

Key Features of PlantFATE

Plant Functional Acclimation and Trait Evolution (PlantFATE) model

1. Eco-evolutionary Optimal Physiology
2. Trait-based Functional Diversity
3. Size-structured Demographics
4. Trait Evolution via Eco-evolutionary Dynamics

Current advantages

- Good predictability in new sites
- Can predict species adapted to future climate
- Physiology well represented with new P-hydro model
- Coupled with water basin model

BG3.38 | Orals | Jaideep Joshi et al.
Fri, 19 Apr, 16:55-17:05 ■ Room 2.95

HS10.9 | Orals | Elisa Stefaniak et al.
Fri, 19 Apr, 15:00-15:10 ■ Room 2.15

Next step: improved representation of roots

Traits

- Specific root length (SRL)
 - Root tissue density (RTD)
 - Root diameter (D)
 - Root lifespan
 - Root nitrogen (N)
 - Root mass per leaf area (ζ)
- Non-plastic
- Plastic: Change over short timescales
- Plastic: Change over long timescales

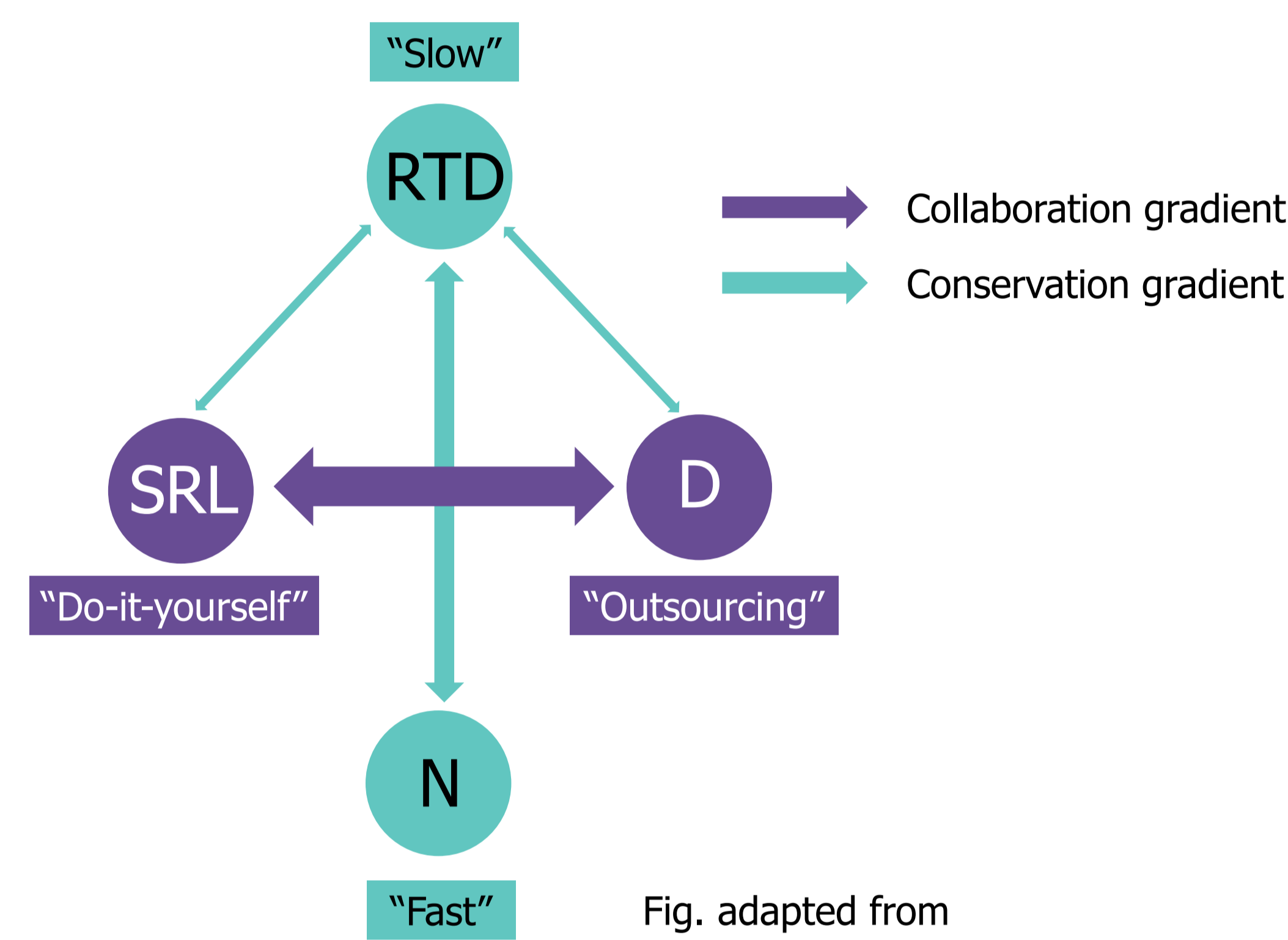
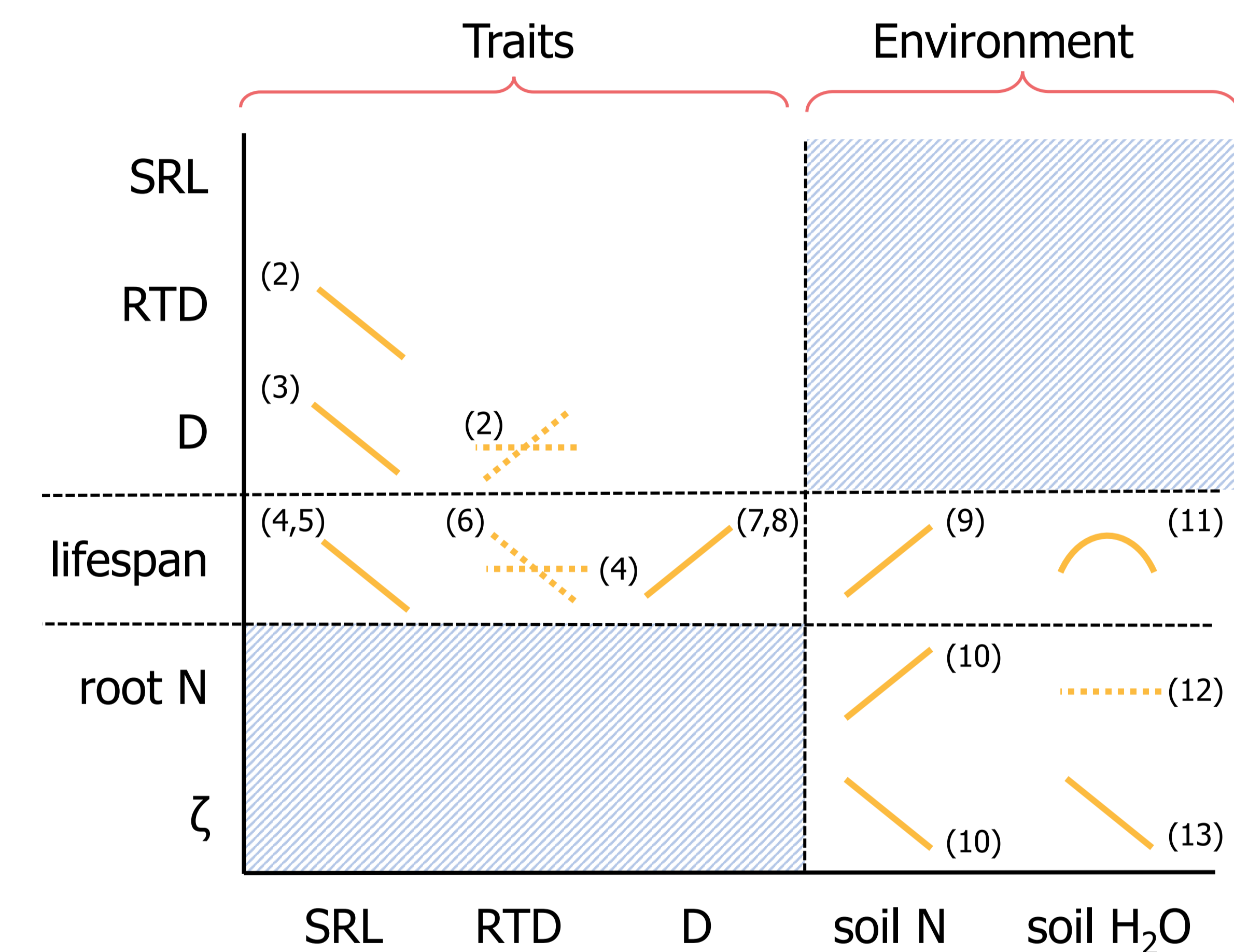


Fig. adapted from Bergmann et al. 2020 (1)

Tradeoffs



We want your input!

