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Effects of Arabidopsis thaliana Villin-4 mutations on root hair physiology, morphology and function

Maya Klem  
*Western Washington University*

Emily Bossard  
*Western Washington University*

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Abstract
The protein VILIN (VNL) is found in both plants and animals across many taxa. In plants, one of the roles of VNL is to aid in root hair formation and function. They do this by assisting in maintenance of actin bundles in root hairs. It has been found that Arabidopsis thaliana Villin-4 mutations on Root Hair Physiology, Morphology, and Function

What are Villins and Why Study Them?
- Villins are a protein responsible for the dynamic nature of the cytoskeleton and its regulation in vertebrates and plants
- Villins are most likely an ancient protein evolved to regulate the cytoskeleton in addition to how it affects root hair growth and morphology. However, the data is starting to suggest that the presence of 100 mM NaCl does affect A. thaliana graviotropism.

Effect of Sucrose on A. thaliana VLN mutations
Methods and Results:
Seeds were vernalized, surface sterilized, and then planted on either 100 mM NaCl, 1% Agar MS media (Salt condition) or 1% Agar MS media (MS condition.) Plants were allowed to grow one week and then turned exactly 90°, and allowed to grow for an additional week. After the two week growth period plates were photographed and measurements 1-5 and angle of curvature were recorded using ImageJ (Fig 3A, B.)

Conclusions
Although preliminary, this suggests that mutations in VLN4 do not seem to affect overall growth (measurement 1) or ability to respond to gravity (measurement 2/angle), but that it potentially affects how long it takes the plants to respond to gravity (measurement 3).

Although other literature indicates potential phenotypic differences in root hairs when grown on 3% sucrose, none were observed (Fig 2.)

When combined, these data suggest that VLN4 functions in directional growth responses in elongating root cells rather than affecting root hairs.

Literature Cited
