Controlling broad-leaved dock (*Rumex obtusifolius*) in grass clover mixtures

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Abstract

This article describes three experiments on the control of broad-leaved dock. Experiment 1: Dock seeds were ensiled in grass silages of different dry matter percentages; 23, 34 and 60% respectively. All silages showed a decline of seed vitality in time. Grass clover with dock seeds should be ensiled at a low dry matter percentage or remain in the silage bin for a longer period than 8 weeks. Experiment 2: In a potassium fertilisation trial on grass clover the development of dock was followed. After two years of potassium fertilisation, the number of dock and the root mass was not significant different between the fertilised and the unfertilised plots. It is concluded that potassium fertilisation at a low potassium status does not positively influence the dock development. Experiment 3: In a resown grass clover, dock seedlings were cut at three frequencies; 2, 4 and 6 weeks. After 3 months the number of seedlings had decreased the same in all treatments. However the root biomass of the seedlings was significantly affected. It is concluded that frequent cutting has a negative effect on root biomass but should be practised for a longer period than 12 weeks to have an effect on seedling numbers.

Keywords: broad-leaved dock, grass clover, silage, potassium fertilisation, cutting frequency.

Introduction

For organic dairy farmers in the Netherlands the control of broad-leaved dock in grass clover is a major problem. Research on broad-leaved dock control focuses on three major topics; 1) controlling of the seed dispersion on the farm, 2) controlling docks in a permanent pasture and the control of docks at the time of reseeding a pasture (Van Eekeren and Jansonius, 2005). This article describes three experiments, covering facets of these major topics:
Experiment 1: Importation of seed on a farm via silage from natural grasslands looks one of the sources through which infestation of a farm with docks takes place. The objective of this research is to test the vitality of seeds in grass silage with different dry matter percentages.
Experiment 2: Soil potassium concentrations has a positive effect on number of docks (Humpreys *et al.*, 1999). With a low potassium status, potassium fertilisation has a positive effect on grass clover development. The objective of this research is to see the effect of potassium fertilisation on dock development.
Experiment 3: Once a resown grass clover ley is established young dock seedlings are difficult to cope with. Cutting frequency has been shown to have effect on first year dock plants in a grass clover mixture in pots (Humpreys *et al.*, 1999). The objective of this trial was to study the effect of cutting frequency on dock seedlings under field conditions.

Material and methods

Experiment 1: Dock seeds were ensiled in pots with wilted grass of three different dry matter percentages. The vitality of ensiled seeds was measured each 2 weeks for 8 weeks, on basis of a tetrazolium test (Hampton and TeKrony, 1995).
Experiment 2: In an ongoing potassium fertilisation trial on grass clover, number of adult broad leaved dock plants were counted in June 2005. The fertilisation trial which started in 2003 is situated on a sandy soil, in a block design with 4 repetitions. Phosphate status of soil is high and potassium status of soil is low. The treatments in which dock plants were counted received either 0 kg K_2O per ha $^{-1}$ or 480

kg K_2O per ha $^{-1}$ on a yearly base. No other fertilizer was applied. Plots are cut 4 to 5 times per year. Besides number of plants the root biomass from 10 adult plants per plot was determined.
Experiment 3: In April 2004 a cutting trial was established on a resown grass clover, heavily infested with broad-leaved dock seedlings. Three cutting frequencies were practised; 2, 4 and 6 weeks interval. Plots size was 1.5 m x 5 m, layed-out in a randomised block design in 5 repetitions. The treatments lasted for 12 weeks. Before each harvest and after 24 weeks the number of seedlings were counted. After 12 weeks the root biomass of 10 plants per plot was determined.

Results and discussion

Experiment 1: The vitality of seeds decreased significantly over time ($p<0,001$) (see Figure 1). The dry matter percentage of the silage had a significant effect on the vitality of the seeds ($p=0,004$). Even the silage with the highest dry matter (60% dry matter) showed a decline of seed vitality within 8 weeks after ensiling (Figure 1). Research carried out in Austria showed also a decrease of the germination percentage in silages with a dry matter percentages of 18 and 35% dry matter. However the germination percentages in a dryer silage (47% dry matter) remained stable (Pötsch, 2000).

