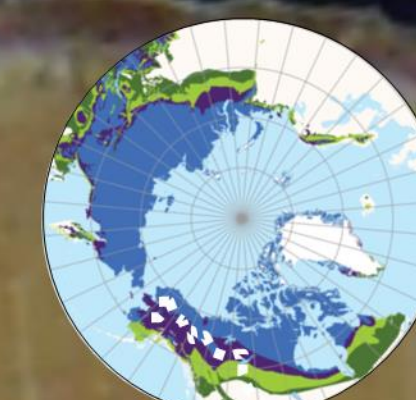


GRENE-Arctic



Kazumichi Fujii¹, Yojiro Matsuura¹, Yoshiyuki Inagaki¹, Akira Osawa²
(¹Forestry & Forest Products Research Institute, ²Kyoto Univ.)



Urea uptake by drunken trees in hummocky soils on permafrost

Questions

Is amino acid uptake advantageous for trees?

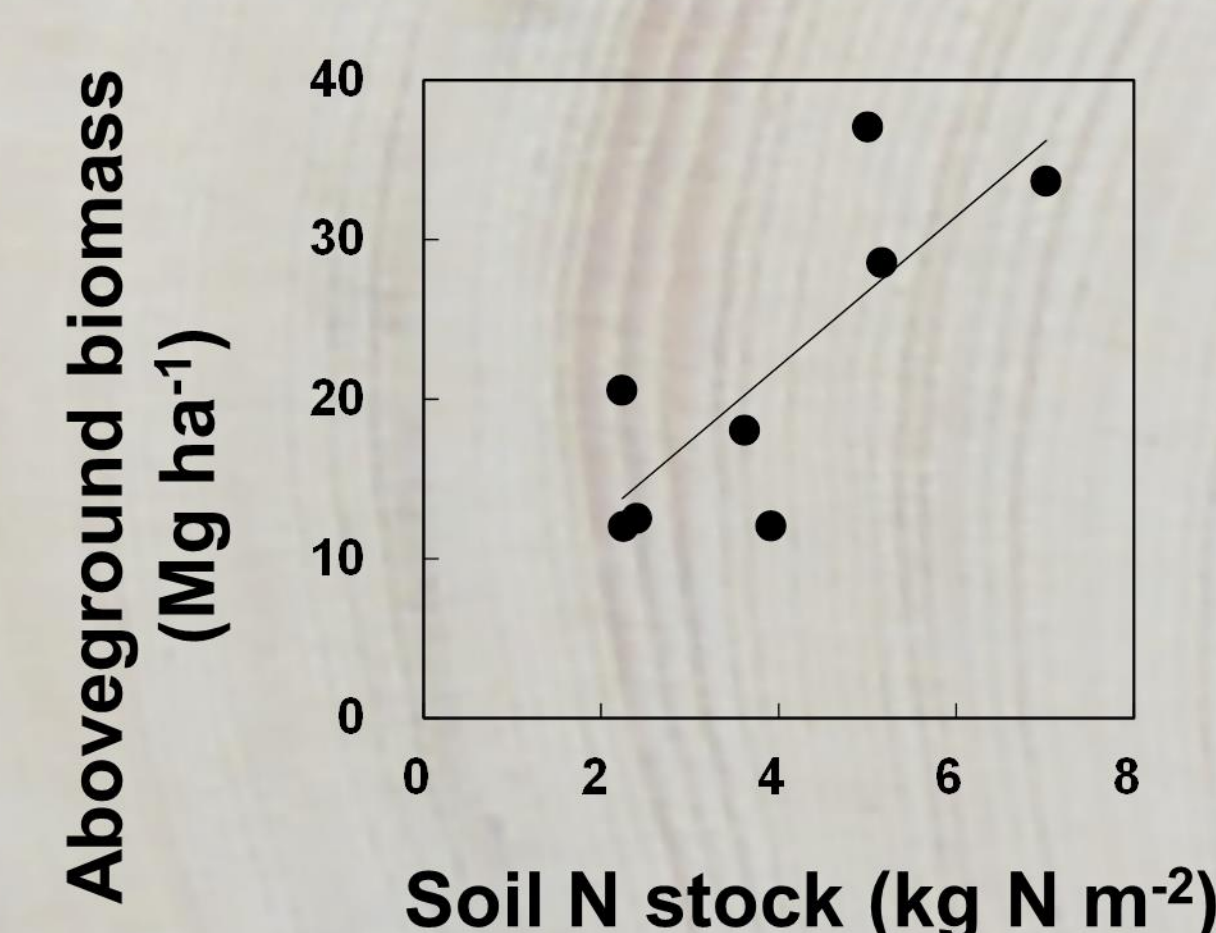
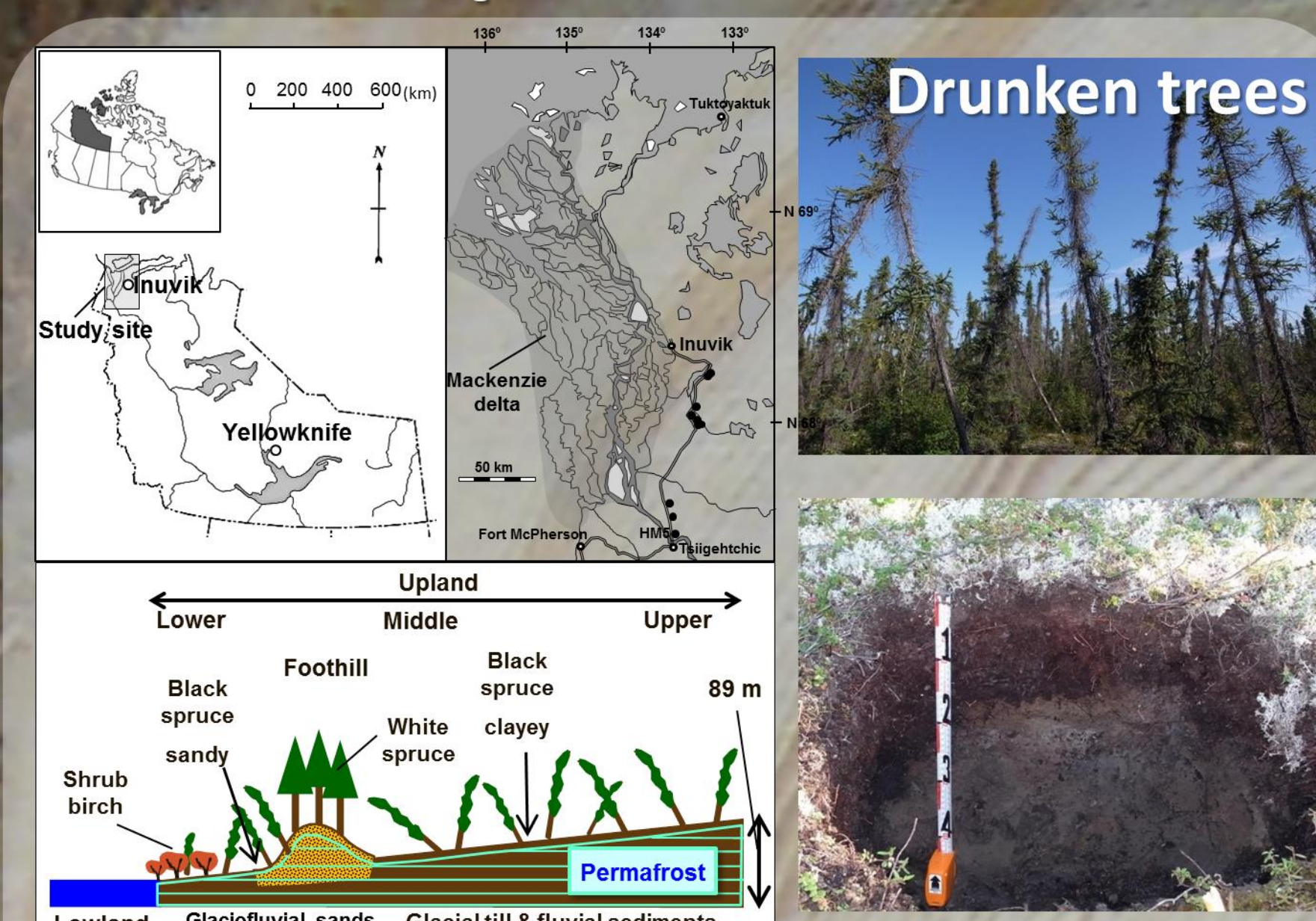
1. What limits plant productivity on permafrost?
2. Why is nitrogen availability limited?
3. How can trees take up nitrogen in cold soil?
4. Why is urea available to trees on permafrost?

