

RESIN VESICLES IN *ABIES PINSAPO* SEEDS: CHARACTERIZATION AND EFFECT ON GERMINATION

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Seeds of some conifer species have resin vesicles in their coats (Kolotelo 1997). Different roles have been proposed for the liquid oleoresin contained in these cavities, such as protection of the seed against pathogens, pests and herbivores (Rubino et al. 2012; Lobo 2014; Kshatriya et al. 2018), protection of the embryo and megagametophyte from excessive drying (Gunia and Simak 1970), allelopathic effects (Dässler and Zentsch 1959; Keeling et al. 2018), and control of seed dormancy and germination (Kolotelo 2005).

In this work, the morphology, abundance and spatial distribution of resin vesicles were examined in seeds from five populations of *Abies pinsapo*, analyzing the chemical composition of resin samples by gas chromatography-mass spectrometry. The effect of resin on own seed germination was also evaluated, investigating the influence of its major constituent and the seed coat exudate.

Significant differences in the number of resin vesicles were found depending on the seeds origin, although no relevant variations were observed in their morphology and distribution. The resin from seed vesicles consisted of a complex mixture, rich in terpenes. Limonene was the major component in all populations. However, compounds present in smaller quantities showed a variable relative abundance depending on the population.

Damage of resin vesicles had a significant effect on seed germination. Injuring before germination drastically reduced the germination percentage, modifying the kinetics of the process. Seedling growth was also affected, with a significant decrease in root length and a total inhibition of shoot development. Vesicle damage prior to stratification totally inhibited the germination process. Incubation with limonene negatively affected germination and plantlet development, exhibiting a dose-dependent effect. However, the hydrophilic seed coat exudate did not exert a significant influence on the final germination percentage.

Key words: *Abies pinsapo*, germination, resin vesicle, terpenes, seed

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