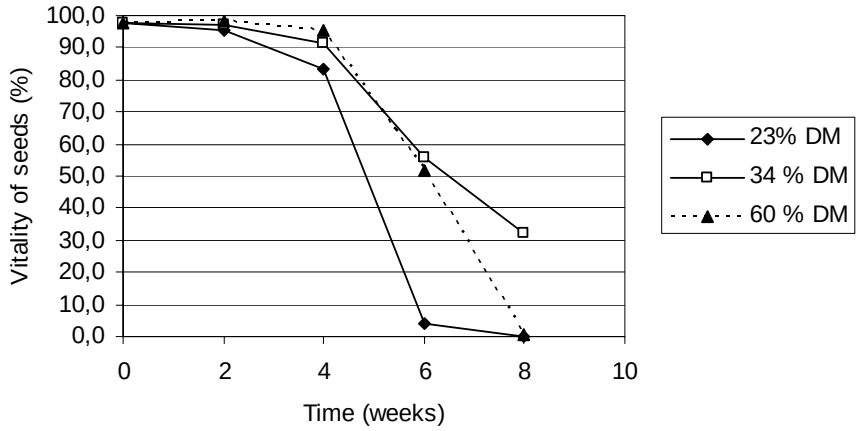

Figure 1. Development of dock seeds vitality in silage with different dry matter percentages.

Experiment 2: Fertilisation on grass clover gave a higher clover percentage and total dry matter production. The number and the root mass of adult broad leaved dock plants on the plots with potassium fertilisation is lower but differences are not significant due to variation within the plots (Table 1). Humpreys *et al.* (1999) found a positive effect of soil potassium concentration on the number of broad leaved dock plants. In the described experiment with a low soil potassium status, potassium fertilisation did not have an effect on the number of docks or root biomass.

Table 1. Number of dock plants and root mass under two potassium fertiliser rates.

Fertilisation	No. of adult plants m^{-2}	Root mass G DM per plant
0 kg K_2O per ha $^{-1}$	0.81 (ns)	87.1 (ns)
480 kg K_2O per ha $^{-1}$	0.46 (ns)	66.2 (ns)

Experiment 3: The number of seedlings decreased steadily during the trial period but no difference between the treatments was observed (Figure 2). However, an increased cutting frequency had a significant ($p=0,004$) diminishing effect on the root mass after 12 weeks of treatments; 0.40 g DM per plant at 2 weeks cutting interval, 0.62 g DM per plant at 4 weeks interval and 0.97 g DM per plant at 6

weeks interval. Again this did not affect the number of plants after 25 weeks. Apparently frequent cutting to control broad leaved dock seedlings has to be continued for a longer period. To make this practical for farmers this would probably mean continues grazing with young stock.

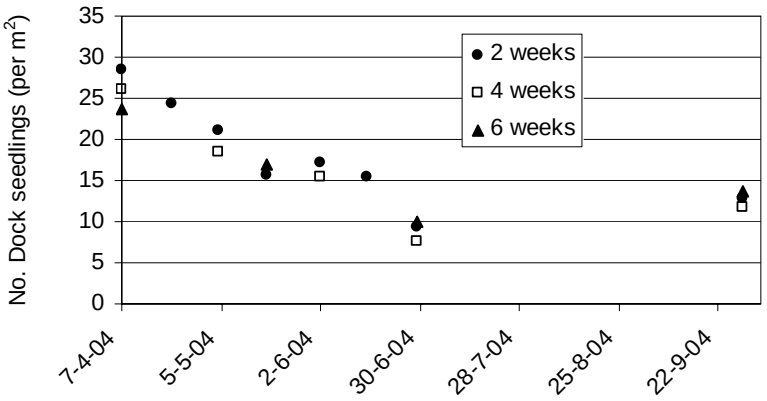

Figure 2. Development of number of dock seedlings under 3 cutting frequencies.

Conclusions

Grass clover with dock seeds should be ensiled at a low dry matter percentage or remain in the silage bin for a longer timer than 8 weeks. Potassium fertilisation at a low potassium status does not positively influence the dock development. Frequent cutting has a negative effect on root biomass but should be practised for a longer period than 12 weeks to influence the number of seedlings.

References

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