Answers

Not always. Monopolizing urea is another strategy on shallow permafrost

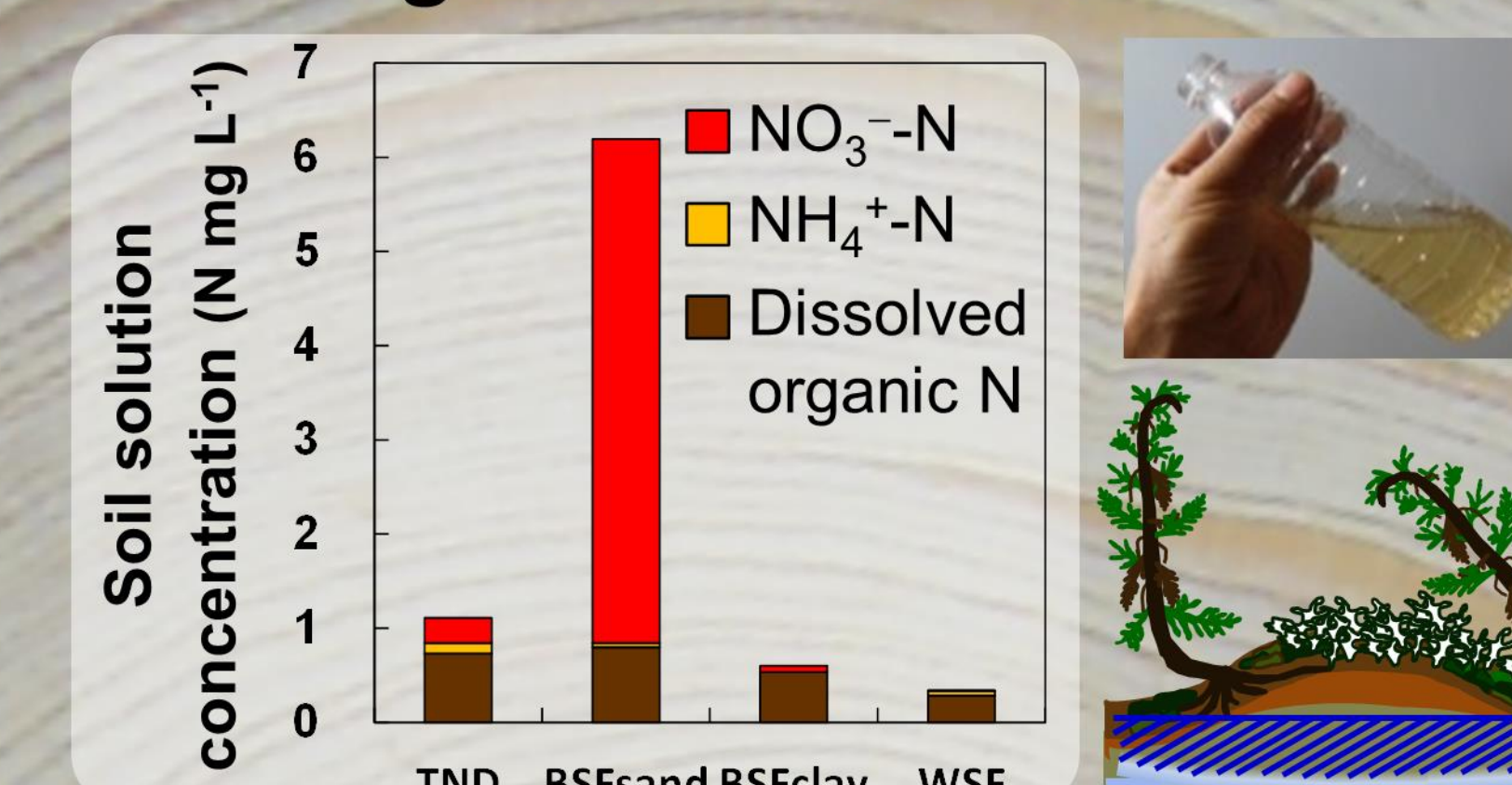
1. Soil nitrogen stock in active layers
2. No inorganic nitrogen in clayey soil on shallow permafrost table
3. Direct uptake of urea as well as amino acids
4. Low microbial activity of urea mineralization in flooded & cold soil

