

Innovative and sustainable solutions for agricultural problems could help controlling exotic plant invasions

Paula Lorenzo*, Helena Freitas and Susana Rodríguez-Echeverría

¹ CENTRE FOR FUNCTIONAL ECOLOGY - Science for People & the Planet (CFE), Department of Life Sciences, University of Coimbra, 3000-456 Coimbra, Portugal *E-mail: paulalorenzo@uc.pt



Management actions to prevent/minimize the impact of aggressive invasive species require new and viable long-term strategies. A recent idea consists on finding potential uses for plant residues derived from management actions as a way to partially recover invested funds while contributing to palliate other environmental problems, thus favoring a circular bioeconomy.

We focus our study on Acacia dealbata Link, which is considered the third worst invasive acacia species worldwide and it is expanding in Mediterranean areas, mainly in agroecosystems and abandoned arable lands. This species is a nitrogen-fixing tree with phytotoxic molecules that interfere with normal functioning of surrounding plants and soil microbes. The leguminous and phytotoxic traits make A. dealbata a potential source of new products for agriculture.

We are currently conducting a project to evaluate potential uses for the residues of this invader.

1. Potential herbicidal activity: phytotoxicity of chemical compounds extracted from leaves

Study carried out in collaboration with the Department of Organic Chemistry of University of Vigo (Dr. Luís Muñoz, Spain)





Chemical compounds from the aqueous fraction drastically reduced the radicle length of *L. sativa* in laboratory bioassays. Field studies are required.

5. Potential stimulating effect of chemical compounds extracted from bark

Allium cepa

2. Potential herbicidal activity: phytotoxicity of chemical compounds extracted from flowers

Effect of methyl cinnamate



In laboratory bioassays, methyl cinnamate inhibited the germination and radicle growth of *L. rigidimun*, a weed in T. aestivum crops. T. aestivum was not affected. Field studies are required.

> 3. Potential herbicidal activity: phytotoxicity of mulches and green manures





In a pot-greenhouse experiment with field soil, bark extracts increased the plant growth of onions under high saline conditions. However, the extract neither showed a stimulatory activity under moderate salinity nor under no saline conditions. Field studies are required.





4. Potential use of green manures as fertilizers



Zea mays

Misión Biologica de Galicia (Dr. Pedro Revilla, Dr. Lorena Álvarez-Iglesias, MBG-CSIC, Spain)

Flowers | Jonatan Rodríg

The greenhouse pot experiment with agricultural soil showed that Acacia residues incorporated into the soil for 4 or 6 months before maize sowing had the same effect than conventional fertilization for maize performance. A field study is planned.

