The Effect of Sourdough Starter on Cherry Belle Radish Growth

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Chemical Fertilizers

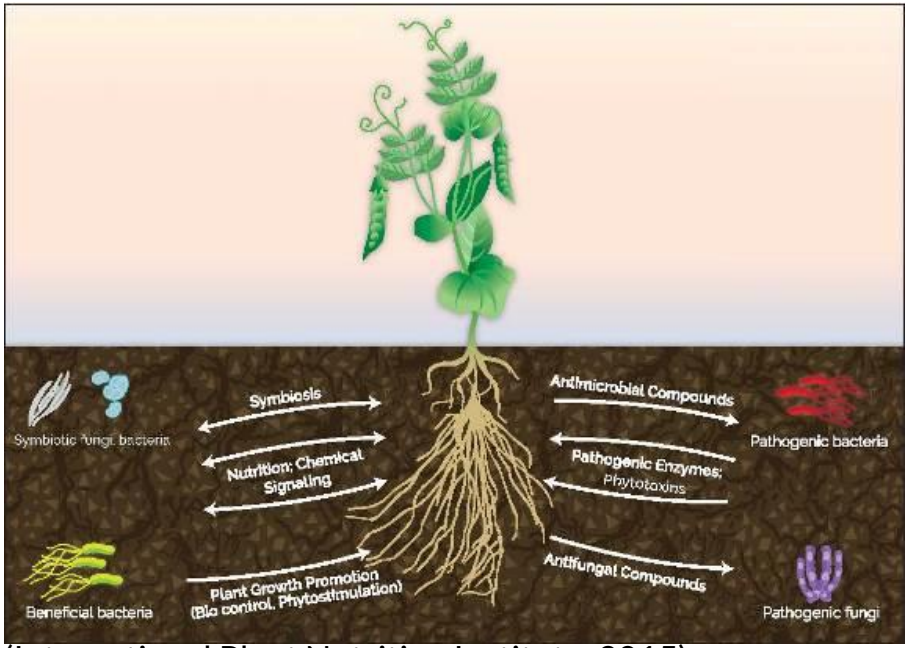
Environmental Protection Agency

Very harmful to the Environment

Causes:

- Water pollution
- Soil acidification
- Air Pollution
- As well as many other negative effects.

Soil microorganisms



(International Plant Nutrition Institute, 2015)

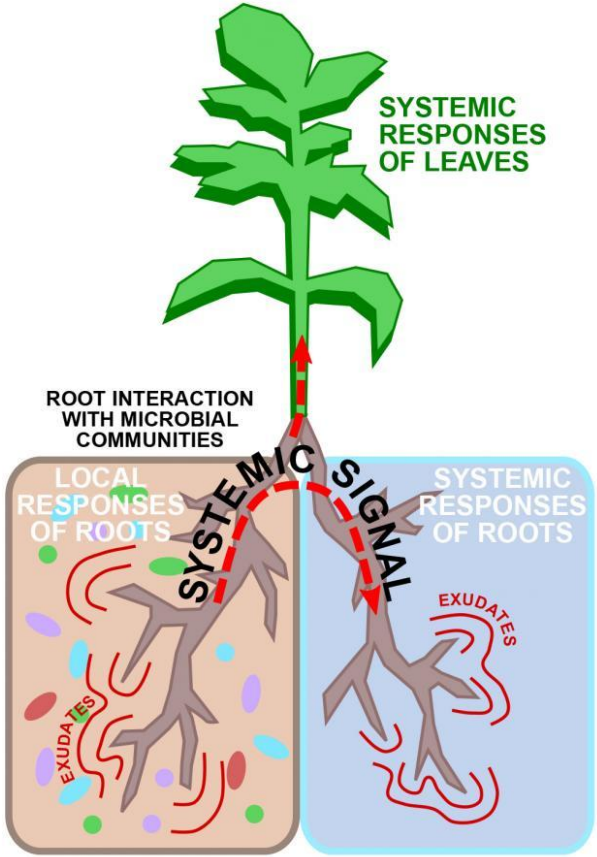
Beneficial bacteria in soil are vital to a healthy plant.

- Help plant fight pathogens
- Encourage plant growth
- Decompose and recycle nutrients in organic material
- Maintain soil fertility
- Increase water retention

The Rhizosphere

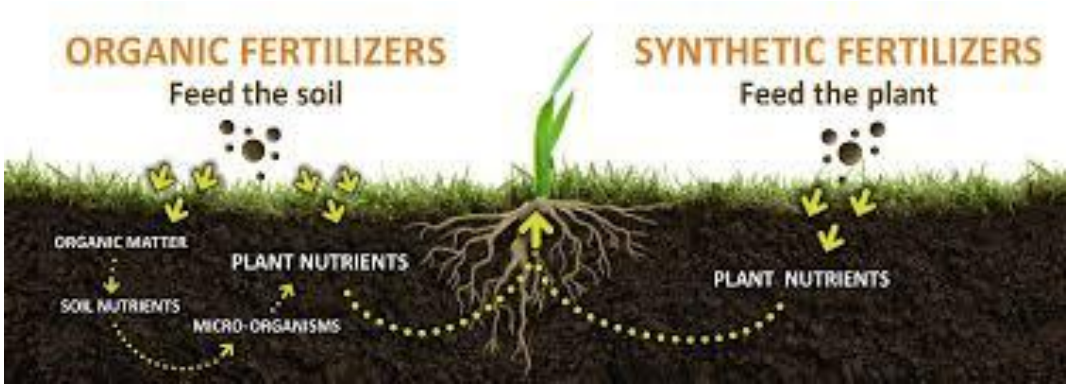
- Area of soil around a plant's roots where many microorganisms communicate with the roots and are affected by root secretions.
- Beneficial microorganisms in the rhizosphere have a large effect on the overall health of a plant.
- What bacteria are helpful to plants when present in the rhizosphere?