1. What limits productivity on permafrost ?

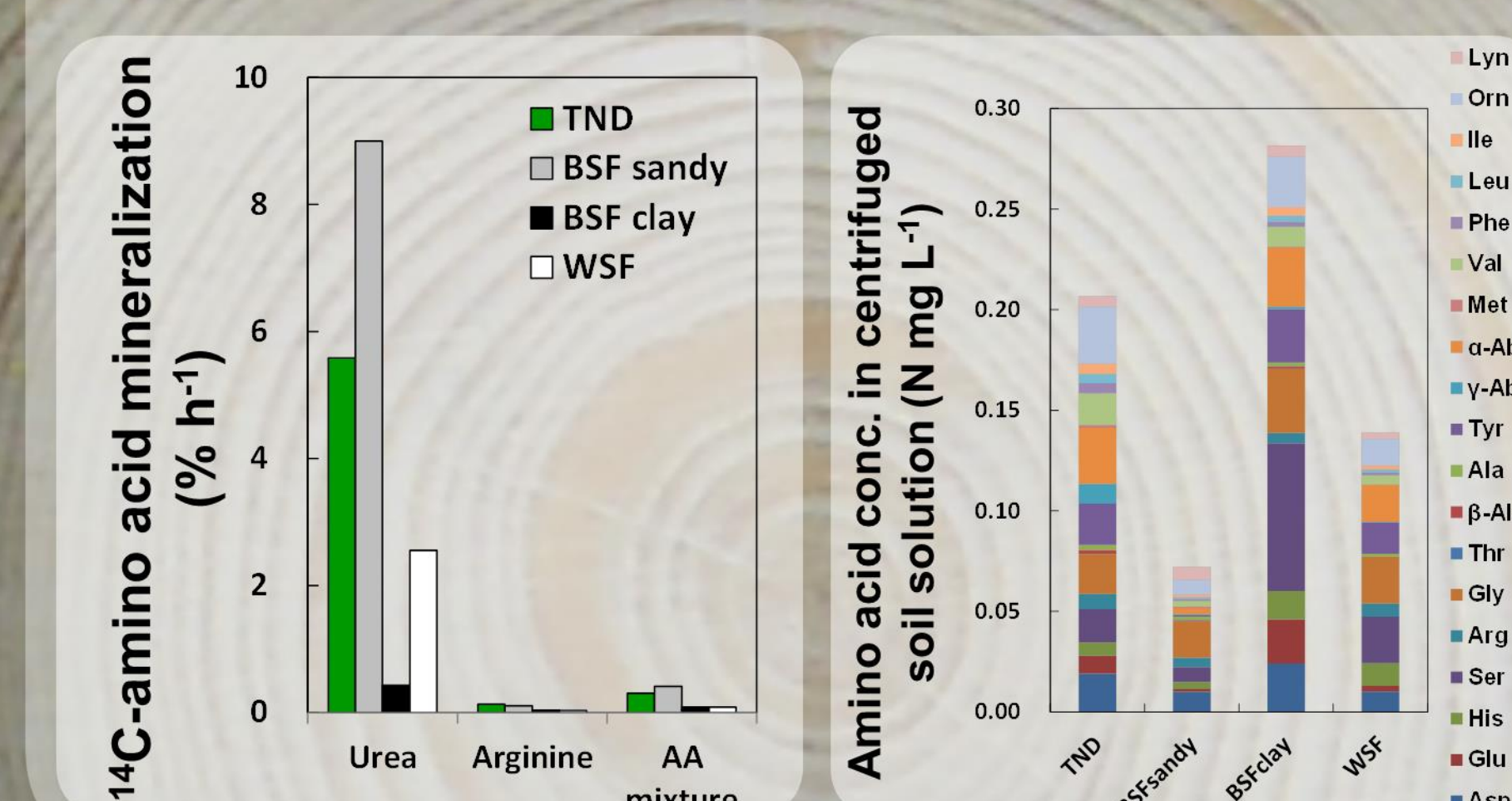


2. Why is soil N availability limited?

