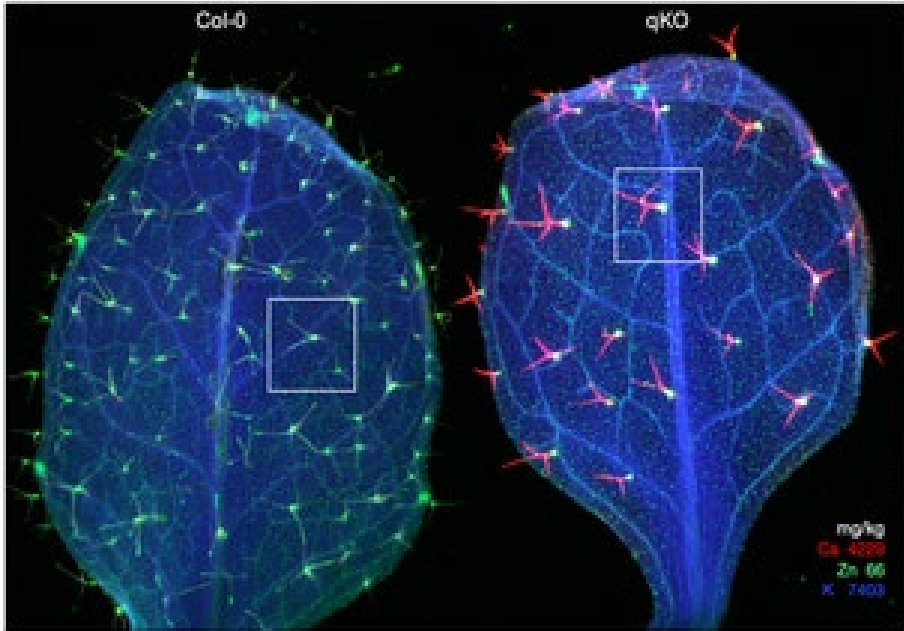


# The Role of Positive-Ion Exchange in Arabidopsis



XRF image of calcium (red), zinc (green), and potassium (blue) in 14-day-old leaves of wild-type *Arabidopsis* (Col-0) and quadruple-mutated (qKO).

Mathew, I.E., Rhein, H.S., Yang, J., Gradogna, A., Carpaneto, A., Guo, Q., Tappero, R., Scholz-Starke, J., Barkla, B.J., Hirschi, K.D., Punshon, T. *Plant Cell Environ.* **47**, 557-573 (2024)

Work performed in part at NSLS-II

## Scientific Achievement

Researchers establish that hydrogen-ion and calcium-ion ( $\text{Ca}^{2+}$ ) exchange in *Arabidopsis* plant cells contribute to plant growth, elemental distribution, and stress responses.

## Significance and Impact

The work shows the many functions of ion exchange in plants and how suppressed ion uptake can improve anoxia tolerance.

## Research Details

- *Arabidopsis* leaves were subjected to mutations that inhibited positive-ion transport; samples were studied, in part, at NSLS-II's XFM beamline using x-ray fluorescence (XRF) microscopy.
- Results show that elemental concentrations and distributions in the leaves strongly correlate with the number of mutations.
- Reduced  $\text{Ca}^{2+}$  abundance is also seen, which promotes tolerance to anoxia (total oxygen deprivation).