

# Can *Equisetum palustre* L. be combatted using electrical weed control?

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## Abstract

Marsh horsetail (*Equisetum palustre* L.) is harmful to livestock and it increases in grassland when fertilisation is reduced. The combination of being a toxic feed and having few options to reduce its population brings challenges, especially for organic dairy farming. In a field trial on grassland with marsh horsetail infestation, electrical weed control (Zasso Xpower) was compared to no control of marsh horsetail and aboveground control using a chain harrow. Three replicates were placed in a field with high infestation and three in low infestation. Before treatments were applied, ground cover of marsh horsetail was between 8 and 15% in the high infestation plots and between 0.5 and 4% in the low infestation plots. Chain harrowing showed an initial reduction between 17 and 21%, while electrical control showed a reduction between 42 and 94%. Although initial reduction through electrical control was promising, in the next year marsh horsetail levels returned to that of the control treatment. The reduction through use of the chain harrow was not significant. Therefore, we conclude that a Zasso Xpower, as a single application, to control of marsh horsetail did not result in the desired level of reduction in the longer term. More frequent applications could provide a desirable effect.

**Keywords:** grassland, herbicide, semi-natural

## Introduction

Marsh horsetail (*Equisetum palustre* L.) is harmful to livestock when grazed and is known to increase its population in grassland when fertilisation is reduced (Müller *et al.*, 2020). In grassland with a high level of fertilisation it is unable to compete with surrounding grasses (Borg, 1971). Especially in grassland with a high groundwater table marsh horsetail is able to spread more quickly. Grasslands with marsh horsetail with contents of 5% or more cause issues for livestock. Therefore, it is of great importance to be able to reduce its content in the field without sacrificing yield (Hünsche, 2010). Besides draining and fertilisation there are few known methods to combat marsh horsetail (Mukula, 1963). Only rolling of grasslands is known to reduce marsh horsetail after frequent application (Timmermans *et al.*, 2016). The goal of this research is to study the effect of Electrical weed control (EWC) to combat Marsh horsetail in grassland. EWC could be a potential method to control marsh horsetail as the grass itself is not affected by the electricity (C. Thijssen, personal communication).

## Materials and methods

In order to test its effectiveness in a semi-natural grassland with an existing marsh horsetail infestation, electrical weed control (Zasso Xpower) was compared with no control of marsh horsetail, and aboveground control using a chain harrow. The grassland used was a semi-natural grassland which had been managed this way for 15+ years. Three replicates were placed in a high infestation area and three in a low infestation area. All treatments were applied on 13 September 2021 in field area of 3m x 6m. Infestation of marsh horsetail was done by visual estimation by an expert on the basis of canopy cover and expressed in %. This is based on an estimation of standing aboveground biomass. Visual estimations were done one week before application of treatments and one, two, three, five and 35 weeks after.

## Results and discussion

In the week before applications of the treatments there was no significant difference in the plots to which the treatments were applied. Marsh horsetail infestation ranged between 8 and 15% in the high infestation plots and between 0.5 and 4% in the low infestation plots. After application of the treatments a decline in marsh horsetail biomass was observed in both the electrical and chain harrow treatments. Use of the chain harrow resulted in a relative reduction of 21 and 17% in the high and low infestation respectively, as observed three weeks after application. In the same period EWC resulted in a relative reduction of 90 and 42% in the high and low infestation respectively. At 36 weeks after application there was only a significant difference between the chain harrow and the EWC observed in the high infestation (Table 1). No significant difference between the control treatment and the EWC was observed in both high and low infestation levels at 36 weeks after treatment. Therefore, one application of EWC for the control of marsh horsetail cannot be considered effective in the longer term. However, the results in the short term suggest the method is able to provide some control over marsh horsetail. It could possibly be effective when combined with other treatments or as multiple applications of EWC. Some drawbacks of this method are the cost per hectare, the possible reduction in other species in grasslands and a possible reduction in grass growth. The application of EWC can be considered effective in term of reducing the aboveground biomass and would therefore be suitable for reducing the harmfulness for livestock.

Table 1. Effect of electric weed control (EWC) treatments on amount of marsh horsetail (% aboveground cover).<sup>1</sup>

Treatment	Before treatment	1 week after	2 weeks after	3 weeks after	5 weeks after	36 weeks after
Absolute infestation high						
Control	10.7	11.3 <sup>a</sup>	11.3 <sup>a</sup>	11.3 <sup>a</sup>	13.0 <sup>a</sup>	13.3 <sup>ab</sup>
Chain	11.7	11.0 <sup>a</sup>	11.0 <sup>a</sup>	9.3 <sup>a</sup>	18.3 <sup>b</sup>	18.0 <sup>a</sup>
EWC	9.3	0.2 <sup>b</sup>	0.2 <sup>b</sup>	1.0 <sup>b</sup>	3.7 <sup>c</sup>	10.0 <sup>b</sup>
<i>P</i> -value	0.698	0.013	0.013	0.007	<0.001	0.012
Absolute infestation low						
Control	2.7	2.7	2.7 <sup>a</sup>	3.0 <sup>a</sup>	6.7	5.3
Chain	2.7	2.3	2.3 <sup>ab</sup>	2.3 <sup>ab</sup>	6.3	5.0
EWC	1.2	0.2	0.0 <sup>b</sup>	0.5 <sup>b</sup>	2.3	2.7
<i>P</i> -value	0.241	0.056	0.030	0.023	0.080	0.165

<sup>1</sup> Treatments were applied on 13 September 2021. Different superscript letters denote significant difference between treatments within measurement moment and infestation level.

## Conclusions

Although EWC of marsh horsetail seemed to work in the short term there was no evidence for longer term control. Therefore it is not a viable option for the organic control of marsh horsetail using one application. A further possibility would be a repeated application.

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