Low inorganic N in soil solution

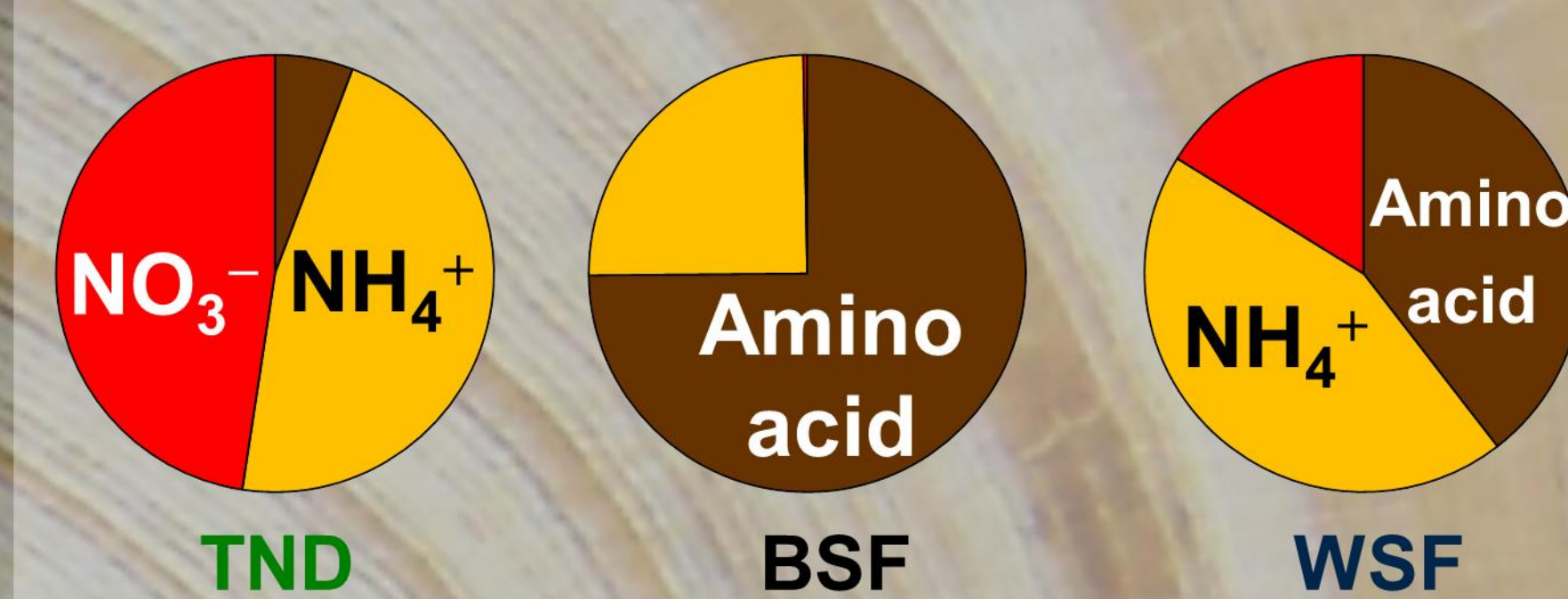


Low microbial activity of amino acid mineralization & amino acid accumulation



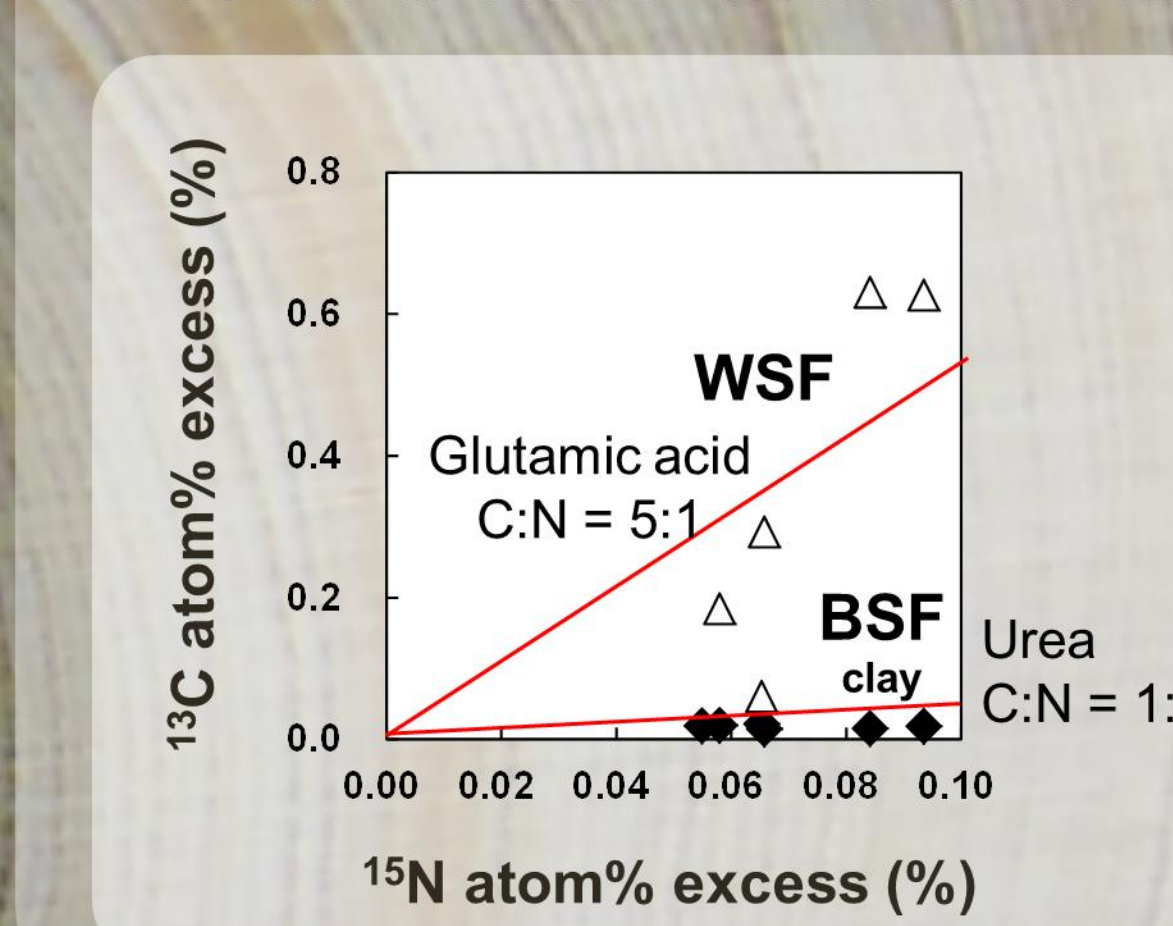
3. How can spruce trees take up nitrogen in cold soil?

