Evaluation of Plant-Beneficial Actinobacteria for Enhancing Growth and Bioactive Compound Production in Microgreens

Chomploy Panthawong* and Pharada Rangseekaew

Department of Biology, Faculty of science, Chiang Mai University, Chiang Mai 50200, Thailand

E-mail* : Chomploy_p@cmu.ac.th

Abstract

Microgreens have gained popularity among health-conscious individuals due to their higher nutrient content compared to their mature counterparts. They are particularly rich in bioactive compounds such as antioxidants, carotenoids, flavonoids, glucosinolates, and phenolic compounds. Plant-beneficial actinobacteria have previously been reported to promote plant growth and enhance the accumulation of bioactive compounds. Therefore, this study aimed to evaluate the effect of the actinobacterium *Streptomyces thermocarboxydus* S3 on the growth and bioactive compound production in four types of microgreen: kale, red cabbage, broccoli, and mustard. The following treatments were applied to microgreens: (1) *S. thermocarboxydus* S3 spore suspension (10^8 CFU/ml), (2) *S. thermocarboxydus* S3 supernatant, (3) ISP2 broth, and (4) control (without actinobacteria). The microgreens were cultivated for 9 days under well-watered and reduced water conditions. The results showed that inoculation with *S. thermocarboxydus* S3 spore suspension significantly increased total chlorophyll, carotenoids, antioxidant activity, and phenolic compound content in kale and broccoli microgreens compared to other treatments under both water conditions. In addition, both types of microgreen treated with *S. thermocarboxydus* S3 spore suspension showed no significant differences in fresh weigh and dry weight compared to the control. However, *S. thermocarboxydus* S3 effectively maintained plants parameters under both well-watered and reduced water conditions, suggesting a potential role in supporting plant resilience. Study on the effect of *S. thermocarboxydus* S3 on red cabbage and mustard microgreens are ongoing. This study reveals the potential of plant-beneficial actinobacteria to boost bioactive compounds in microgreens, offering new strategies to enhance plant nutrition.

Objective

To evaluate the effects of actinobacteria on growth and bioactive compound production in microgreens

Materials and Methods

1. Materials

- **Actinobacteria**

Streptomyces thermocarboxydus S3

- **Plants**

Kale (*Brassica oleracea* var. *sabellica*)

Broccoli (*Brassica oleracea* var. *italica*)

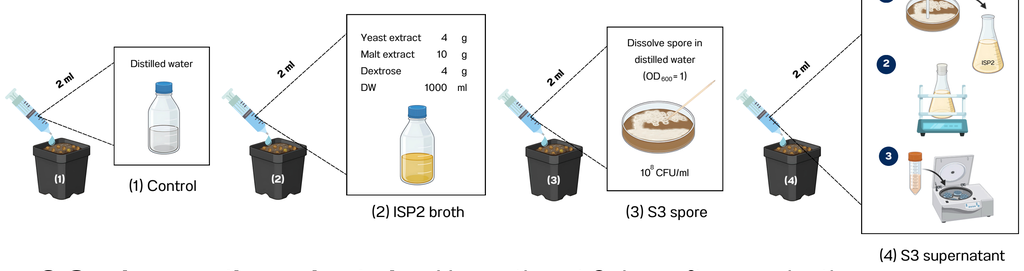
*In progress

Red cabbage (*Brassica oleracea* var. *capitata f. rubra*)

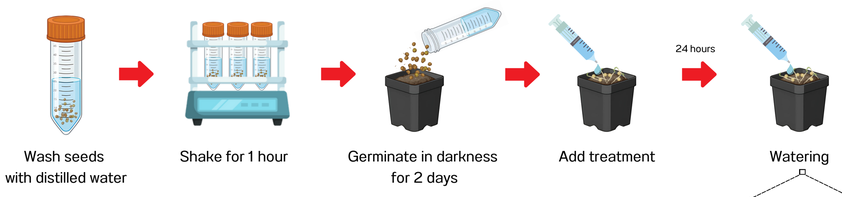
*In progress

Mustard (*Brassica juncea*)

2. Plant treatment preparation



3. Seed preparation and watering: Harvesting at 9 days after germination



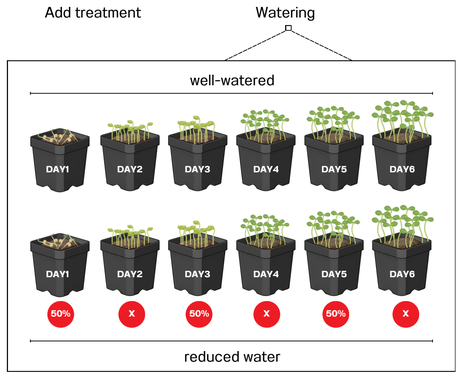
4. Determination of plant parameters

Bioactive compounds

- Total chlorophyll content
- Carotenoid content
- Antioxidant activity
- Phenolic compound content

