LETTER

Reply to Smith and Shortle: Lacking evidence of hydraulic efficiency changes

After calcium silicate amendment to an entire watershed at the Hubbard Brook Experimental Forest, evapotranspiration (*ET*) increased by ~20% for 2 y, broadly attributed to a fertilization of tree physiology (1). We suggested that the increase in *ET* most likely arose from enhanced transpiration due to increased stomatal conductance (g_s) associated with increased photosynthesis. Smith and Shortle (2) point out that enhanced xylem conductivity due to increased soil water ionic strength could help account for increased stomatal conductance because of the role calcium plays in the construction and efficiency of xylem water transport. We accept that this may be a relevant mechanism due to the importance of the entire hydraulic architecture of a tree to stomatal function (3). However, although we agree that enhanced xylem conductivity could have contributed to the enhanced *ET* response after calcium silicate amendment, we have no evidence that this mechanism was active during the enhancement. Our data were consistent with increased photosynthetic capacity [a major control on stomatal conductance (4)], which led to a general stimulation of primary production (tree and leaf biomass) during and after the enhanced *ET* (1). Thus, the available information leads us to conclude that increased g_s was related to increased photosynthesis.

Furthermore, Smith and Shortle (2) suggest that water use efficiency (WUE) would be an interesting and informative metric for assessing this *ET* response to calcium silicate. We agree that WUE could help us interpret the *ET* response; however, we cannot calculate the WUE response with our current data. Future research addressing the integrated role of calcium in enhancing the hydraulic architecture, water transport, nutrition, and both xylem conductivity and WUE need to be conducted to understand the apparently important role of calcium in transpiration of these forested ecosystems.

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