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## Can we use heather to control worms in sheep in organic agriculture?

### RELACS partner 'Scotland's Rural College' (SRUC) explores the use of heather as an alternative for parasite control

Gastrointestinal Nematode (GIN) parasitism is the main health challenge small ruminants face with detrimental consequences on their health, welfare, and economic returns. Gastrointestinal parasite control is usually achieved with the use of anthelmintic drugs. Use of anthelmintics is strictly regulated in the organic sector. However, due to the global spread of anthelmintic resistance and their impact on the environment, the organic sector is seeking for non-chemical complements or alternatives. Examples of alternatives used by farmers include grazing management strategies, selective breeding for resistance and protein supplementation for improved productivity and immunity. The primary focus of our group is to investigate the anthelmintic efficacy of bioactive plants as an alternative for the control of GIN.

Bioactive plants contain plant secondary metabolites (PSM), which are compounds not essential for plant growth or reproduction, but they are thought to play a role in plant defences. One group of PSM are the condensed tannins and they have been associated with significant anthelmintic activity. The perennial shrub heather is rich in condensed tannins and is abundant across northern Europe.

The objective of our work was to quantify the anthelmintic efficacy of heather extracts (*Calluna vulgaris*/ *Erica cinerea*). This was achieved by performing a comparative analysis of extracts obtained from two heather species, collected in five different European countries across two seasons and tested against two GIN species.

#### Heather samples

*Calluna vulgaris* samples were collected in the UK (Scotland), Germany, Norway, Switzerland, and Spain, where a second heather species (*Erica cinerea*) was also collected. Extracts were tested against the egg hatching of the GIN species *Teladorsagia circumcincta* (abomasal) and *Trichostrongylus colubriformis* (intestinal).



Picture 1: Heather collection in the Pentlands, Scotland (Photo: Spiridoula Athanasiadou, SRUC)



Figure 1: Map of Europe showing countries where heather samples were collected



## Results and application

Our results show that heather extracts had a significant impact on egg hatching and the anthelmintic efficacy of the extracts varied as a function of season, country of origin and heather species. In addition, *T. circumcincta* eggs were more susceptible compared to *T. colubriformis*. Our results indicate that heather could be a contributor to parasite control management in small ruminants. The variation in efficacy may be explained by differences in environmental factors impacting heather growth, the presence and levels of condensed tannins, and their interactions with the parasite species. Demonstrating anthelmintic activity *in living animals* and identifying the sources of variation in anthelmintic efficacy is fundamental in optimising heather as a viable alternative in the control of GIN.



**Picture 2:** *Calluna vulgaris* sample collected in Spain (Photo: Francesca Shepherd, SRUC)

**Picture 3:** *Trichostrongylus colubriformis* egg hatching (Photo: Francesca Shepherd, SRUC)

## About this news story and RELACS

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**RELACS:** 'Replacement of Contentious Inputs in Organic Farming Systems' (RELACS) builds on results of previous research projects and takes far-advanced solutions forward. As a system approach to sustainable agriculture, organic farming aims to effectively manage ecological processes whilst lowering dependence on off-farm inputs. The RELACS partners will evaluate solutions to further reduce the use of external inputs and, if needed, develop and adopt cost-efficient and environmentally safe tools and technologies.

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