Different pattern of ¹⁵N uptake



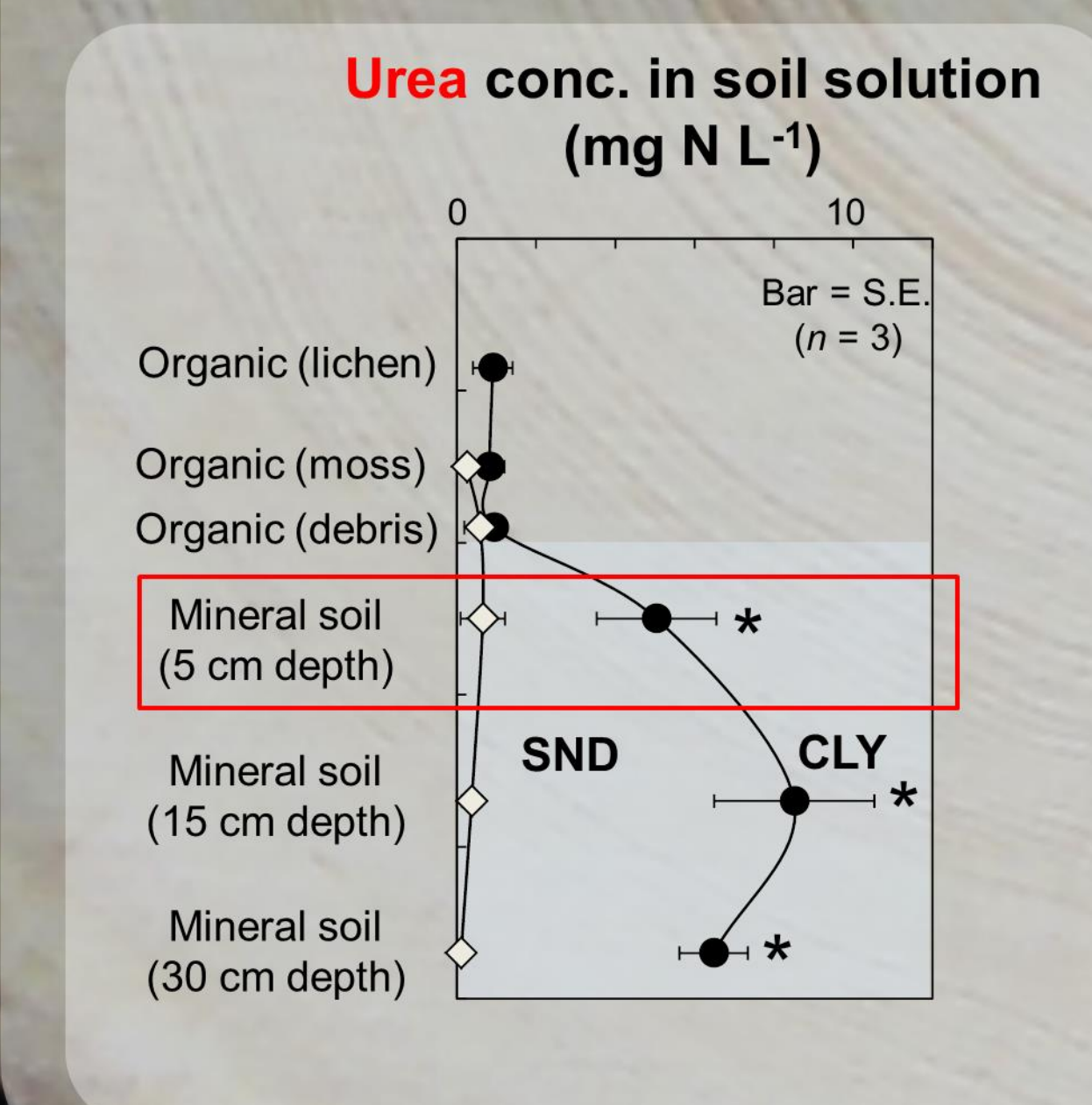
Root assimilation of ¹³C, ¹⁵N-labeled glutamic acid, ¹⁵NH₄⁺, ¹⁵NO₃⁻ 24h after addition to surface soil

