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2015

Oxidized Cell Wall Fragments in Plant Growth and Development

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Oxidized Cell Wall Fragments in Plant Growth and Development

Karl Schneider

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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 growth[2]. 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.

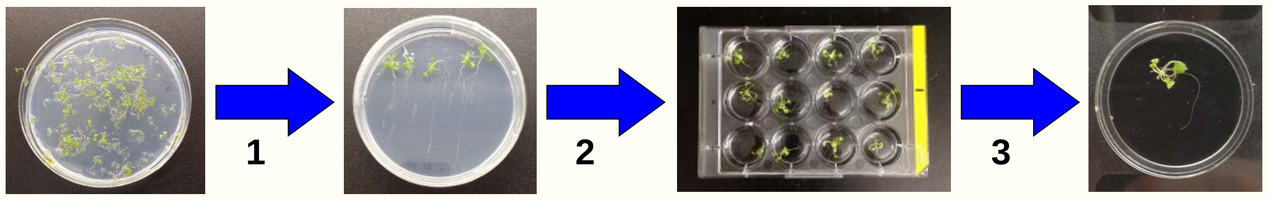
Significance: Controlling this redox signaling pathway could provide unprecedented regulation over growth and development, as well as stress responses in plants.

References

1 = *Pest Management Science* (2009) **65**:512-19

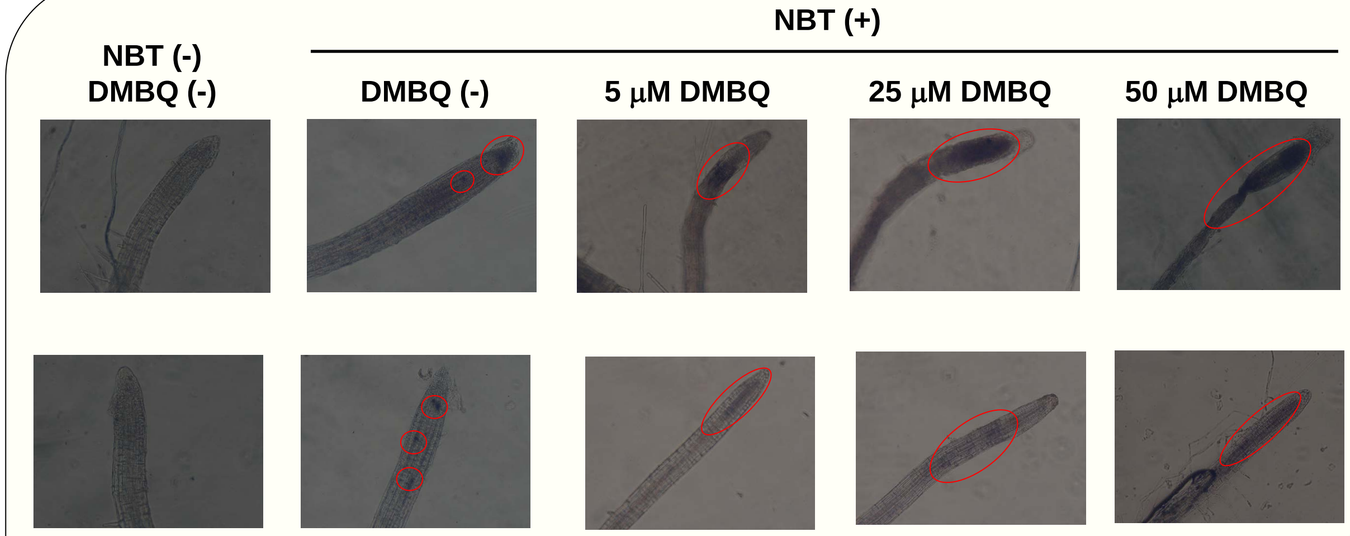
2 = *The Plant Journal* (2007) **51**:707-16

Experimental Design

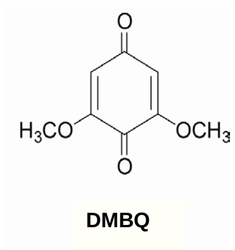


1. *A. thaliana* seedlings transferred to plates containing 0.5X MS media for 14-21d.
2. Seedlings transferred to wells and incubated with DMBQ for 30 min. Stained with 50 μM NBT.
3. Seedlings transferred to depression slide and visualized for stain accumulation

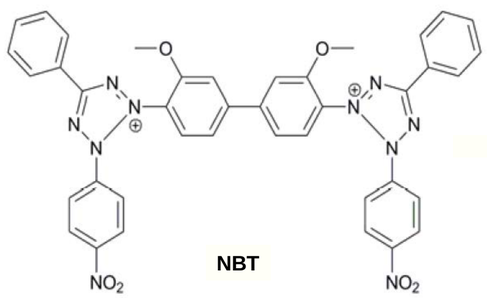
Progress



Molecules



DMBQ



NBT

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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