Photosynthetic Bacteria Enhance Cherry Tomato Yield and Quality While Promoting Sustainable Agriculture

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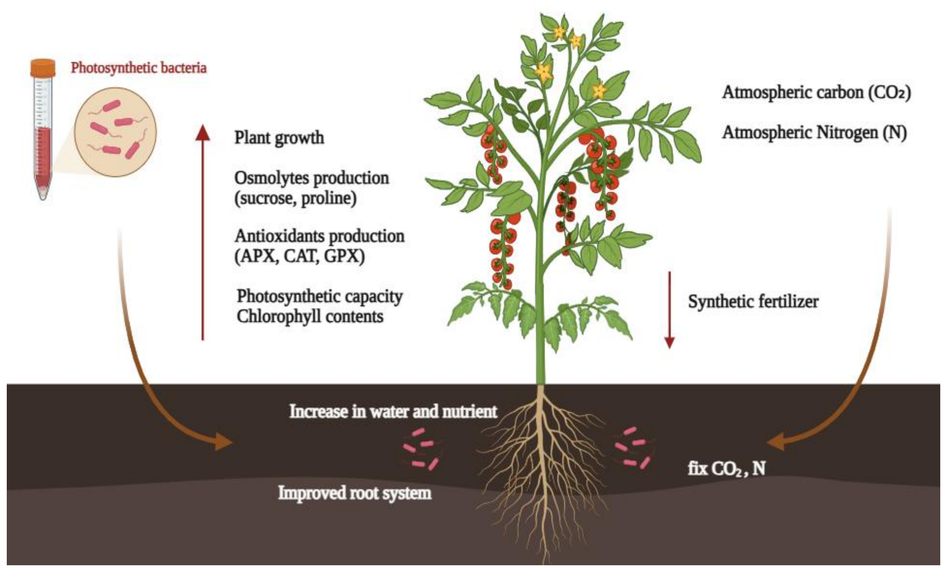
Abstract

Photosynthetic bacteria represent a promising biological approach to sustainable agriculture, offering multifaceted benefits for plant growth and crop quality through phytohormone production, antioxidant protection, nitrogen fixation, and improved stress tolerance. Results indicated that treatments with photosynthetic bacteria significantly improved plant growth at 28, 42, and 56 days after transplanting (p = 0.004) and resulted in higher yields compared to untreated controls (2.64 and 2.14 kg plant^{-1}; p = 0.001). Moreover, treated plants exhibited significantly greater total soluble solid, TSS (7.2 and 6.0 ° Brix; p = 0.001), although no significant differences were observed in individual fruit weight, fruit length, or fruit width. These findings underscore the considerable potential of photosynthetic bacteria as sustainable bio-inputs for modern horticultural systems.

Introduction



Objective

- To study the efficiency of photosynthetic bacteria in promoting the growth, quality, and yield of cherry tomato

Results

- Efficiency of photosynthetic bacteria in promoting the growth, quality, and yield of cherry tomato

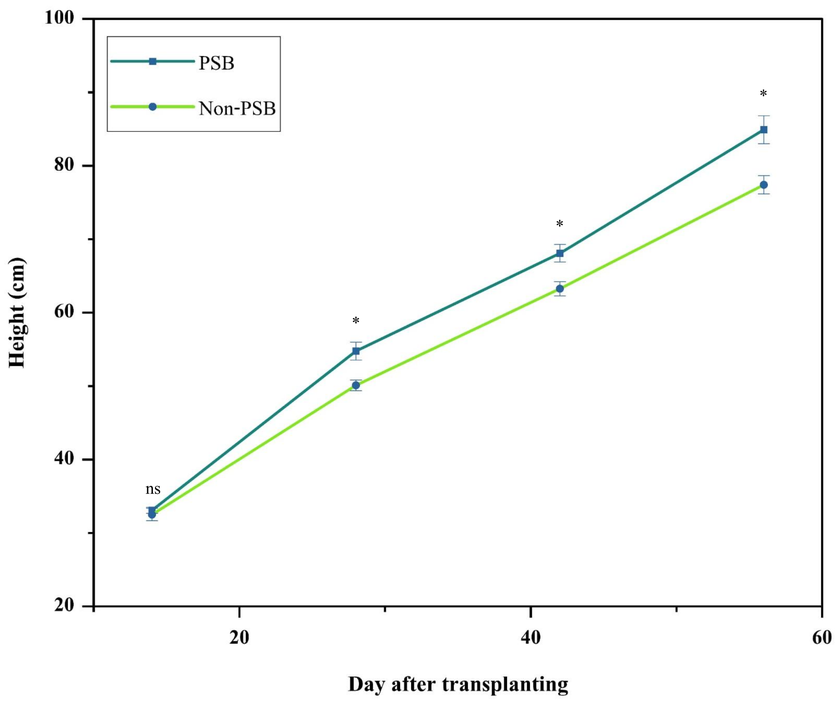


Fig 1. Effect of photosynthetic bacteria on plant growth at 14, 28, 42, and 56 days after transplanting

