WOODLAND COMMUNITY COLLEGE MESA UNDERGRADUATE RESEARCH SCHOLARS

UC DAVIS

Stigma- and seed-sourced microbes from watermelon (*Citrullus lanatus*) influence seedling health

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Introduction

- Microbe communities help shape the future health of seedlings and mature plants
- Certain microbes found in microbial communities can improve or deteriorate developmental health in seedlings
- Important to understand the positive/negative effects of microbes on seedling health
- **Research question:** What microbes inhibit the germination of the watermelon (*Citrullus lanatus*) seedlings?

Methods

- Surface sterilized watermelon seeds were inoculated with specific stigma/seed microbe (Table 1).

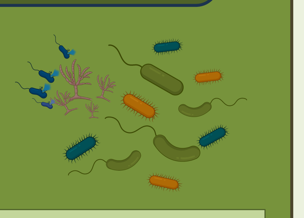
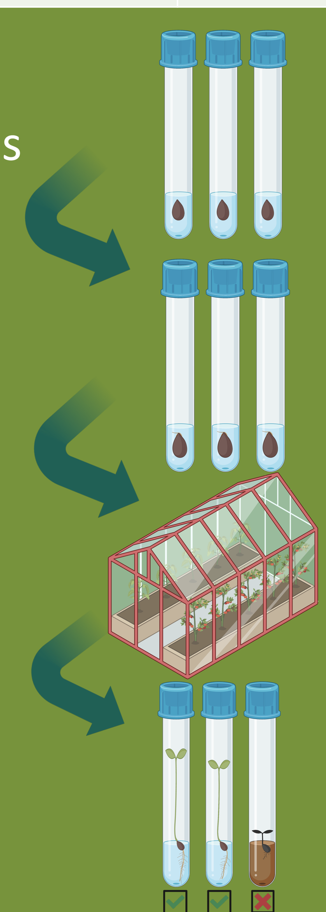


Table 1. The microbial isolates used in this experiment, including their type (kingdom and growth form), where they were isolated from, and the study where they were first reported.

Microbe (isolate ID)	Microbe type	Isolation source	Ref
Bacillus (T.m10.b1)	Bacterium	Watermelon seed	[3]
Cladosporium (T.m8.f1)	Mold fungus	Watermelon seed	[3]
Acidovorax citrulli (AAC00-1R)	Bacterium	Watermelon fruit	[1]
Erwinia (P.s8.b2)	Bacterium	Watermelon stigma	[3]
Fusarium (P.s6.f4)	Mold fungus	Watermelon stigma	[3]
Paraburkholderia (T.s1.b2)	Bacterium	Watermelon stigma	[3]
Rosenbergiella (P.s10.b1)	Bacterium	Watermelon stigma	[3]
Starmerella (T.s10.f3)	Yeast fungus	Watermelon stigma	[3]
Acidovorax citrulli (M6R)	Bacterium	Melon fruit	[2]
Pantoea agglomerans (Pa299R)	Bacterium	Pear leaf	[4]

- Inoculated seeds were moved to individual test tubes with plant propagation medium.
- Days 1-7 post-inoculation: Germination of the seeds was recorded
- Days 7-14 post-inoculation: Germinated seeds were moved to the growth chamber
- Day 14 post-inoculation: Normal and abnormal phenotypes were recorded based on the rules from the International Seed Testing Association [7]



Results

Microbial inoculation caused variation in germination rates (Kruskal-Wallis; X^2=28.685, df =10, p = 0.001401), with decreases in germination for *Cladosporium* and *Fusarium*-inoculated seed batches.

