iberian PLANT BIOLOGY 2023

Braga Portugal
9-12 July

XVIII Portuguese Spanish Congress of Plant Biology

XXV Meeting of the Spanish Society of Plant Biology

BOOK OF ABSTRACTS

Portuguese Society of Plant Biology

Spanish Society of Plant Biology

ISBN 978-989-33-4917-5

Published: July 2023

PS8-7

Encapsulated salicylic acid induces stress tolerance on *Arabidopsis thaliana*

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Abiotic stresses are the main constrain caused by climate change, conditioning the quantity and quality of crop production. Stressed plants trigger several responses that alter their gene expression, metabolism, endogenous hormone levels and growth rate. The stress response involves a regulatory complex where signalling molecules such as receptors, regulatory factors and phytohormones interact. Salicylic acid (SA) induces plant responses and their acclimation to unfavorable conditions. In addition, its exogenous application in plants can revert the negative effects of stress, and these benefits can be enhanced by its encapsulation in different coating materials. To study the practical applications of SA encapsulation, Arabidopsis plants were treated with encapsulated or free SA (1 µM) and subjected to different abiotic stress conditions (saline and osmotic stress individually applied or combined with high temperatures). Plants were cultivated in vitro, either by sowing seeds directly into plates with the media treatments or by transferring the plants after 4 days of growth. Plants were treated with salt or mannitol at 10 mM and subjected or not to high temperature (30°C). Phytohormone endogenous content and phytohormone-related gene expression were analyzed, both in rosettes and in roots, together with plant morphological characteristics. Plants treated with the encapsulated hormone showed greater tolerance to abiotic stress, improving root length, rosette size and density of secondary roots compared to untreated and free SA-treated plants. Data also showed that SA interacts with auxins (IAA) to regulate plant tolerance. In this work, we highlight the powerful promoting effect of SA encapsulation to alleviate the negative effects of harsh environmental conditions. Furthermore, this study could be the basis for future stress experiments under real field cultivation conditions.

Acknowledgments

This work was supported by MCIN/AEI/10.13039/501100011033 and by the European Union Next Generation (TED2021-129795B-I00) and AGROALNEXT program, funded by MCIN, European Union Next Generation EU-PRTR-C17.I1- and Generalitat Valenciana (AGROALNEXT/2022/010). Funding was also obtained from Generalitat Valenciana through the programs CIAICO/2021/063 and GRISOLIAP/2020/043.

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Sampedro-Guerrero, J.; Vives-Peris, V.; Gomez-Cadenas, A.; Clausell-Terol, C. Improvement of Salicylic Acid Biological Effect through Its Encapsulation with Silica or Chitosan. *Int. J. Biol. Macromol*. 2022, 199, 108–120.

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UNIVERSITAT JAUME I

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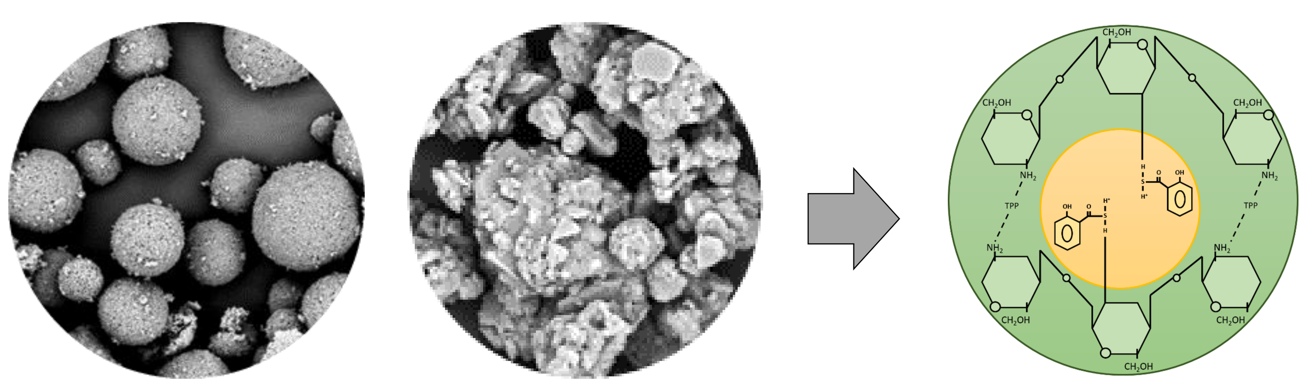
INTRODUCTION

Abiotic stresses are the major affection caused by climate change, influencing the quantity and quality of crop production. Plant stress response involves a regulatory complex in which signaling molecules, such as phytohormones, interact. Salicylic acid (SA) enhances plant responses and promotes their acclimatization to unfavorable conditions. The exogenous application of SA in stressed plants can mitigate the negative effects of stress, and these benefits can be further enhanced through its encapsulation in different coating materials, such as silica and chitosan.

