

[\(HTTPS://SCIFORUM.NET/\)](https://sciforum.net/)[MY SUBMISSIONS \(HTTPS://SCIFORUM.NET/DASHBOARD/AUTHOR/SUBMISSIONS\)](https://sciforum.net/dashboard/author/submissions)[\(HTTPS://SCIFORUM.NET/\)](https://sciforum.net/)[EVENTS \(HTTPS://SCIFORUM.NET/EVENTS\)](https://sciforum.net/events)[ABOUT](#)[CONTACT \(HTTPS://](https://sciforum.net/pages/contact)[SCIFORUM.NET/PAGES/CONTACT\)](https://sciforum.net/pages/contact)[MY SUBMISSIONS \(HTTPS://SCIFORUM.NET/DASHBOARD/AUTHOR/SUBMISSIONS\)](https://sciforum.net/dashboard/author/submissions)

Optimizing root exudate collection to enhance metabolomic analysis of neighboring plant interactions

Mattia Terzaghi (<https://sciprofiles.com/profile/947786>)¹, Biagia Musio (<https://sciprofiles.com/profile/1649268>)^{2,3}, Antonino Rizzuti (<https://sciprofiles.com/profile/1649269>)^{2,4}, Rosa Ragone (<https://sciprofiles.com/profile/3799224>)^{2,4}, Vito Gallo (<https://sciprofiles.com/profile/1132038>)^{2,4}, Domenico Cardinale⁵, Nikola Schlosserová⁵, Giorgio Perrella (<https://sciprofiles.com/profile/1062913>)⁶, Cecilia Lasorella (<https://sciprofiles.com/profile/2774494>)⁷, Gaetano Pazienza¹, Mario De Tullio (<https://sciprofiles.com/profile/681446>)⁷, Adriano Sofo (<https://sciprofiles.com/profile/43381>)^{*8}

¹ Department of Biosciences, Biotechnology and Environment, University of Bari Aldo Moro - Piazza Umberto I - 70121 Bari, Italy

² Department of Civil, Environmental, Land, Building Engineering and Chemistry (DICATECh), Polytechnic University of Bari, Via Orabona, 4, I-70125 Bari, Italy

³ Innovative Solutions S.r.l.—Spin-Off Company of the Polytechnic University of Bari, Zona H 150/B, I-70015 Noci (BA), Italy.eDepartment of Pharmacy – Pharmaceutical Sciences, University of Bari Aldo Moro, Bari, Italy

⁴ Innovative Solutions S.r.l.—Spin-Off Company of the Polytechnic University of Bari, Zona H 150/B, I-70015 Noci (BA), Italy

⁵ Department of Agricultural, Forestry, Food and Environmental Sciences, Università degli Studi della Basilicata, Viale dell'Ateneo Lucano 10, 85100 Potenza PZ, Italy

⁶ Department of Biosciences, University of Milan, Via Giovanni Celoria 26, 20133, Milan, Italy

⁷ Department of Earth and Environmental Sciences, University of Bari Aldo Moro - Piazza Umberto I - 70121 Bari Italy

⁸ Department of Agricultural, Forestry, Food and Environmental Sciences, Università degli Studi della Basilicata, Via dell'Ateneo Lucano 10, 85100 Potenza PZ, Italy

Academic Editor: Dilantha Fernando



Published: 31 March 2025 by MDPI in **Plants 2025: From Seeds to Food Security** (<https://sciforum.net/event/plants2025>), session **Emerging Technologies in Biotechnology and Molecular Research** (<https://sciforum.net/>)

[Bookmark](#)[Cite](#)[Additional options](#)

0 Reads

0 Recommendations

[event/Plants2025#sections\)](#)**Abstract:**

Plant roots release significant amounts of root exudates into the surrounding soil, shaping rhizosphere dynamics and mediating plant-soil interactions. These exudates include high-molecular-weight compounds such as proteins and mucilage, as well as a diverse array of low-molecular-weight compounds like primary metabolites (e.g., amino acids, sugars, carboxylates) and secondary metabolites (e.g., sorgoleone, flavonoids, coumarins). Understanding the composition and functions of these exudates is essential for elucidating mechanisms of plant-to-plant communication. However, the effects of environmental stressors, such as drought, on these interactions remain poorly understood, representing a critical knowledge gap for advancing crop resilience strategies.

