Alkaloid content variability in *Lolium perenne* infected with *Epichloë* endophytes in natural grasslands

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Introduction

Many grass species are in symbiosis with *Epichloë* fungal endophytes. Infected plants are known to contain several mycotoxins and three of these are particularly important in *Lolium perenne*:

- *Lolitrem B* is a tremorgenic compound responsible for ryegrass staggers, a toxic syndrome affecting mainly sheep.

- *Ergovaline* is an ergopeptine alkaloid causing various diseases in cattle, like fescue-foot and fescue toxicosis.

- *Peramine* is an alkaloid toxic for insects but not for mammals.

Objective: To analyse the variability in alkaloids content of a heterogeneous set of *Lolium perenne* plants from natural grasslands, infected with different morphotypes of *Epichloë* endophytes.

Materials and methods

- *Lolium perenne* plants were collected in six grasslands in West of Spain.

- Incidence of *Epichloë* fungal endophytes: 32-60% of plants.

- Some plants were infected by the stroma-forming endophyte *Epichloë typhina*.

- Asymptomatic *Epichloë* endophytes were classified into three morphotypes based in their morphological characteristics observed in PDA.

- Plants were transplanted to an experimental farm and maintained under natural conditions.

Results

Percentage of plants producing alkaloids according to the morphology of the endophyte:

Concentration of fungal alkaloids in *Lolium perenne* plants according to the morphology of the *Epichloë* endophyte and plant's origin:

The highest concentration of lolitrem B was detected in M3-infected plants and M2 had the highest peramine. Differences in the concentration of ergovaline among *Epichloë*-morphotypes were not statistically significant. These results show a strong influence of *Epichloë* morphotype on the concentration of alkaloids in *Lolium perenne* plants.

Variation of ergovaline and peramine followed a similar trend across the different plant populations, with highest concentrations in CR and LVA. These differences were related to occurrence of *Epichloë* morphotypes in the population, since the proportion of each morphotype was not equal in all the six grasslands. For instance, the highest concentration of peramine was found in the CR population where the proportion of M2-stroma types plants was the greatest.

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