Add your thoughts to the page below:

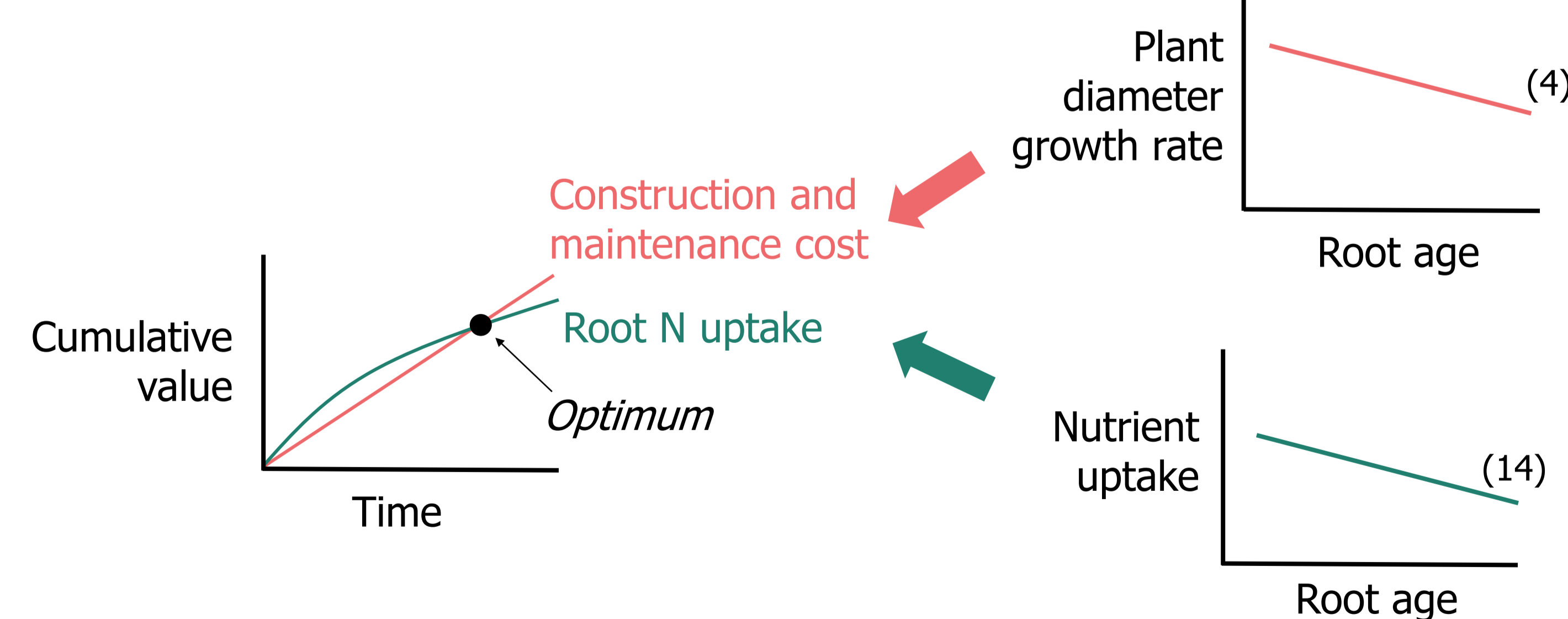
- A. What determines root lifespan?
- B. Why do root traits behave differently in different soil types?