In this study, we investigated root exudate secretion under controlled conditions, testing three sterilized substrates—river sand, glass beads, and epoxy-resin-coated sand. Additionally, we developed an innovative 3D-printed pot system that physically separates two root-growing environments while allowing unidirectional root communication. This setup enabled the evaluation of self and non-self interactions between the roots of *Solanum lycopersicum* L. and *Tagetes patula* L. Two irrigation methods were compared: nutrient solution recirculation and daily irrigation with discharge of percolating solution. To optimize exudate collection, we tested two eluents: distilled water and a methanol:water:formic acid mixture (50:49.9:0.1, v/v).

Our findings emphasize the importance of selecting appropriate substrates, eluents, and experimental setups for root exudate studies. These insights advance our understanding of crop resilience mechanisms, providing valuable tools for improving agricultural sustainability under climate change.

Funded by the European Union- Next Generation EU, Mission 4, Component 1, CUP C53D23003410006.

Keywords: Crop resilience; drought; growing substrates; root exudates; secondary metabolites.

Comments on this paper

Currently there are no comments available.

[Comment on this paper](#)

Average rating of this article (we haven't received any ratings yet, be the first one!)

[Rate this paper](#)



Authors




zaghi (<https://sciprofiles.com/profile/947786>)

 [Biagia Musio \(https://sciprofiles.com/profile/1649268\)](https://sciprofiles.com/profile/1649268)

 [Antonino Rizzuti \(https://sciprofiles.com/profile/1649269\)](https://sciprofiles.com/profile/1649269)

 [Rosa Ragone \(https://sciprofiles.com/profile/3799224\)](https://sciprofiles.com/profile/3799224)

 [Vito Gallo \(https://sciprofiles.com/profile/1132038\)](https://sciprofiles.com/profile/1132038)

Domenico Cardinale,

Nikola Schlosserová,

 [Giorgio Perrella \(https://sciprofiles.com/profile/1062913\)](https://sciprofiles.com/profile/1062913)

 [Cecilia Lasorella \(https://sciprofiles.com/profile/2774494\)](https://sciprofiles.com/profile/2774494)

Gaetano Pazienza,

 [Mario De Tullio \(https://sciprofiles.com/profile/681446\)](https://sciprofiles.com/profile/681446)

 [Adriano Sofo \(https://sciprofiles.com/profile/43381\)](https://sciprofiles.com/profile/43381)

Follow Sciforum

[LinkedIn \(https://www.linkedin.com/showcase/sciforum/\)](https://www.linkedin.com/showcase/sciforum/)

[Twitter \(https://twitter.com/sciforum\)](https://twitter.com/sciforum)

[Facebook \(https://www.facebook.com/mdpisciforum/info?tab=overview\)](https://www.facebook.com/mdpisciforum/info?tab=overview)

Further Information

[About Sciforum \(https://sciforum.net/pages/about\)](https://sciforum.net/pages/about)

[Services \(https://sciforum.net/pages/services\)](https://sciforum.net/pages/services)

[Sciforum Team \(https://sciforum.net/pages/team\)](https://sciforum.net/pages/team)

[Contact us \(https://sciforum.net/pages/contact\)](https://sciforum.net/pages/contact)

MDPI Initiatives


[MDPI Books \(https://www.mdpi.com/books\)](https://www.mdpi.com/books)


[Preprints.org \(https://www.preprints.org/\)](https://www.preprints.org/)

[Scilit \(https://www.scilit.com/\)](https://www.scilit.com/)

[SciProfiles \(https://sciprofiles.com/\)](https://sciprofiles.com/)

MDPI

 [encyclopedia \(https://encyclopedia.pub/\)](https://encyclopedia.pub/)

 [JAMS \(https://jams.pub/\)](https://jams.pub/)

[Proceedings Series \(https://www.mdpi.com/about/proceedings\)](https://www.mdpi.com/about/proceedings)



© 1996-2025 MDPI (Basel, Switzerland) unless otherwise stated

Disclaimer **Terms and Conditions** (<https://sciforum.net/pages/termsfuse>)

Privacy Policy (<https://sciforum.net/pages/privacy>)

