Defensive strategies in *Pinus pinaster*: interprovenance variation in constitutive and induced allocation to chemical defences

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Maritime pine can respond to antagonistic interactions with herbivores and pathogens by producing a modified phenotype with increased resistance. That involves quantitative and qualitative changes in chemical defences in target pine tissues. It is known that both genotype and environmental factors such as resource availability may modulate those induced responses. Maritime pine harbour a large intraspecific variation in life history traits, however little is still known about across population variation in constitutive and induced allocation to chemical defences.

Here we studied the constitutive allocation to chemical defences in young pine trees and the inducibility of those defensive traits in response to real herbivory and to simulated damage signalling in ten population of this model Mediterranean pine species. We performed a greenhouse experiment growing Maritime pine juveniles belonging to the CLONAPIN® clonal collection (Serida, Asturias, Spain), consisting of 25 genotypes from each of 10 provenances covering the whole range of the species distribution, with 4 clonal copies per genotype. Clones were treated either with methyl jasmonate (MeJa), a phytohormone analogue involved in the damage signalling and production of defensive responses against chewing herbivores and necrotroph pathogens, or with the large pine weevil (*Hylobius abietis*, Coleoptera: Curculionidae – a conifer specialist chewing insect) in herbivory assays. We quantified pine defences (non-volatile resin and total polyphenolics) in stem and needles and the damage by the pine weevil.

There were significant differences among populations for both non-volatile resin and total phenolics, suggesting a genetic diversity background for defence production. Both MeJa and real herbivory significantly increased the concentration of non-volatile resin in stem and needles (15.1% and 22% for both tissues for MeJa, 14.7% and 6.8% for both tissues for real herbivory). Total phenolics content decreased significantly after MeJa application in stem and needles (19.2% and 9.1% respectively) and no effect was detected for herbivory in stem but a significant increase for needles was observed (7.7%). We found a large variation in defence production and in defensive capability against the herbivore among pine populations, and also in quantitative responses to MeJa application.

This study contributes to the understanding the role of chemical defences in herbivore-pine interactions and to the understanding of the structure of co-variation of plant defensive investment with other life history traits in local adaptation in the Mediterranean range. Further analysis should address possible geographical or climatic patterns in the divergences observed in the defensive capabilities and plasticity across populations.