(A.C. Kennedy, L.Z. de Luna, in Encyclopedia of Soils in the Environment, 2005)



J. Szymanski / IPK

Switching to Biofertilizer



milorganite

Harnesses the power of beneficial microorganisms to promote holistic plant and soil health by colonizing the plant's microbiome. Increases biodiversity around the plant, sustainably.

Which microorganisms are beneficial?

- With research, the purpose of specific microorganisms are being revealed.
- We still don’t know exactly what microorganisms promote plant health, and how.

Sourdough Starter

- Mix of flour and water fermented by a colony bacteria and yeast living symbiotically.
- Mostly lactobacillus bacteria (probiotic) and Saccharomycetales yeast present in sourdough starter.
  - Are these microorganisms good for plants, too?
  - Can sourdough starter be used as a biofertilizer?

My Experiment's Question:

How does sourdough starter affect Cherry Belle radish germination rate, root growth, and plant growth when radishes are watered with water-sourdough solutions of varying concentrations?

Hypothesis and Goal:

Hypothesis: If Cherry Belle radishes are watered with water-sourdough solutions at 0%, 1%, 5%, 15%, and 30% concentrations, then radishes watered with 1%-5% sourdough starter concentrations will germinate the fastest, grow the largest roots, and grow the tallest stems because beneficial lactobacillus bacteria are present in sourdough, however a 15%-30% concentration of sourdough is too acidic for optimal plant growth.

Goal: To determine if sourdough is a cost-effective biofertilizer that enhances plant growth by donating beneficial bacteria to the plant's rhizosphere.

Materials

- pH Soil Test Strips
- Soil pH Test Kit
- 5 Deep plastic bins for each group of radishes
- Precise Scale
- Cherry Belle Radish Seeds
- Planting Soil
- King Arthur All Purpose Flour

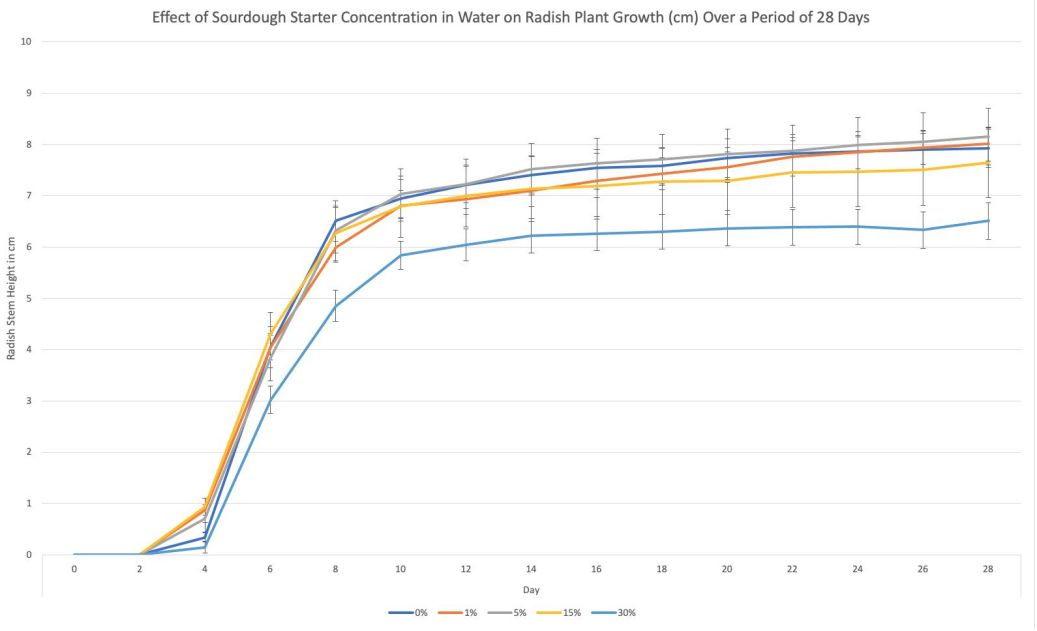
Procedure

- Split radishes into 5 groups of 10 radishes, one for each concentration (0%, 1%, 5%, 15%, and 30%)
- Water each group with a different water-sourdough mixtures in the above concentrations.
- Measure plant growth for 28 days (in cm.), soil pH, and root length.
- Analyze data using ANOVA

Results

Minimal differences in plant growth: Trends on graph indicate that if the experiment were continued, the 1% and 5% groups may have grown taller than the other groups.

30% sourdough starter concentration group grew less than the other groups- supported by a lack of overlap of the error bars in the graph on the right one starting on day 20.



Conclusions

- Hypothesis rejected by this experiment
- High concentrations of sourdough starter create a crust on surface of soil, experiment may be more successful if much more dilute solutions are used.
- Experiments studying sourdough microbiome on plant resistance to pathogens may be better suited to the beneficial qualities of sourdough starter.
- Much more research needed to uncover the composition of sourdough starter microbiomes and their interactions.
- Interesting future experiment: How do sourdough starter microbiomes change over time from creation to maturity?