

Researchers discover protein that helps plants tolerate drought, flooding, other stresses

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A team including Dartmouth researchers has uncovered a protein that plays a vital role in how plant roots use water and nutrients, a key step in improving the production and quality of crops and biofuels.

The findings appear this week in the journal *PNAS*. The team included researchers from Dartmouth, the University of Aberdeen and the University of Lausanne.

Plant roots use their endodermis, or inner skin, as a cellular gatekeeper to control the [efficient use](#) and movement of water and nutrients from the soil to the above-ground parts of the plant. A key part of that cellular barrier is the Casparian strip, which also helps plants to tolerate stresses such as salinity, drought and flooding. Until recently, little was known about the genes that drive the formation of the Casparian strip, which is composed of a fine band of lignin, the polymer that gives wood its strength.

In their study, the researchers identified a protein, ESB1, involved in the [deposition](#) of lignin patches early in the development of the Casparian strip and the fusion of these patches into a continuous band of lignin as the Casparian strip matures.

Plants use lignin deposition in many different cell types and in response to various [environmental stresses](#). A better understanding of lignin

deposition may eventually help scientists to manipulate lignin content in plants and boost crop and biofuels production, including in locations where growth conditions are not ideal.

More information: Dirigent domain-containing protein is part of the machinery required for formation of the lignin-based Casparian strip in the root, www.pnas.org/cgi/doi/10.1073/pnas.1308412110

Provided by Dartmouth College

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