicweeds/farmer_trials/projects.php?id=0)*)
- dock physiology trials are on-going in the glasshouse and field (see below for details).
- the potential for biological control with dock beetle *Gastrophysa viridula* is being investigated (*current results available on the website at [http://www.hdra.org.uk/organicweeds/farmer\\_trials/show\\_project\\_results.php?id=9](http://www.hdra.org.uk/organicweeds/farmer_trials/show_project_results.php?id=9)*)

Dock Physiology trials have indicated that:

Species:

- two main species common; broad-leaved dock (*Rumex obtusifolius*) and curled dock (*Rumex crispus*). Hybrids between the two are common

Physiology:

- reproduce by seed (e.g. new habitat) and vegetatively (e.g. grassland) and by a mixture of methods in cultivated land
- they develop by secondary taproot development and fragmentation
- one plant can produce 60,000 seed, viable from milk stage (14-18 days after flowering) onwards
- can germinate at any time but peaks March-April, July-Oct

- germination of broadleaved and curly dock high (90+%) within 3 months and lower (30%) with hybrids
- seed viable in soil for 50+ years
- seeds will develop on cut stems
- main dispersal methods, in seed, feed, manure or straw
- seeds pass through cattle unharmed will survive in manure and un-aerated slurry
- low viability in silage with additives for fermentation
- favoured by high N, and low K

#### Regeneration:

- 40 days from emergence to develop a root stock capable of regenerating
- generally agreed upper 7.5 cm of broad-leaved and upper 4 cm of curled will regenerate
- broad-leaved docks tend to be long-lived, curled may die after flowering but will persist if cut
- in trials on average 88% of roots dug from all depths (0-15 cm) regenerated, all plant regeneration was from the root collar, 95% of the roots had generated root hairs, Of fragments left buried, one site has so far produced 40% regeneration at 1 cm depths and 30% regeneration at 5 cm depths, the other site has produced 60% regeneration at 1 cm depths. Roots potted up after 1 weeks drying have shown 15% regeneration at one site, 20% from the other, there has been no regeneration from the 4 or 8 week dried roots yet

#### Biological Control and Dock Beetle Survey:

- 28 replies so far (1 arable, 20 livestock, 4 mixed, 3 horticultural farms).
- 18 had seen the beetle, 10 hadn't seen it.
- 14 said it occurred every year and 3 that it didn't. Seen from April – October especially prevalent in June, July, August, September.
- 15 replies judged that it causes significant damage to docks as compared to 2 that didn't. (Of these) 6 said it did damage all over the farm and 11 that it was present in patches.
- The beetle was associated with older/ mature pasture and conservation land (4), reseeded areas (1), verges ( 1), some remarked that there seemed to be more beetle in hot dry weather and also in polytunnels (2).
- Ideas for encouraging beetle: in field margins, help beetle get going at start of season, moving beetles from patches to new areas, breeding beetles and releasing, helping it to overwinter
- Other remarks include: docks still form seed even when attacked or only weakens plant, not many in horticultural patches (ground disturbance?)

### **Farm Walk around Abbey Home Farm**

Abbey Home Farm has 635 ha split between cereals and leys, 120 dairy and 75 beef cattle, 500 ewes, 15 sows, 460 hens and 6 ha of vegetables, fields were previously 5-year set aside and the farm has been organic since 1991. During the walk five fields were visited in which dock management was discussed

In the first field (South Way), the arable phase has started with spring wheat. For 5 years prior to this, it was a herbal mixture including species like birdsfoot trefoil and sheeps parsley. No docks were apparent in the field but docks present in field margins. Sheep were grazed on the field, which was also used for silage.

In the second field (Downs), triticale had been sown mid October 2003, the area is fairly clear of docks. Prior to triticale, was wheat and sheep grazing. Uses a terradisc for dock control. Its main effect is on docks, an even depth is achieved while moving soil across the surface, tends to slice everything. Used after pasture, stubble, leave from harvest to the following spring, Costs £7.50/ac to go through, 2 passes necessary. The discs' on the back of the machine pull roots onto surface, moves them along but doesn't chop them up. 370 hp needed to pull machine. 1.5m, 3m or 5m widths are available, does a good job. On the pasture land, 1 pass carried out in July. Then important to plough all back down, don't leave roots on surface?