Morphology

- Fresh weight
- Dry weight



Results

1. Kale microgreen

Figure. 1 Total chlorophyll content

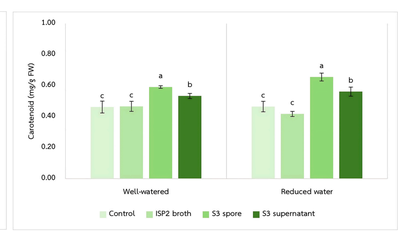


Figure. 2 Carotenoid content

Figure. 3 Antioxidant activity

Figure. 4 Phenolic compound content

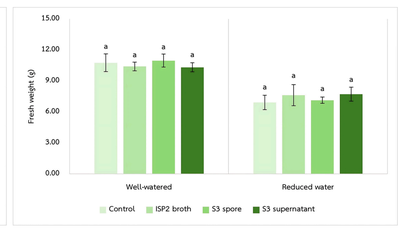


Figure. 5 Fresh weight

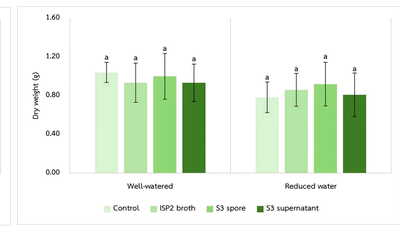


Figure. 6 Dry weight

2. Broccoli microgreen

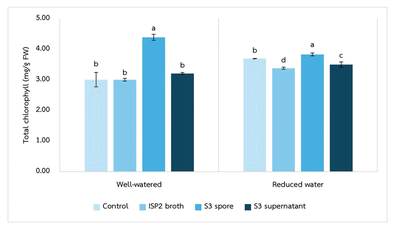


Figure. 7 Total chlorophyll content

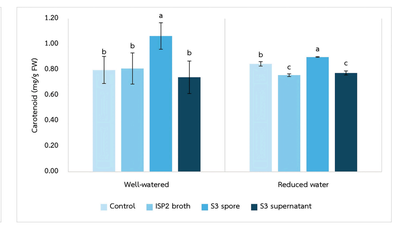


Figure. 8 Carotenoid content

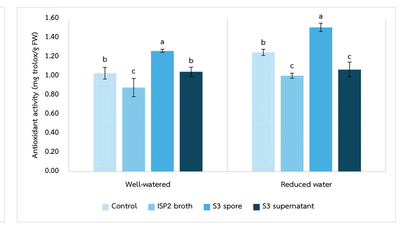


Figure. 9 Antioxidant activity

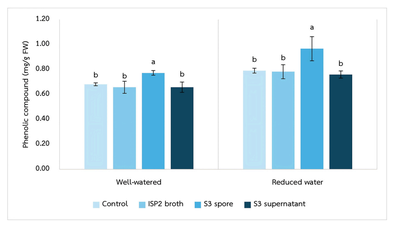


Figure. 10 Phenolic compound content

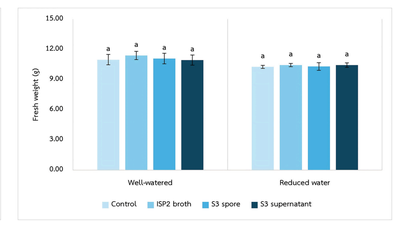


Figure. 11 Fresh weight

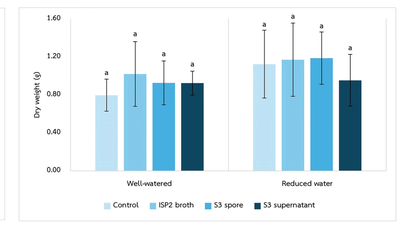


Figure. 12 Dry weight

Conclusion

- Inoculation with *S. thermocarboxydus* S3 spore suspension significantly increased bioactive compounds including total chlorophyll, carotenoids, antioxidant activity, and phenolic compounds in microgreens compared to the control.

Acknowledgements

Lect. Dr. Pharada Rangseekaew, Project's advisor

Microbiology section, Department of Biology, Faculty of Science, Chiang Mai University

2806 Laboratory members