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Control of Docks through Electrophysical Destruction

Interim report

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Background

Docks (*Rumex* spp.), particularly broad-leaved (*Rumex obtusifolius*) and curled dock (*Rumex crispus*) and their hybrids, are a major problem in Welsh grassland systems. Infestation can reduce grass yields and utilisation through competition for light, moisture and nutrients. They have rapid growth potential and a high fecundity rate, particularly in high nutrient situations. Docks are less palatable than grass and can also reduce silage quality. Docks have only 65% of the feed value of grass. The use of herbicide sprays to control docks can have a negative effect on clover in pasture (as there are very few clover-safe options available) and implications for the wider catchment ecosystem if used incorrectly.

The aim of this project is to evaluate innovative new technology which can potentially be used to control docks in grassland systems in Wales. The RootWave Pro machine will be utilised over a period of two growing seasons (within specific trialling months) to control docks by electrophysical destruction on two dairy farms in Monmouthshire which are suffering from dock infestation. Electrical treatments (Table 1) will be compared to conventional herbicide applications and an untreated control area. The dairy farms tend to have high nutrient status and reducing nitrogen inputs (lower nutrient status can assist in reducing dock populations) on the fields is not feasible.

The experimental treatments are:

Table 1. Proposed treatment list

Treatment no.	Treatment
T1	Electrical treatment once in spring
T2	Electrical treatment twice (2 nd treatment <i>ideally 3-4 weeks after the first timing, to be decided depending on the growing season, weed infestation level and practicality</i>)
T3	Electrical treatment three times, (3 rd treatment <i>3-4 weeks after 2nd treatment timing</i>)
T4	A conventional herbicide programme*
T5	A combination of electrical treatment (once) and conventional herbicides
T6	No intervention (untreated control area)

The conventional herbicide should be applied when the docks are at the correct growth stage of a rosette of 150-200mm wide. If applied too early they will be less effective.

The treatments will include three replications and plot size of 2m x 6m.

Summary of Project - Year 1

The trials were located on two locations in Wales. Argoed Farm and Llwynceilyn farm, Raglan, Monmouthshire. Suitable fields with a high populations of docks were identified and field plots were marked out in early May 2019.

1. Treatments

All treatments were successfully applied by on the dates listed in Table 2 below.

Table 2. Treatment timings

Treatment no.	Treatment description	Date of application
T1	Electrical treatment x 1	20/05/19
T2	Electrical treatment 1 + 2 (4 weeks apart)	20/05/19 + 18/06/19
T3	Electrical treatment 1 + 2 + 3 (at T1, T2 and a further 2-4 weeks after)	20/05/19 + 18/06/19 +15/07/19
T4	Conventional herbicides (at T2)	20/05/19
T5	Electrical treatment x1 (T1) + Conventional herbicides (at T2)	20/05/19 + 18/06/19
T6	Untreated control	n/a

1.1 Herbicide application

The herbicide (Doxstar Pro (fluroxypyr + triclopyr)) in T4 and T5 was applied @ 2.0 l/ha using a knapsack sprayer and 2m hand-held boom on 20 May 2019 by ADAS.

1.2 Electrical treatments

All electrical treatments were applied by trained staff from RootWave. The RootWave Pro machine uses a generator and hand-held lance with a long (~20m) cable. Each dock plant in a plot was touched with the charged lance for approximately 5-10 seconds before moving on to the next plant.



Electrical weeder (generator and lance of the 'RootWave Pro machine').



Trial plots marked out



Electrical treatment in progress

2. Assessments

All plots were assessed for percentage dock cover pre- and post treatment. These assessments occurred at the following timings:

- Pre-treatment (the morning of treatment)
- 1 week after treatment (WAT)
- 2 WAT
- 4 WAT

Photos were taken at each assessment, along with a record of the dock growth stages and any other symptoms.

Both field sites continued with their normal grazing or topping regimes and these were recorded.

3. Results

The results for the final assessment on 30 July 2019 are summarised below as a mean of all replicate plots per treatment (

Figure 1).