Previous encapsulated SA samples, used in this work



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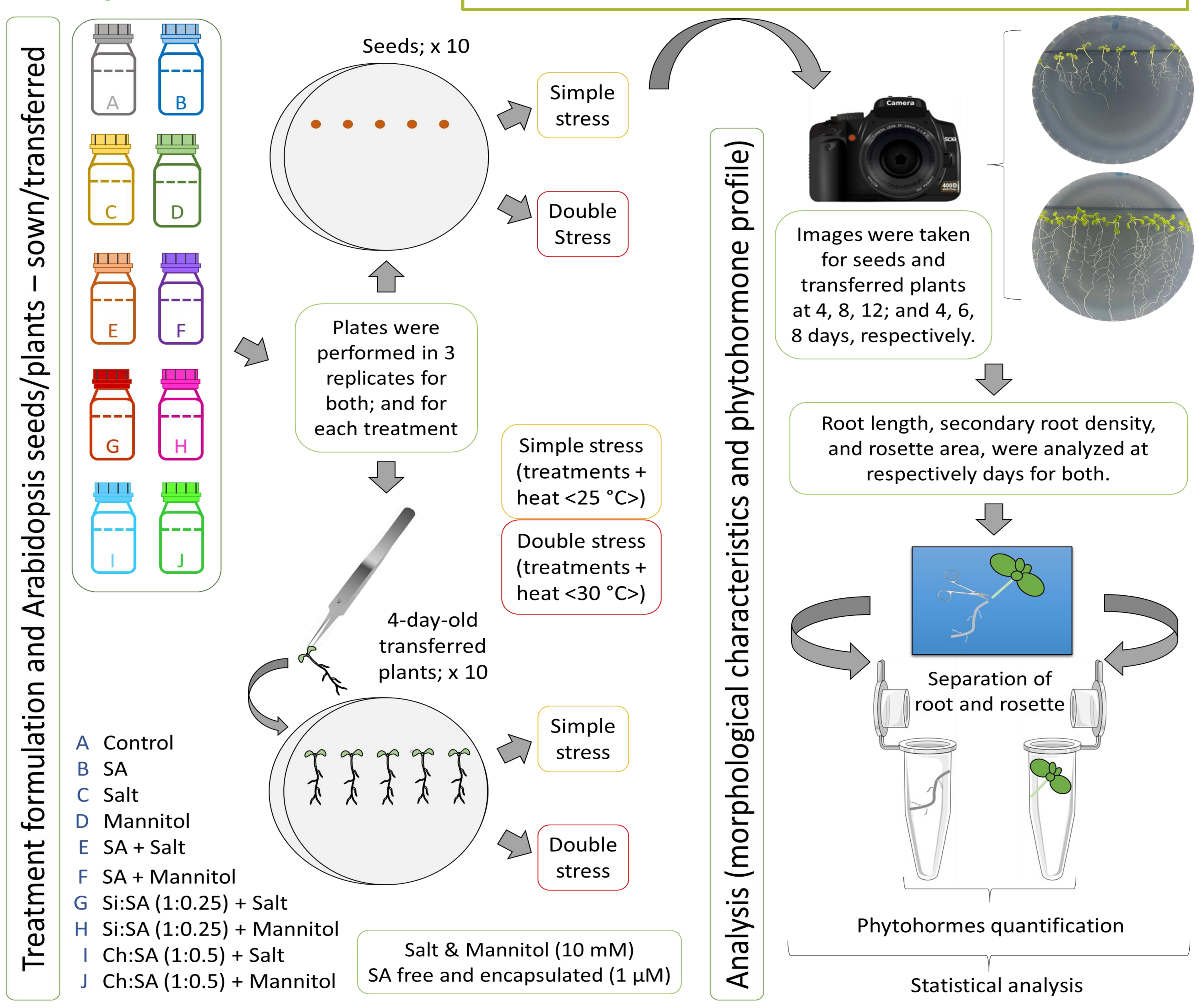
Probable SA encapsulation model

Sampedro-Guerrero *et al.*, 2022, International Journal of Biological Macromolecules

