# Peripheral membrane TTL proteins safeguard cellulose synthesis under stress

Vítor Amorim-Silva[1], Álvaro García-Moreno[1], Christopher Kesten[2,3,4], Alexandra Menna[2], Araceli G. Castillo[5], Francisco Percio[1], Raquel Pagano-Márquez[1], José Moya-Cuevas[1], Laia Armengot[6], Noemi Ruiz-Lopez[1], Yvon Jaillais[6], Clara Sánchez-Rodríguez[2,7], Miguel A Botella[1]

## Affiliations

[1]Instituto de Hortofruticultura Subtropical y Mediterránea, Universidad de Málaga-Consejo Superior de Investigaciones Científicas (IHSM-UMA-CSIC), Dept. Biología Molecular y Bioquímica, Campus de Teatinos, Málaga E-29071, Spain.
[2]Department of Biology, ETH Zurich, 8092, Zurich, Switzerland.
[3]Department for Plant and Environmental Sciences, University of Copenhagen, 1871, Frederiksberg C, Denmark.
[4]Current address: Lonza AG, Visp, Switzerland.
[5]Instituto de Hortofruticultura Subtropical y Mediterránea, Universidad de Málaga-Consejo Superior de Investigaciones Científicas (IHSM-UMA-CSIC), Dept. Biología Celular, Genética y Fisiología, Campus de Teatinos, Málaga E-29071, Spain.
[6]Laboratoire Reproduction et Développement des Plantes, Université de Lyon, ENS de Lyon, CNRS, INRAE, F-69342, Lyon, France.
[7]Current address: Centro de Biotecnología y Genómica de Plantas (CBGP), Universidad Politécnica de Madrid (UPM) – Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria (INIA/CSIC), 28223 Pozuelo de Alarcón, Spain.

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Cellulose biosynthesis, Abiotic stress tolerance, Cell wall stress perception

## Abstract

Land plants provide around eighty percent of biomass on Earth and roughly one-third corresponds to cellulose (Bar-On *et al* 2018). Despite its biological and societal importance, many aspects of cellulose biosynthesis and regulation remain elusive. Controlled primary cell wall remodeling allows plant growth under stressful conditions, but how these changes are conveyed to adjust cellulose synthesis is not well understood (Colin *et al* 2023).

In this work, we identify that Tetratricopeptide Thioredoxin-Like (TTL) proteins, which we previous describe as a scaffold of brassinosteroids signalling components, are also new members of the cellulose synthase complex (CSC) and we describe their unique and hitherto unknown dynamic association with the CSC under cellulose-deficient conditions (Amorim-Silva *et al* 2019 and Kesten, García-Moreno, Amorim-Silva *et al* 2022). We found out that TTLs are essential for maintaining cellulose synthesis under high salinity conditions, establishing a stress-resilient cortical microtubule array, and stabilizing CSCs at the plasma membrane. To fulfill these functions, TTLs interact with Cellulose Synthase1 (CESA1) and engage with cortical microtubules to promote their polymerization. We propose that TTLs function as bridges connecting stress perception with dynamic regulation of cellulose biosynthesis at the plasma membrane. In addition, we are currently working to identify and characterize new components involved in TTLs function and dynamics during cellulose biosynthesis under saline stress conditions.

## References

Amorim-Silva *et al.* 2019 *The Plant Cell*
Bar-On *et al.* 2018 *Proc. Natl. Acad. Sci.*
Colin *et al.* 2023 *The Plant Cell*
Kesten, García-Moreno, Amorim-Silva *et al.* 2022 *Sci. Adv.*