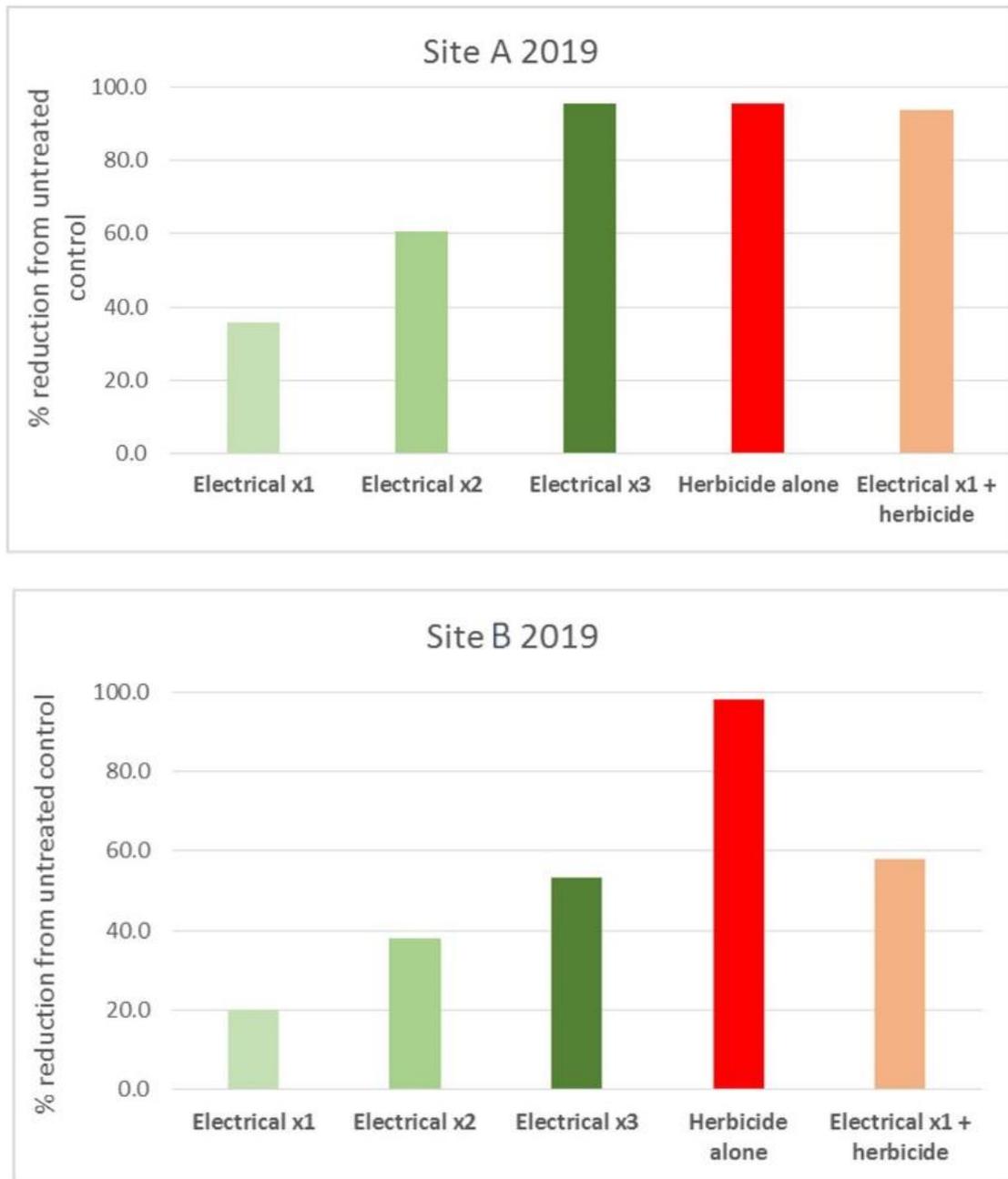


Figure 1. Results summary (final assessment 30/07/19)

The results from trial year one are showing that one electrical treatment is relatively ineffective in terms of controlling the docks. Repeat electrical treatments prove more

effective but there is significant differences between the two sites. Repeating treatments in season two may however show a different picture.

The herbicide treatment was effective in controlling the docks on both field sites. On one site it was equally as effective as three electrical treatments, however on the other site it was much more effective than the three electrical treatment. This is likely to be due to the weed growth stage at treatment, as the herbicides require an actively growing plant that is not too small or large, so getting the application timing correct for optimal uptake is very important.

The herbicide used was not clover safe, so it killed any clover in the grass sward. This is viewed as a negative effect to the farmer as they require the clover for fertility and ley quality.

4. Conclusions (End of Year 1)

Contractors have worked well together to implement the trial methodology. Initial technical problem with the RootWave meant that the initial treatment was delayed several weeks in spring 2019, but once trials began they were maintained on target.

Farmers have worked well with the contractors who have provided ongoing mentoring to the group. The project steering group met at the trial site on 25 September 2019 to discuss the results from year one and planning for year two. Based on the findings from Year 1, it has been agreed that the 1st year's trial will continue into Year 2. However the initial treatment will take place earlier in the spring 2020 and follow up treatments will be carried out after a longer break. It was felt that docks had not recovered sufficiently within a few weeks to warrant a follow up treatment.

Options to trial treatment against 'clover-safe' herbicides will also be considered. Soil nutrient status (including SMN) will also be ascertained to allow a comparison between sites.