

- **Project Title:** The root distributions of trees on karst

**Investigator:** Susan Schwinning

**Department:** Biology

**Project Summary:**

During two weeks of May 2007, tree root excavations were conducted on Freeman Ranch to settle questions about the largely unknown rooting habits of trees on the eastern Edwards Plateau. The PI, three graduate students and two undergraduate students conducted this work. Site 1 was located on an Edwards limestone outcrop. We found that the soil cover was only 20 cm deep. Both Ashe juniper and live oak formed dense root mats in the soil layer, but also extended thick structural roots into the underlying matrix of fissured and fractured bedrock (epikarst). We also found fine-root mats filling the narrow crevices between rocks, suggesting the capacity of trees to take up water from the rock layers below the soil. At the second site, on Glen Rose limestone, we encountered a soil depth of 1.0-2.5 m above a hard dolostone bedding plane. Here, we found honey mesquite roots growing in generally steeper down-sloping angles than Ashe juniper roots. However, both species had roots reaching the bottom of the soil layer and some roots had grown into the rock below. The most valuable product of this research were the numerous photographs taken of the excavated root systems, which have been shown in numerous presentations by myself and my students and have been received with great interest by local science community. Two photographs have been included in a manuscript submitted to the Journal of Hydrology. Another photograph will be published in a graduate student paper that is currently in preparation.

**Publications:**

- 1.) Heilman, JL, McInnes, KJ, Kjelgaard, JF, Owens, MK, Schwinning, S. (in review). Energy balance and water use in a subtropical karst woodland. *Journal of Hydrology*.
- 2.) Eggemeyer, KD, Schwinning S (in preparation). Why is mesquite excluded from the eastern Edwards Plateau of central Texas?

**Presentations:**

- 1.) Eggemeyer, KD, Schwinning S. Why is mesquite excluded from the eastern Edwards Plateau of central Texas? 92nd Annual Meeting of the Ecological Society of America, San Jose, California, 5-10 August, 2007 (contributed talk)

2.) Eggemeyer, KD, Schwinning S. Why is mesquite excluded from the eastern Edwards Plateau of central Texas? 3rd Central Texas Ecologists Meeting, Temple, Texas, 1 December, 2007 (talk).

3.) Schwinning, S. Ecohydrology of Ashe juniper and live oak in the Texas Hill Country. 3rd Central Texas Ecologists Meeting, Temple, Texas, 1 December, 2007 (talk).

4.) Schwinning, S., Heilman, J.L., Lai, C.-T., Litvak, M., Thijs, A. Are karst savannas like any other? Isoscapes 2008, Santa Barbara, California, 7-10 April, 2008 (poster)

5.) Schwinning, S. The water relations of trees on karst. AGU Joint Assembly, Fort Lauderdale, Florida, 27-30 May, 2008.

**External Grants Applied:**

NSF-CAREER (PI): Ecohydrology of Karst Savannas (\$741,366)

ARP/ATP (co-PI): Epikarst Controls on Recharge, Water Quality and Biodiversity in the Central Texas Hill Country (\$150,000)

**External Grants Awarded:**

ARP/ATP (co-PI): Epikarst Controls on Recharge, Water Quality and Biodiversity in the Central Texas Hill Country (\$150,000)

**Student Number: 5**