Loss of amino acid-C relative to N

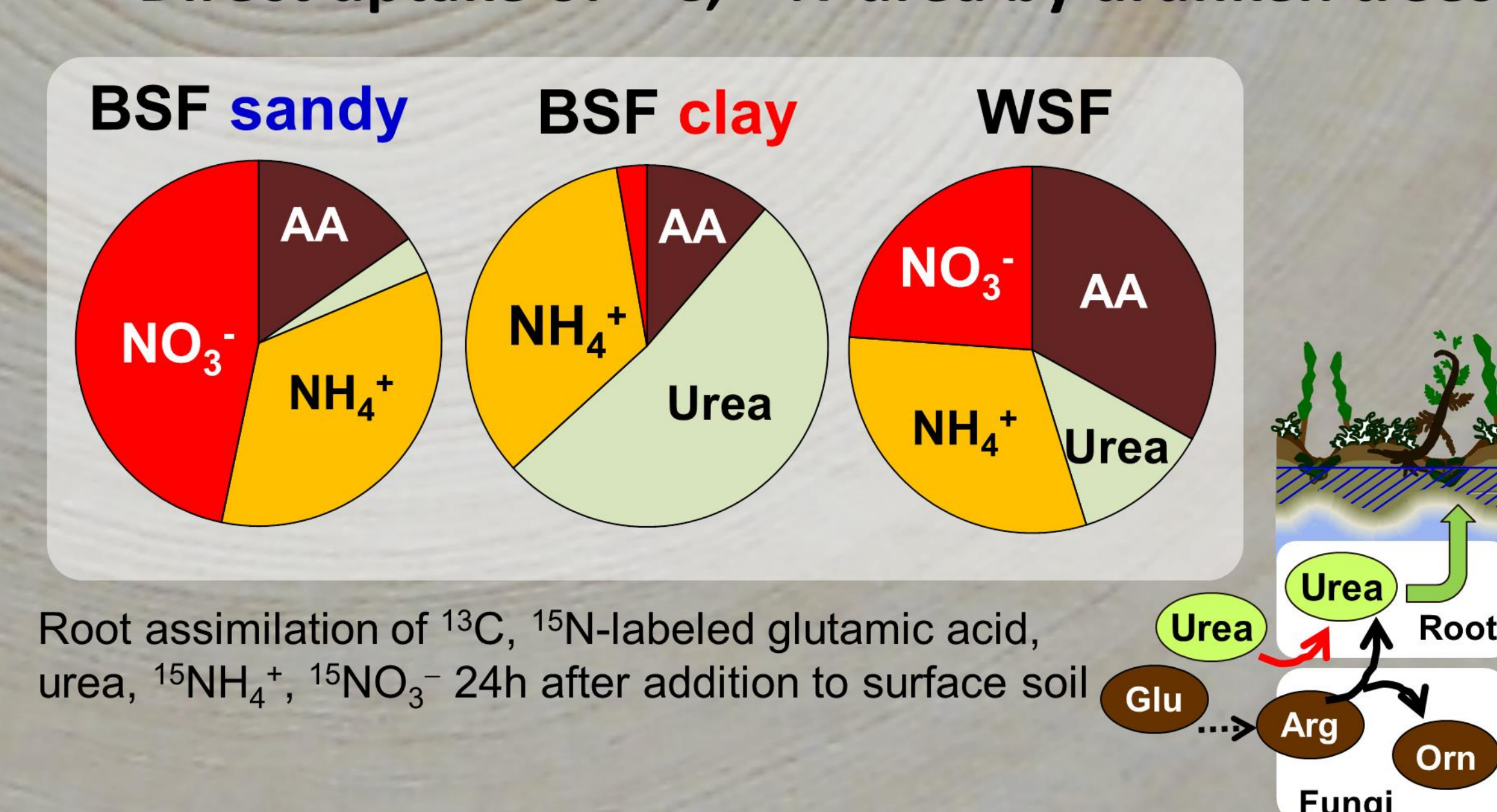


4. Urea accumulation in clayey soil and direct uptake by drunken trees

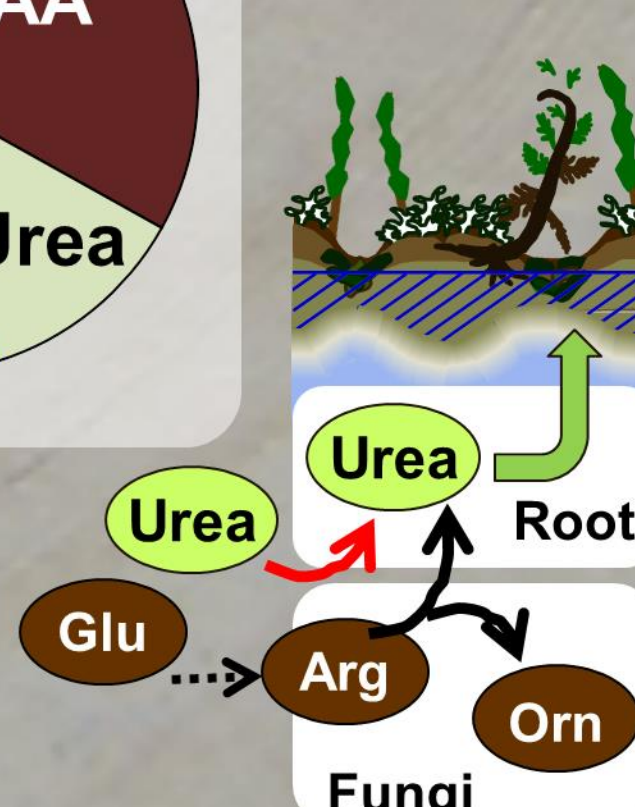
Urea accumulation in subsoil



Direct uptake of ¹³C, ¹⁵N-urea by drunken trees



Root assimilation of ¹³C, ¹⁵N-labeled glutamic acid, urea, ¹⁵NH₄⁺, ¹⁵NO₃⁻ 24h after addition to surface soil



1 cm