
PHENOLIC COMPOUNDS AS DUAL ACTORS ON PLANT-PLANT AND PLANT-INSECT INTERACTIONS

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Abstract

Plant ecologists exploring the secrets of plant secondary metabolism often explain its tremendous diversity by the critical need for the plants to defend themselves against a wide range of herbivores. Considering this diversity as a result of herbivory pressure has to be questioned in relation with rising evidences of pleiotropic roles of many of the secondary compounds at different ecosystem levels. Polyphenols appeared to be especially good candidates to unravel the complexity of the roles of such metabolites as they have become the most studied compounds both in plant defense and as allelopathic agents. Is it a coincidence? an artifact link to technical constraint? or does it tells us something about the interactions between anti herbivore and allelopathic processes, with further implications on ecosystem functioning ?

Illustrations of this dual role of phenolic compounds both in allelopathic and response to herbivory contexts will be presented through experiments concerning a cespitous and conservative Poaceae dominating subalpine grasslands in the Alps : *Festuca paniculata*. First, a semi-natural and realistic design has allowed to identify growth inhibitory activity of this species through the release of soluble compounds (including polyphenols). Second, concentrations of *Festuca* leaf phenolics were not modified by insect (grasshopper) herbivory, unlike in other grass species. But these polyphenols disappeared more rapidly from grazed senescent leaves when compared to intact leaves, and their abundance was correlated to the slowdown of *Festuca* litter decomposition observed under herbivore pressure.

Considering these results together encourage to reinforce efforts towards better descriptions of the different classes of polyphenols (phenolic acids, flavonoids, etc..) which have different responses when plants are submitted to herbivory pressure and could have contrasted allelopathic potentials. But it also stresses the need of adapted experimental designs favoring the coexistence and co-expression of both herbivory response and allelopathic activity.

Keywords: Phenolic compounds, allelopathy, herbivory, litter decomposition, *Festuca paniculata*.

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