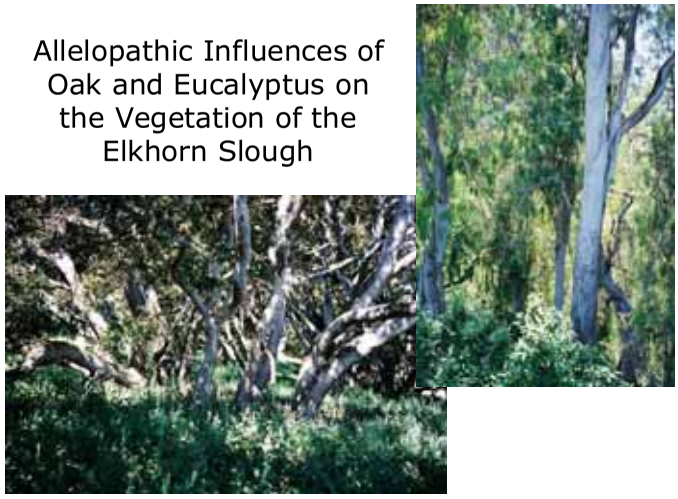
Allelopathy is an interference mechanism in which live or dead plant materials release chemicals which have a direct or indirect effect on herbivores, pathogens, and other plants.

Allelopathic Influences of Oak and Eucalyptus on the Vegetation of the Elkhorn Slough



How Does it Work?

Plant A:
Allelochemicals
present

Plant B:
Allelochemicals
absent

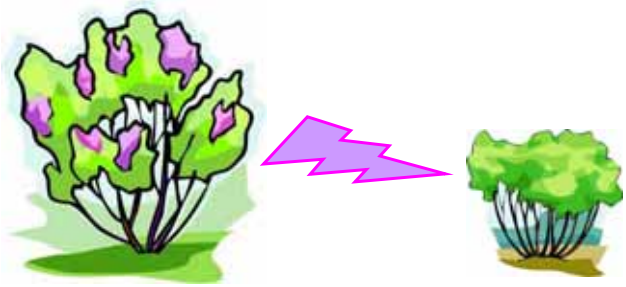
Plant chemical compounds

•Primary products: found in all plant cells, necessary for survival

•Secondary products: restricted in their distribution, both within the plant and among different species

•Includes alkaloids, phenolics, and terpenes

How Does it Work?



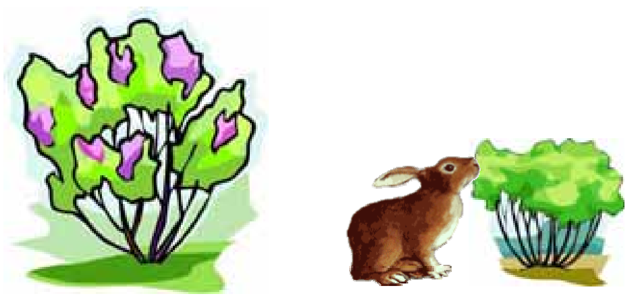
Plant A:
Allelochemicals
present

Plant B:
Allelochemicals
absent

Functions of secondary products

- Act as signals in response to environmental cues
- Provide protection against solar radiation
- Aid in pollen and seed dispersal
- Defense against herbivores, pathogens, and other plant competitors

How Does it Work?



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My research:

- Investigated the direct effect of allelochemicals derived from the leaf litter of *Quercus agrifolia* and *Eucalyptus globulus* on native and non-native understory plants
- Carried out a series of germination experiments, in which seeds were exposed to varying light intensity, substrate composition, and concentrations of leaf litter leachate

How Does it Work?

Plant A:
Allelochemicals
present

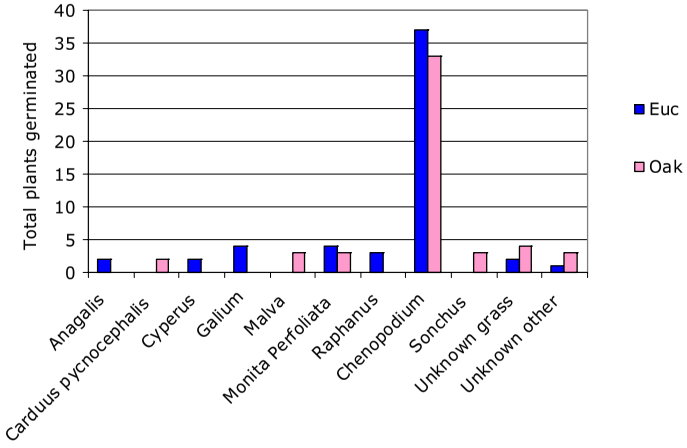
Plant B:
Allelochemicals
absent

The Growing Structure

Allelopathic compounds

- Oaks produce mostly tannins, which are a sub-group of phenolics
- Eucalyptus produce several compounds, mostly terpenes and phenolics