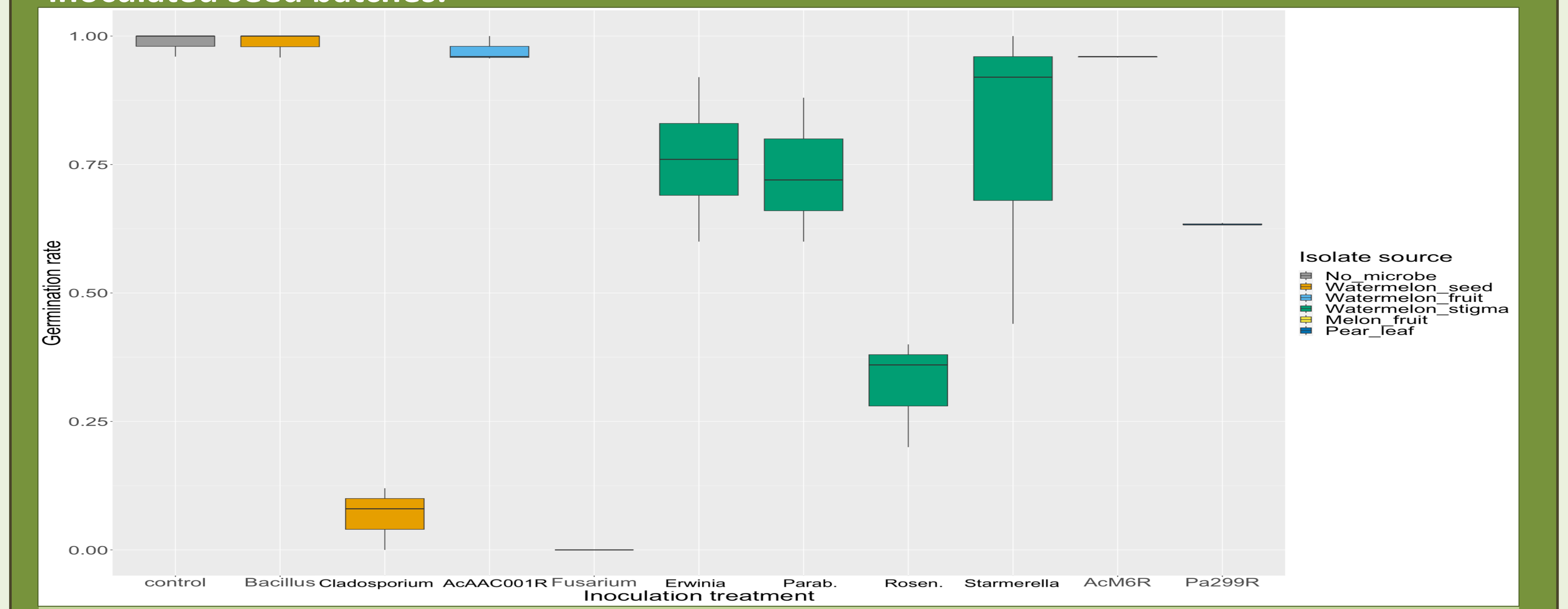


Figure 1. Variation in germination rates between inoculation treatments. Germination rate was calculated as the number of seeds that germinated out of the 25 seeds in the inoculation batch.

There were differences in the number of days it took for seeds to reach 50% germination between microbes (Kruskal-Wallis; X^2= 31.861, df= 10, p=0.0004223). Control, *Acidovorax*- and *Bacillus*-inoculated seed batches reached 50% germination faster.

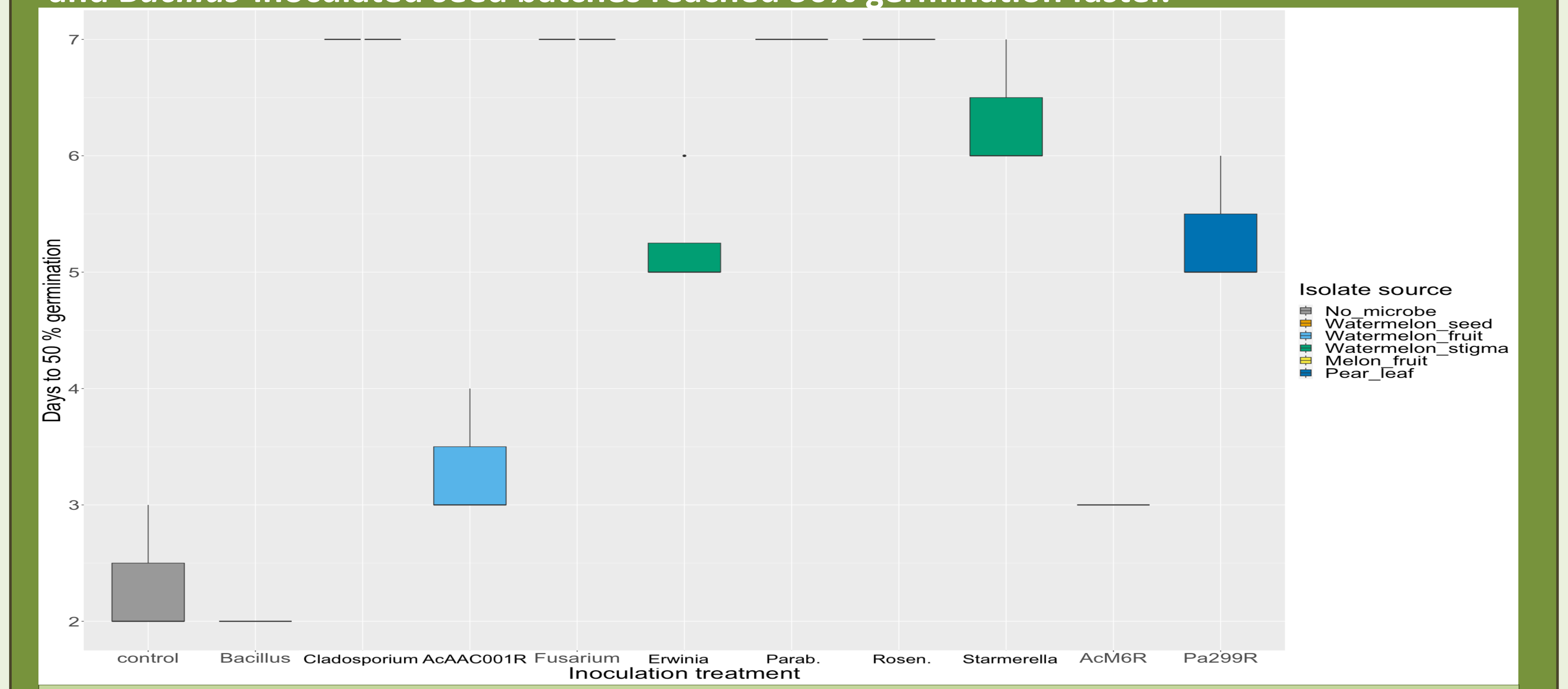


Figure 2. Variation in the number of days it took for half the sample size of seeds to reach germination.