In the third field (Downs Bank), spring wheat had been sown in an arable rotation, wheat, beans, turnips. The wheat in this field had been drilled at a wide row spacing. Some docks evident and roots on surface of field. Beans failed due to too much competition from docks and couch. Turnips - sheep used to graze off docks and couch over winter. Harvest was left until winter, then sheep put on. 2 passes with terradisc left dock roots everywhere on surface, not dead, but they were easy to pick up by hand with a bag and then burnt. Employment found in Cirencester. Fields can be raked off with an Einbock but difficulties arise at headlands.

The fourth field (Coneygars) had more docks and was currently being used for pigs and sheep grazing. History was lucerne for four years, prior to that, white clover ley. Then used for forage, then winter wheat, followed by spring wheat, which gave a good yield (2.7 tonnes). Winter beans did not establish very well and were ploughed in, problems started after spring wheat was undersown with a grass ley which led to docks. Tried to remove by digging, but this was a big job, with the result four years later of lots of docks. Currently about 2-3 docks per sq m in the field but with denser patches (e.g. opposite the gates). Had a initial sheep graze, pigs have been on land since Jan, these are beginning on the docks, they eat the roots as well, but sometimes don't eat the leaves. Sheep grazing is a useful defoliation tool in docks and an area tightly grazed by sheep had less visible docks. Docks were also not apparent in the pigpen areas. Pigs in with vegetables are quite good too. After the stock are removed they will use rotovator/terrardisc to clean up, especially rotovating the parts where the stock aren't.

The fifth field (Ferns) is one year on from pigs, grass / clover ley, short cut rotation, no moisture, oversown now (spring). G/C ley sown into terrardisc surface, firmly slices docks off. Stubble clean, good weed strike, 2 passes with terrardisc. Rotovated alleyways between pig enclosures, an improvisation to control docks although at this stage they can be dug up if there are not too many.

General discussing points during the farm walk included:

- A year on year management strategy should use different methods and approaches, as this is more likely to be effective in reducing the population. Learning to live with them to some extent is important.
- Topping Regimes: always top regularly to stop seeding. If keep chopping off, seeds become less viable. However this can cause the dock to develop a shorter stalk and/or grow sideways instead if they are cut regularly once a week (they adapt to the regime). In this case you should vary topping frequency to stop this effect.
- Power harrow can cause docks to multiply. However it brings the roots to the surface enabling them to be picked up, no need for Einbock rake/digging. Roots can't grow if surface is hard (rolling and dry weather might be important here).

- Using a rotovator for docks in pasture can also have a definite effect. Method is slow as it hits stones and wears out equipment.
- Silage increases docks (explanation not recorded, any ideas?).
- Undersown crops can cause less regeneration through competition but might need to be dealt with after harvest.
- Docks can become concentrated in compacted areas (e.g. under trees where cows take shelter) and feeding areas. Nitrogen higher and seeds tend to be deposited in one place so docks tend to increase or become concentrated in specific areas.
- A high concentration of docks is necessary before a significant yield decrease occurs. Some work has shown, 1 dock per 4 sq m has an effect on grass production though this needs to be developed further to produce useful guidelines?
- Benefits of docks – can bring up trace elements from deep in the soil and are said to reduce bloat in cattle. Dairy cows, build up of oxalic acid in docks makes them unpalatable at 28 days in pasture. Oxalic acid is a chemical defence and there is probably a play off between establishment and the cost of chemical defence? If leave sheep in long enough, they eat will docks but better on smaller plants. Alternative grazing each year or combination grazing.
- Competition – dock seedlings are poor competitors and generally out competed by other plants. Generally not shade tolerant and takes a time (40 days or so) to develop viable roots (that can regenerate). Cover crops such as red clover should be able to out compete? Various combinations of crop and undersowings might be used to exploit this weakness in docks.

### **Farm Walk around Down Farm**

Down Farm has 364 ha split between cereals and leys, 450 dairy cows in two herds, 300 beef cattle and 170 polo horses to accommodate. Various fields were visited on the farm walk and dock management discussed in four of them.

East Red Lodge: field in second year of cereal phase of rotation after four years in grass; had been ploughed, disced twice, power harrowed and put down to spring wheat and rolled. After harvest it had been rotavated twice, ploughed, power harrowed and then sown with winter barley and rolled. Docks were still evident in the crop (about 1.8 per sq m) and this had not changed markedly in the two years in which the crop had been monitored. Docks worse in some parts of the field.