Modelling Principles

1. **Geometric:** relationship between SRL and $-D^2$ (3)

2. **Optimality:**

At the **root level:** root lifespan and root N

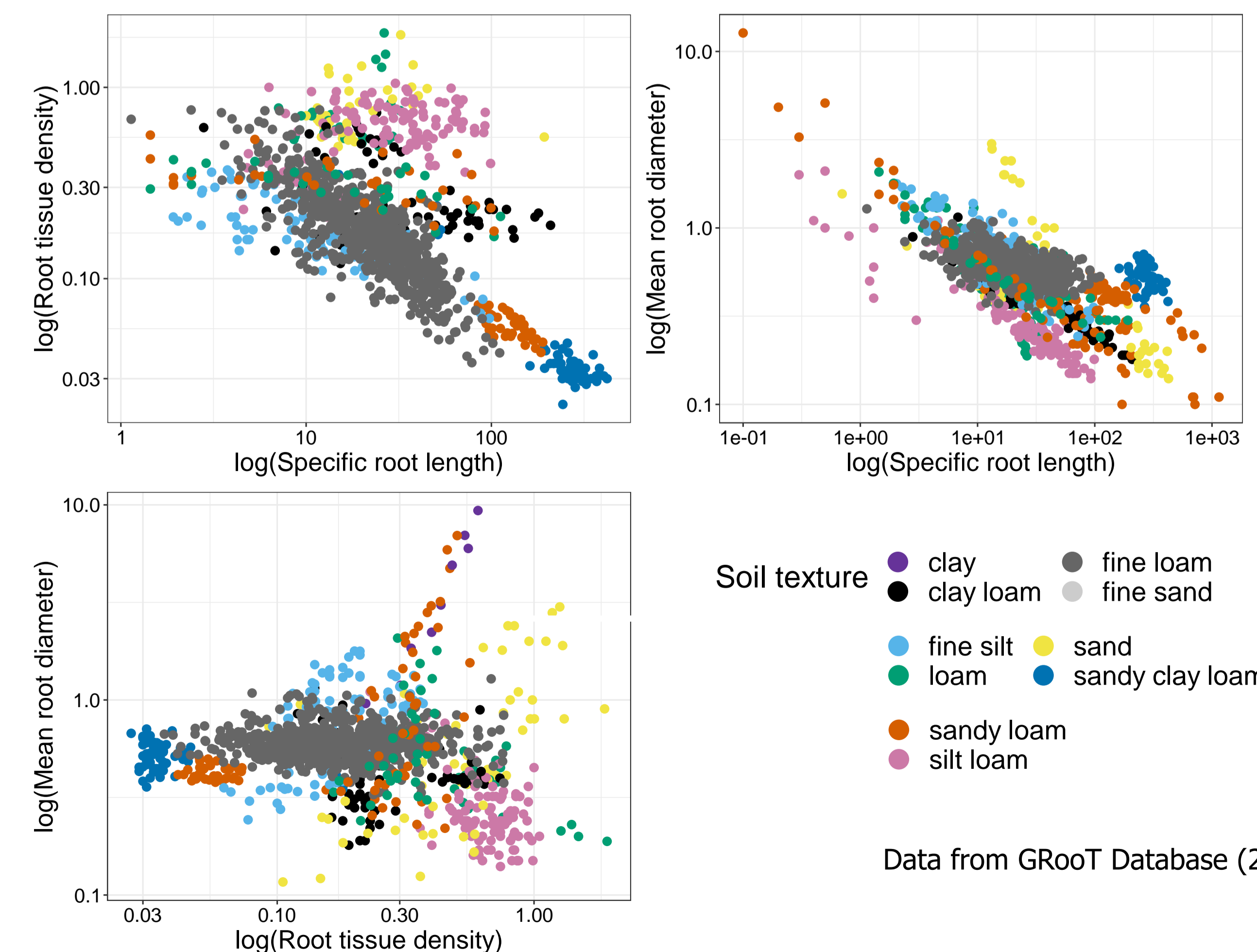


At the **tree level:** root mass per leaf area (ζ)

3. **Evolution:** D or SRL, in response to environmental conditions in the long term

Data

Correlation between RTD and SRL → the 2-D collaboration-conservation gradient collapses to a 1D root economics spectrum within each soil type



PlantFATE website

Paper describing PlantFATE
Joshi et al. 2023, *BioRxiv*

