Linking pecan root biology to nitrogen and water utilization

Leonardo Lombardini & Astrid Volder
Department of Horticultural Sciences
Texas A&M University
Project description: Site

- Texas A&M University Pecan research orchard
- 450 trees planted in Jan-Mar 2009
New orchard
lat. 30° 31'N, long. 96° 25'W, elevation 67 m
Pecan root observation
Trunk diameter

Trunk diameter (mm)

April | June | July | Dec

- April: 35 ± 0.5
- June: 36 ± 0.6
- July: 36 ± 0.6
- Dec: 36 ± 0.6
Data collection: Root production

• Collected every 2 weeks.
  – Root birth-date, disappearance date, length, diameter, root length production (RLPnew) and disappearance (RLD), annual root length turnover, branching order and general condition (alive, senescing, cortex shedding) for each individual root.
Data collection: Physiological parameters

- Pressure/Volume curves
- Transpiration rate
Data collection: Soil moisture

- TDR probes
- \( \text{ECH}_2\text{O} \) probes
Data collection: Root respiration

- CO$_2$ emission rate
  - Soil CO$_2$ flux chamber (6400-09, LI-COR)
Data collection: Nitrogen movement

- \([\text{(NH}_4\text{)}_2\text{SO}_4]/^{15}\text{N}-[\text{(NH}_4\text{)}_2\text{SO}_4]\) applications (April, June, July)
- Movement of and distribution \(^{15}\text{N}\) in tree tissues (roots & leaves)
- Soil \(^{15}\text{N}\) concentrations measured twice a year (March and October) from untreated (background) and treated trees.