

Effect of fungal endophyte infection in the grass *Festuca rubra* on germination and growth of four legume species

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INTRODUCTION

Festuca rubra is a perennial grass, very persistent and tolerant in a wide range of ecological conditions. It is frequent in natural grasslands with complex floristic composition, and it is included in mixtures for dry soils, mountain areas and extensive use with other grasses and with legumes.



In Mediterranean grasslands from Western Spain (Dehesas), a high percentage of *F. rubra* plants are asymptotically infected by the fungal endophyte *Epichloë festucae*.

Competitive advantage of endophyte-infected grasses over their non-endophytic congeners: endophyte-infected plants are more resistant to abiotic stress factors such as drought, heavy metal accumulations and nutrient deficiency, as well as more resistant to invertebrate herbivores due to the alkaloid production. This may affect to the growth of companion species in mixtures.



OBJECTIVE

To determine the effect of *Festuca rubra* plants, infected and non-infected by *E. festucae* endophyte, on the germination and seedling growth of four legume species (*Trifolium pratense*, *Trifolium repens*, *Trifolium subterraneum* and *Lotus corniculatus*).

MATERIALS AND METHODS

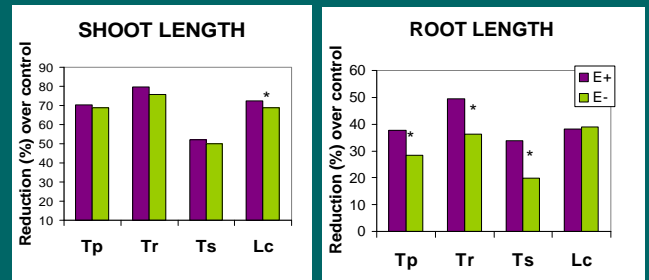


RESULTS AND DISCUSSION

Emergence of legume species when growing with *F. rubra* plants endophyte infected (E+) and non-infected (E-).

No differences between the effect of *F. rubra* plants E+ and E-.

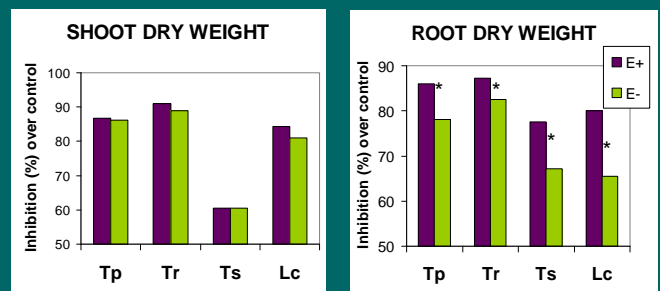
Reduction in length of legume species when growing with *F. rubra* plants infected (E+) and non-infected (E-).



Tp= *T. pratense*; Tr= *T. repens*; Ts= *T. subterraneum*; Lc= *L. corniculatus*
 * = significant differences between E+ and E- pair of means at P < 0.05 (n=20).

The presence of *F. rubra* plants decreased seedling length of the legumes. The inhibitory effect on the shoot length was stronger than on the root length. The reduction of the root length of *T. pratense*, *T. repens* and *T. subterraneum* species growing with E+ plants was significantly ($P < 0.05$) greater than when growing with E- plants.

Reduction in dry weight of legume species when growing with *F. rubra* plants endophyte infected (E+) and non-infected (E-).



Tp= *T. pratense*; Tr= *T. repens*; Ts= *T. subterraneum*; Lc= *L. corniculatus*
 * = significant differences between E+ and E- pair of means at P < 0.05 (n=20).

The decrease in shoot biomass was not significantly affected by the presence of *Epichloë* endophyte in *F. rubra* plants. However, the reduction in root length of the four legumes was significantly greater in presence of E+ than in presence of E- plants.

CONCLUSIONS

When growing with endophyte infected *F. rubra* plants, root length and root biomass of legumes was lower than when growing with non-infected plants. Therefore, fungal infection by *Epichloë festucae* increases competitiveness of *F. rubra*, mainly by a greater inhibition of root growth of companion legumes.