Identifying allelopathic compounds emitted by *Pittosporum undulatum* in Eucalypt forests

Dalila Pasquini [1], Cecilia Brunetti [1,2], Francesco Ferrini [1] and Roslyn Gleadow [3]

1Department of Agriculture, Food, Environment and Forestry - University of Florence, Florence, Italy
2 Institute for Sustainable Plant Protection (IPSP), National Research Council of Italy (CNR), Sesto Fiorentino, Italy
3 School of Biological Science - Monash University, Melbourne, Victoria, Australia

Changing climatic conditions played a major role in plants evolution and could modify the composition, structure and functionality of native plant communities, favoring invasive species. Studies conducted in south-eastern Australia have reported *Pittosporum undulatum*, a native tree, to be an aggressive invader of *Eucalyptus* forests. We tested the hypothesis that its negative impact on floristic diversity is due to the release of allelopathic compounds inhibiting the germination and growth of other plants. Thus, we compared the germination of *Pittosporum undulatum*, *Eucalyptus ovata* and lettuce on different substrates. Seeds were watered with leachates made from fresh *P. undulatum* leaves, litter collected from underneath *P. undulatum* or *Eucalyptus trees,* or distilled water. *P. undulatum* seeds germinated more slowly than the other two species, however showed faster growth rates. E. *ovata* mortality rates seedlings were very high immediately after germination. While there were no significant treatment effects on germination rates, there were differences in morphology. The root system, in lettuce and *E. ovata*, was short and damaged when watered with fresh *P. undulatum* leaves extract.

Additionally, we investigated the possible emission of specific Biogenic Volatile Organic Compounds (BVOCs) which could have ecological functions or increase *P. undulatum* stress resistance. Using Solid Phase Microextraction (SPME) fibers, BVOCs were collected and analysed using Gas chromatography-mass spectrometry (GC-MS) to compare the emissions in eucalypt forests with and without *P. undulatum*. The main difference between the two sites was the higher D-limonene and α-pinene aerial concentration in *P. undulatum* infested sites.

Our results suggest that the high invasiveness of *P. undulatum* is mainly related to morphological and physiological characteristics rather than to allelopathic compounds emitted by this species. Additionally, the greater emission of D-limonene and α-pinene from *P. undulatum* compared to eucalypts could increase the resistance to abiotic stresses, such as drought or ozone.