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## Sustainable weed management in wheat: exploring the allelopathic potential of different cultivars

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Allelopathy is the process by which plants release chemicals that modify the growth or development of other plants or organisms in their surroundings by releasing specialized metabolites (allelochemicals) through root exudation, leaching, volatilisation and decomposition of plant residues in the soil. Wheat (*Triticum aestivum*) has been shown to exhibit allelopathic potential that can be harnessed for weed management, particularly in organic farming systems. Both wheat crop residues and root exudates contain allelochemicals that can suppress the growth and development of weeds, including those that are resistant to herbicides. Different wheat varieties have varying allelopathic potential, indicating that allelopathic variety selection could be a useful strategy for integrated weed management and improving crop productivity. Several categories of allelochemicals have been identified for wheat allelopathy, including phenolic acids, hydroxamic acids, flavonoids, and short-chain fatty acids.

This study focuses on screening the allelopathic or competitive potential of four wheat cultivars, i.e.,

‘Maurizio’, ‘NS 40S’ ‘Adesso’ and ‘Element’, previously selected on the frame of the European project ECOBREED, on two weeds of interest due to acquired herbicide resistance, the dicot *Portulaca oleracea* L. and the monocot *Lolium rigidum* Gaud., through germination and growth bioassays and the identification and quantification of benzoxazinoids (BZXs) and polyphenols (phenolic acids and flavonoids). The different cultivars showed different ability to manage surrounding weeds, and different capacity to exude or accumulate specialized metabolites in the presence of those weeds. Moreover, each cultivar behaved differently depending on the weed present in the medium. The most efficient cultivar to manage the tested monocot and dicot weeds was Maurizio, as effectively induced a reduction in germination and growth of *L. rigidum* and *P. oleracea* while exuding large amounts of BZXs through the roots, especially the hydroxamic acids DIMBOA and DIBOA. However, NS 40S, Adesso and Element just showed potential to control the development just one of both weeds’ growth through allelopathy or competition.

### References

Wu H, Haig T, Pratley J et al. (2000). Distribution and exudation of allelochemicals in wheat *Triticum aestivum*. *Journal of Chemical Ecology*, Vol. 26, No. 9, 2141-2154

**Funding:** This project was funded by the European Union’s Horizon 2020 research and innovation programme under grant agreement No. 771367.



iberian  
**PLANT  
BIOLOGY**  
2023

Braga Portugal  
9-12 July

XVIII Portuguese  
Spanish Congress  
of Plant Biology

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**ISBN 978-989-33-4917-5**

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**Published:** July 2023