West Red Lodge: also in second year of cereal phase of rotation after four year in grass; had received the same treatment and crops as the previous field. Slightly less docks in this field (about 1 per sq m). In both fields the crop was getting above the docks and cereal yield will not be unduly affected by the presence of docks. Will be important to deal with docks at harvest as they will start developing. Quite a few docks present in field margins in both fields. All types of dock (broadleaved, curly and hybrids) were present in both fields.

South Spinney: currently in arable phase of rotation after four years of grass; had peas then shallow subsoil before being ploughed and heavily cultivated. The dock roots were then extensively dragged with spring tynes (six or more times) and pulled off the field with an Einbock. The field was also rogued and spring tyned twice before spring barley was sown and the field lightly rolled. There were a lot of dock roots on the surface and some docks appeared to be regenerating from some depth in the soil, however the field was relatively free of docks at this time (monitoring in previous year had indicated up to two docks per sq m).

Tynnings Ten: currently in grass; the field had been in grass for four years, rotavated and cropped with peas before being ploughed and spring tynes used to pull the docks about (five times) being rolled and sown to spring barley. After using an Einbock grass seed was spun on (Spira PRG, Fennema PRG, Pernille RF, Organic Foxtrot PRG, Organic Lasso PRG, Sobra SSMG) and the field rolled. Grass currently full of docks at around 3 per sq m with all types of dock present (broadleaved, curly and hybrids)

General discussion points on docks include:

- Horses are an integral part of the farm operation (120 polo horses – several groups of these rotated around). Horses don't eat docks – and high level of poaching probably reduces beetle numbers. Suggestion of grazing with sheep but difficult as horses need grazing over winter and management of the two animal types might be difficult to integrate. Docks seem to be a problem in permanent pasture.
- Rotovating worked quite well in some cases and not in others, depending on the depth. The spring wheat was harvested, rotovated and then left a couple of weeks then rotovated again and this left quite a lot of docks. Suggestion that one rotavation and then spring tines might be more effective?
- Arable crop phase used to control docks, spring tines moved roots and then picked up roots – successful in getting docks out but can compact soil badly, will be put down to grass. Constant movement of the soil will deplete soil N and cereals suffer as a consequence (e.g. spring wheat ½ tonne an acre after horses).
- Grass seed should be clean – guaranteed clear to prevent introducing docks. Apparently should check as some thought they'd had dock seed in clover seed.
- Question as to what effect do docks have on good silage.
- Takes a whole summer of bastard fallowing after breaking ley to manage docks.
- Where docks present in pasture it is at least necessary to flail top weeds above level of grass and remove weed seeds.

### **Lessons Learnt**

A brief session was held at the end of the farms walks over a cup of tea to reflect on the day. Points arising included:

- use as many techniques as possible in your approach to dock management
- don't just leave chopped docks on the surface
- knowledge of dock physiology is useful and further work needs to be done under more realistic conditions (outside in rain) and on viability after burial
- still need to concentrate on top of dock, if cutting docks need to determine viability of root in horizontal position
- don't rotavate twice, cultivate at right depth once and then stir the docks around
- animals can have positive and negative effects on dock management (e.g. sheep can be useful, tac sheep fenced to 4yds of edge on red clover in autumn produced high clover at edge where sheep did not graze and low productivity in the field, no horses)
- keep accurate records of what has been done, counts can be useful, weather conditions (e.g. very dry last autumn) can also be important and should be noted, take photos from same spot
- value of fallows to manage problem, but needs to be balanced with N loss
- old system plough (x3)→ rape→ lambs corn, with a serious dock problem fallow→ and then take out one field at a time

- row crops present more opportunities to remove docks including outcompeting them by undersowing
- farm walks good way sharing knowledge, also farming press can be useful

**Other suggestions arising:**

- put DEFRA link back on front page of website and project number (OF0315)
- leave docks in and then dig up after so long
- dry out with summer and rain effect on roots?
- thistles, work on different aspects – Farmers Weekly. Summary.
- Afternoon / Evenings – go to places and do talks e.g. Hereford discussion groups and promote project.

**Forthcoming activities**

- Duchy College Organic Studies Centre – 21<sup>st</sup> September 2004
- Stakeholder Day – 8 December 2004

Gareth Davies, Becky Turner, Heather Moore, Niall Lusby  
HDRA, 13 May 2004