Seed bank composition



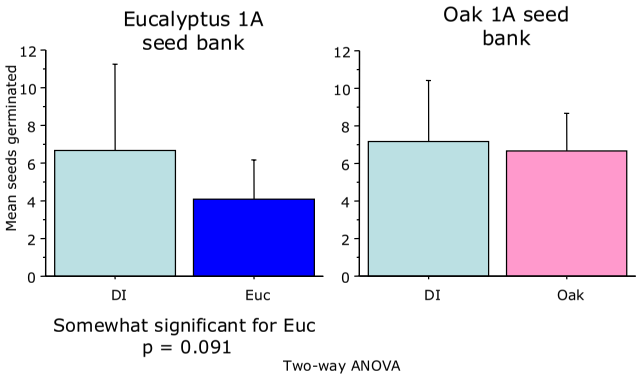
Seed bank comparison

Sax, 2002

- Showed similar species richness and diversity for oak and eucalyptus understory plants
- Majority of species sampled did not occur in both woodland types, with only 39% in common between the two

Sample collection

Seed bank results: Effect of same source leachate



Somewhat significant for Euc
p = 0.091

Two-way ANOVA

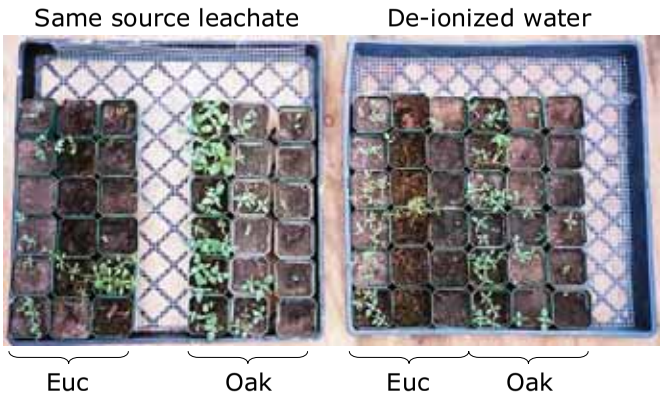
Leachate effects on seed bank

Leachate effects on indicator seeds

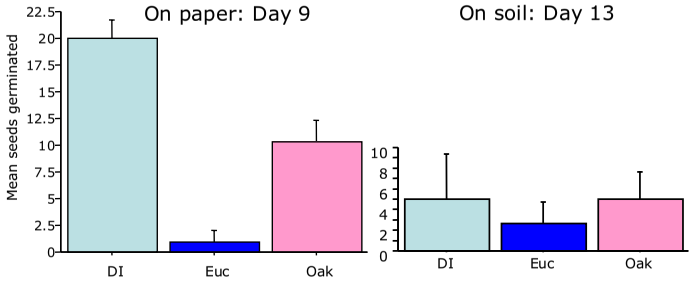
Drip method leachate extraction

Concentrated leachate extraction

Seed bank in 50% shade



Germination of Achillea millefolium

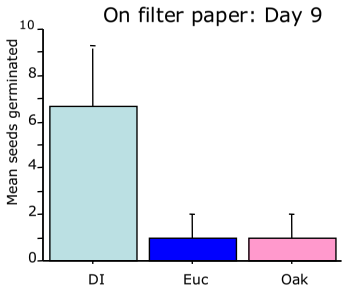


Significant for
Oak p = 0.0040
Euc p = <0.0001

Two-way ANOVA

Germination in Petri dishes

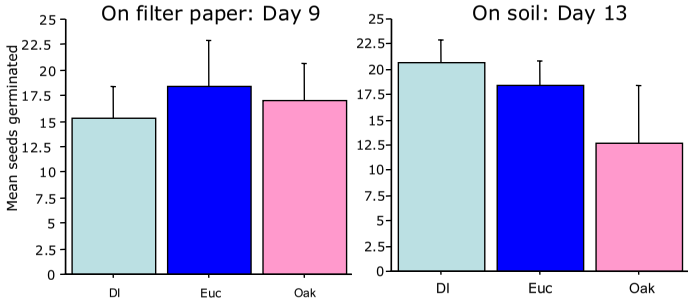
Germination of Mimulus aurantiacus



Significant for
Oak p = 0.0059
Euc p = 0.0059

Two-way ANOVA

Germination of Bromus maritimus



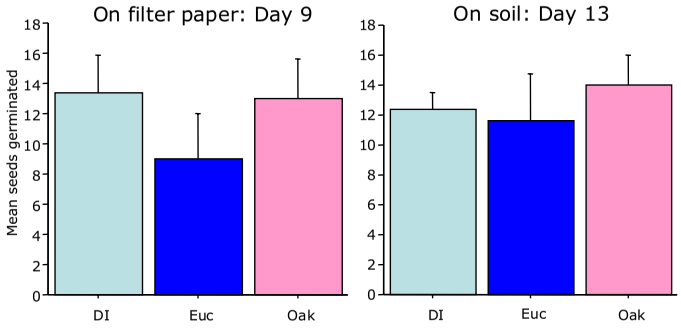
Significant for Oak
p = 0.043

Two-way ANOVA

Conclusions

- Seedbank composition: common dominants, and same level of diversity
- Eucalyptus and oak weakly suppress natural seed bank germination
- Different species have different responses to leachate exposure
- For some species, the soil may buffer the interference mechanism

Germination of Baccharis



Two-way ANOVA

Future questions

- Experiment with different understory plant species
- Manipulate the leachate concentrations
- Explore leachate chemical composition
- Assess and modify the light intensity
- Adjust the leaf litter thickness
- Consider a broader geographic scope

Special thanks to:

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ESNERR

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S & S Seeds, Inc.