

Oxidized Cell Wall Fragments in Plant Growth and Development

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Background & Rationale

Cell wall fragments may function as regulators of plant cell division, growth and development. The best characterized of these are the *p*-benzoquinones (pBQs) derived from the oxidation of cell wall phenols by reactive oxygen species (ROS)^{1,2}. ROS are known to accumulate at sites associated with cell division, elongation, and wounding in plants. We propose that pBQs accumulate at these sites and play a role in regulating these crucial events. Prior studies have confirmed that pBQs, like DMBQ, inhibit root growth². We are utilizing the model system *Arabidopsis thaliana* because of its fast growing time, well defined pattern of growth, and array of genetic resources to evaluate physiological as well as molecular responses to pBQ signals.

Hypothesis: pBQs modulate ROS production in *A. thaliana*.

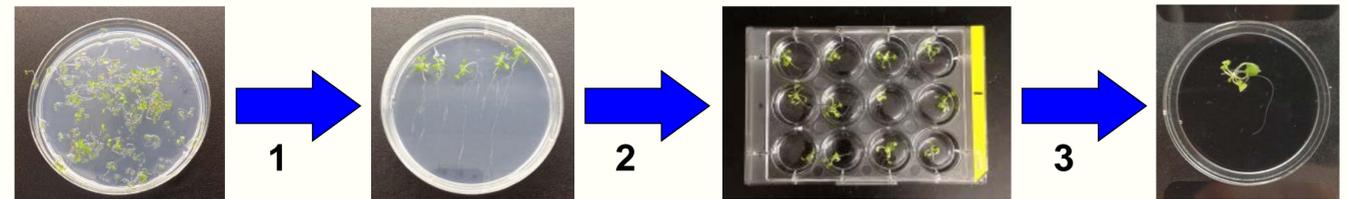
Experiment: Expose seedlings to pBQs and evaluate for changes in ROS production with NBT, a ROS-sensitive stain.

Significance: Controlling this redox signaling pathway could provide unprecedented regulation over growth and development, as well as stress responses in plants.

References

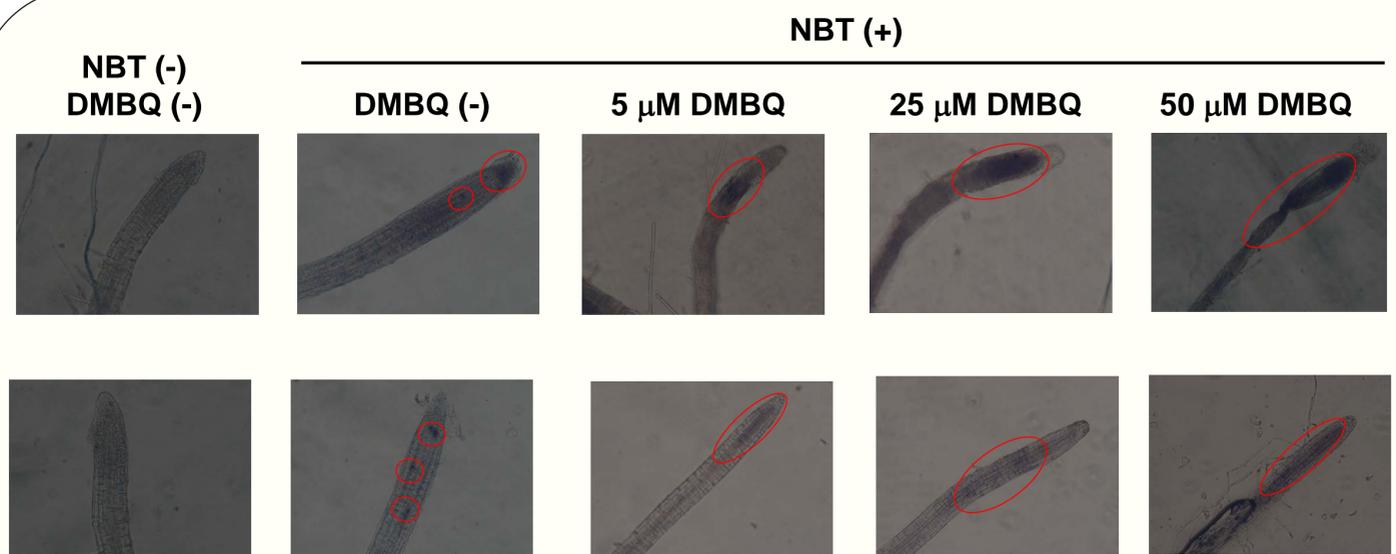
- 1 = *Pest Management Science* (2009) **65**:512-19
- 2 = *The Plant Journal* (2007) **51**:707-16

Experimental Design

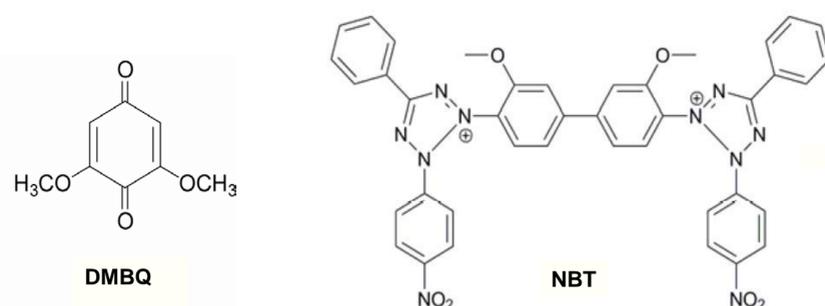


1. *A. thaliana* seedlings transferred to plates containing 0.5X MS media for 14-21d.
2. Seedlings transferred to wells and incubated with DMBQ for 30 min. Stained with 50 μ M NBT.
3. Seedlings transferred to depression slide and visualized for stain accumulation

Progress



Molecules



Conclusions/Future Experiments

- ROS production varies between seedlings
- Preliminary results support hypothesis that pBQs alter ROS production (increased production).
- Increased ROS production inhibits root growth, like pBQ
- Supports that ROS may be the source of pBQ-induced inhibition of growth
- Future experiments: (i) Optimization of NBT staining protocol
(ii) Quantification of staining by image analysis.



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