**ABSTRACT**

In the wake of Dutch elm disease, green ash (Fraxinus pennsylvanica) has been planted as a replacement for the American elm (Ulmus americana). Naturally a drought-tolerant tree, this woody ornamental has been used for agroforestry, conservation, and urban street plantings. We are using genetic engineering to enhance trees with increased water conservation abilities to alleviate pressures placed on current water availability. Overexpression of the AEPF1 gene in Arabidopsis results in reduced stomatal density, a characteristic directly related to water-use efficiency and indirectly to drought tolerance. Successful use of Arabidopsis and poplar model systems indicates this knowledge may be transferable to green ash. Here, we demonstrate a new technique for improving green ash hardiness without adverse effects, thus providing a foundation for the development of environmentally attuned fine hardwoods.

**RESULTS: Arabidopsis**

Fig. 4. Arabidopsis staining. (A) Panels 1-19 represent available stomatal density mutants with stomata highlighted. (B) A magnified unstained leaf. (C) Chart identifying mutant lines, their average stomatal density, and gravimetric water loss over 36 hours. (D) qPCR analysis of six AEPF1 transgenic overexpression lines.

**RESULTS: Poplar**

**PRELIMINARY RESULTS: Green Ash**

Fig. 6. Green ash preliminary results. (A) Transformation and regeneration illustration. (B) Control vector transformed green ash callus (According to Du and Pijut 2009). (C) Regenerated “putative” transgenic plantlets.

**DISCUSSION**

- Stomatal density variations in Arabidopsis and poplar were obtained with AEPF1 overexpression constructs (Figs. 4, 5).
- Observation of Arabidopsis stomatal density mutant transpiration rates indicate a connection to water-use efficiency (Fig. 4B).
- qRT-PCR results indicate stomatal densities vary with AEPF1 overexpression construct levels (Fig. 4C).

**REFERENCES**


**ACKNOWLEDGEMENTS**

Research funded by van Eck Foundation for Purdue University.