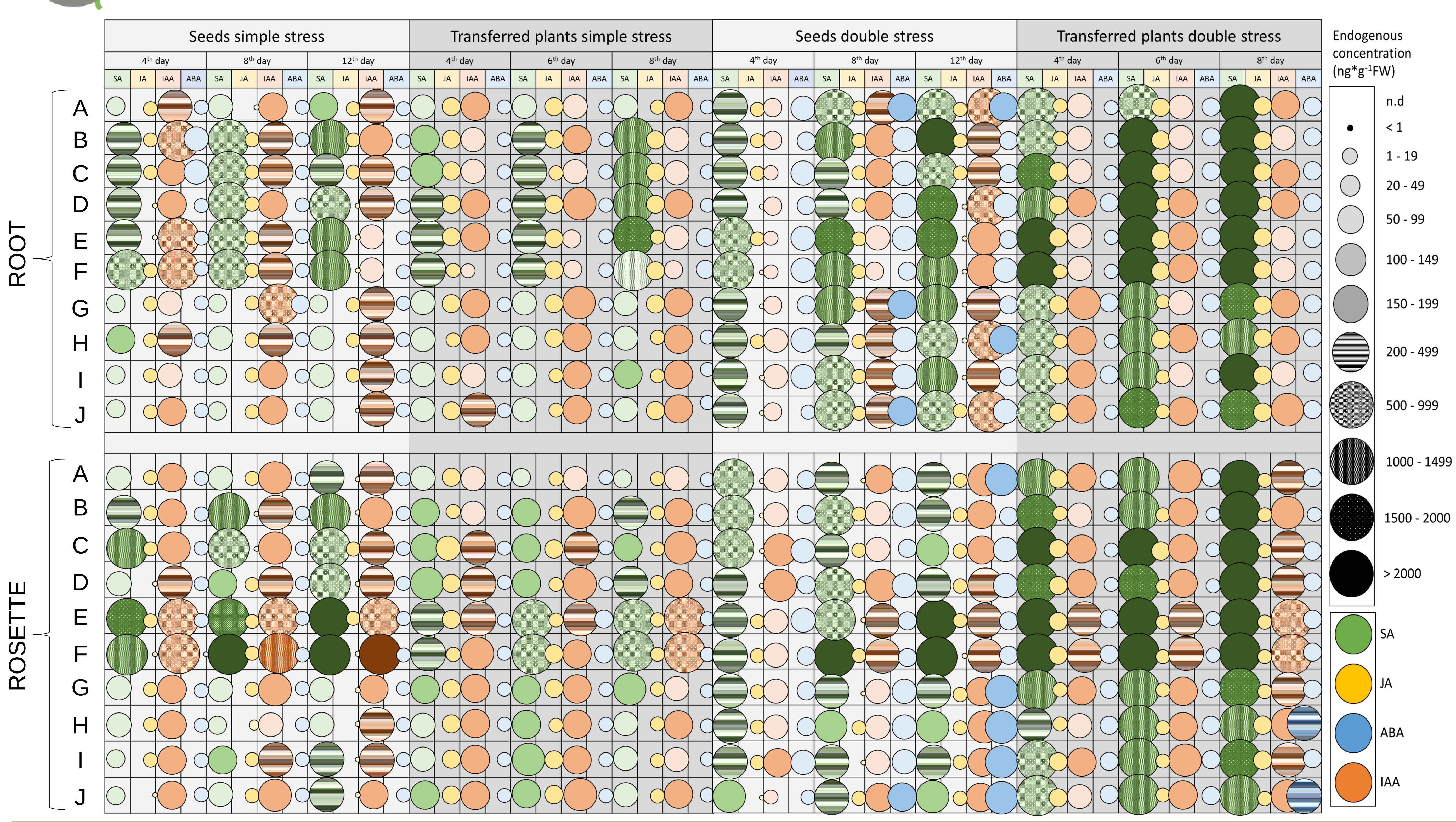
METHODS

A simple method for studying the effects of various stresses on plants is proposed, providing insights into different negative conditions.



RESULTS AND DISCUSION

SA accumulation in the rosette may potentially inhibit the transport of IAA towards the root.



Under both single and double stress conditions, stressed plants exhibited an accumulation of SA in both roots and rosettes, regardless of whether they were in the seed or transferred plant stage. This accumulation of SA resulted in a decrease of IAA specifically in the roots, while an accumulation in the rosettes was observed.