Rates of normal seedling growth varied between microbes (Kruskal-Wallis; X^2= 29.279, df= 10, p= 0.001123). There was a higher amount of normal growth in the control, *Acidovorax*- and *Bacillus*-inoculated seed batches.

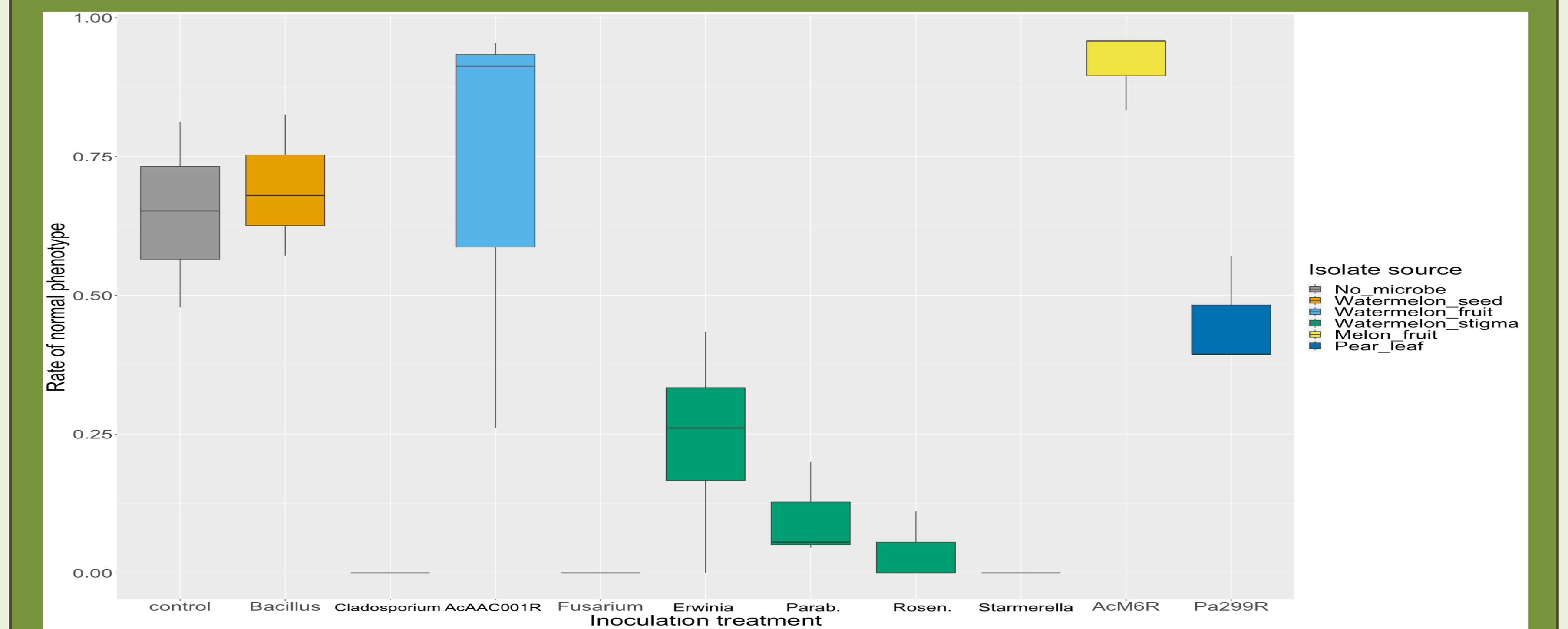


Figure 3. Variation in seedling normal phenotypes rates. The rate of normal phenotype was calculated as the number of seedlings that were growing normally out of the total number of seedlings that germinated in an inoculation batch.

Conclusions

- Seeds inoculated with *Bacillus* showed similar phenotypes observed in past research in other plants such as maize [6] and bean [5].
- There were differences in the rates of germination and phenotype data which depended on which microbe was used for the inoculation
- Although most *Acidovorax citrulli*- inoculated seedlings showed normal phenotype, symptoms could develop later in the plant's life

Future directions

- Test to see if inoculating seeds with *Bacillus* before other pathogenic microbes prevents disease in seedlings
- Test to see how inoculated seedlings develop in later plant stages
- Test to see if inoculating seeds with specific microbes affects fruit quality

References

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