New cost-effective material which mimics natural ‘extracellular matrix’ has allowed scientists to capture previously unseen behaviour in individual plant cells, including new shapes and interactions. New methods highlight potential developments for plant tissue engineering.

Miniscule artificial scaffolding units made from nano-fibre polymers and built to house plant cells have enabled scientists to see for the first time how individual plant cells behave and interact with each other in a three-dimensional environment.

These “hotels for cells” mimic the ‘extracellular matrix’ which cells secrete before they grow and divide to create plant tissue. This environment allows scientists to observe and image individual plant cells developing in a more natural, multi-dimensional environment than previous ‘flat’ cell cultures.

The research team were surprised to see individual plant cells clinging to and winding around their fibrous supports; reaching past neighbouring cells to wrap themselves to the artificial scaffolding in a manner reminiscent of vines growing.

Pioneering new in vitro techniques combining recent developments in 3-D scaffold development and imaging, scientists say they observed plants cells taking on growth and structure of far greater complexity than has ever been seen of plant cells before, either in living tissue or cell culture. “Previously, plant cells in culture had only been seen in round or oblong forms. Now, we have seen 3D cultured cells twisting and weaving around their new supports in truly remarkable ways, creating shapes we never thought possible and never seen before in any plant,” said plant scientist and co-author Raymond Wightman.

“We can use this tool to explore how a whole plant is formed and at the same time to create new materials.” The scientists say the research “defines a new suite of techniques” for exploring cell-environment interactions, allowing greater understating of fundamental plant biology that could lead to new types of biomaterials and help provide solutions to sustainable biomass growth.

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