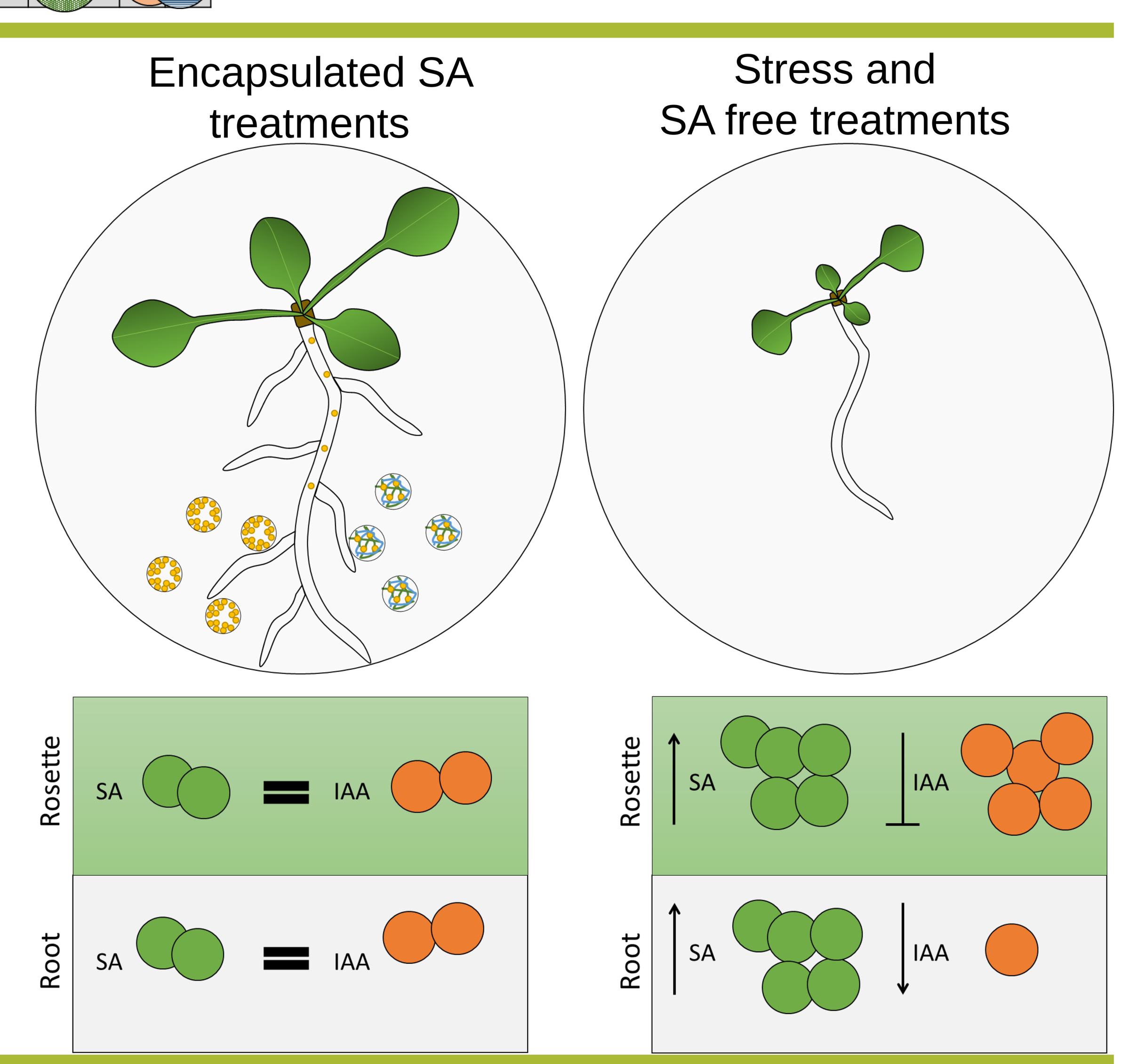
Plants treated with free SA exhibited lower tolerance to various stresses as the applied amount exceeded their endogenous levels, unlike SA encapsulated treated plants, where SA is released in a controlled manner.

ACKNOWLEDGMENTS

MCIN/AEI/10.13039/501100011033 and by the European Union Next Generation (TED2021-129795B-I00) and AGROALNEXT program, funded by MCIN, European Union Next Generation EU-PRTR-C17.I1- and Generalitat Valenciana (AGROALNEXT/2022/010). Funding was also obtained from Generalitat Valenciana through the programs CIAICO/2021/063 and GRISOLIAP/2020/043.

CONCLUSIONS

1. Plants treated with encapsulated SA exhibited enhanced tolerance to abiotic stress, resulting in improved morphological characteristics such as increased root length, rosette size, and density of secondary roots, when compared to untreated and free SA-treated plants.
2. SA and IAA play essential roles in regulating plant tolerance processes while maintaining growth, development, and overall homeostasis.



Financiado por la Unión Europea NextGenerationEU
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