The effects of algae fertilizer on wheat root morphology elucidated using modeling, phenotyping and metabolomics

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Can we use waste water grown algae to cycle nutrients and fertilize wheat?

Methods and results - Experiments to test if wheat can utilize algal nutrients

Modeling

Nutrients from algae are available to wheat root uptake.

Results so far:
Modeled phosphor (P) uptake from different sources based on data from Schreiber et al. 2018.

Phenotyping

Roots respond to algae fertilizer with changes in root architecture and morphology that are different to conventional fertilizers.


Metabolomics

Active response of roots to algal nutrients is reflected in an alternate mode of nutrient uptake.

Discussion of modeling results

- Algae fertilization supports shoot growth to a similar extend compared to mineral fertilization
- Root:shoot ratio and root length are affected by algae treatment
- Around 70% of plant phosphorus algae fertilized wheat is treatment related

Take home message

- Algae addition can support continuous wheat growth in a soil system
- Algae treatment facilitates phosphorus uptake compared to unfertilized controls

What’s next?

Wheat

1/2 MS medium

18 days

Wheat

Algae + MS-micronutrients

P set to 1/2 MS

18 days