Conclusions

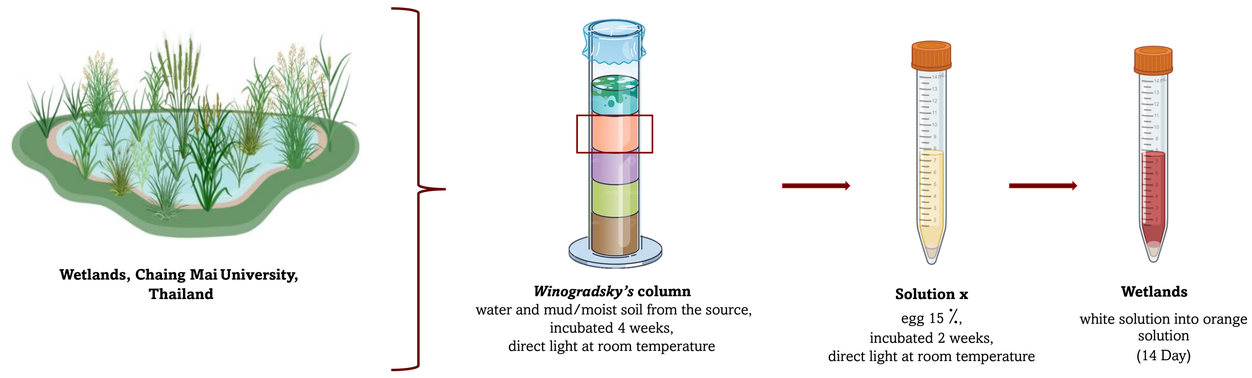
- Photosynthetic bacteria (PSB) promoted the growth of cherry tomatoes.
- PSB application increased fruit yield and total soluble solids.
- The application of photosynthetic bacteria in agriculture is a promising approach to reduce reliance on synthetic fertilizers, improve soil health, reduce environmental contamination, and support sustainable agricultural practices.

Acknowledgement

This research work was partially supported by the Soil Microbiology Laboratory Soil Science. Department of Plant Science and Soil Science, Faculty of Agriculture, Chiang Mai University, Thailand

Materials and methods

- Screening of photosynthetic bacteria from wetlands



- Efficiency of photosynthetic bacteria in promoting the growth, quality, and yield of cherry tomato

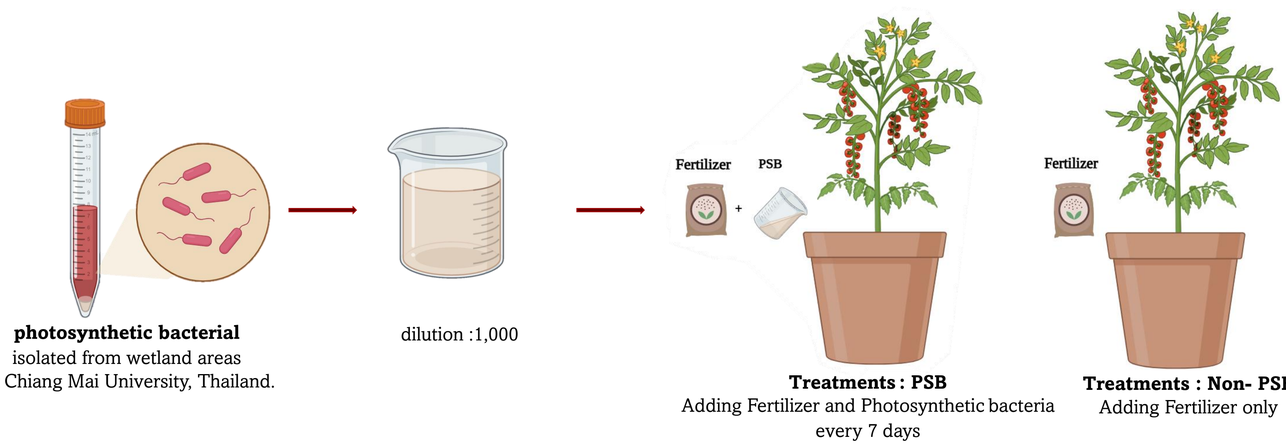


Table 1. effect of photosynthetic bacteria on yield, fruit weight, fruit length, fruit width and total soluble solid

Treatments	Total yield weight (kg plant^{-1})	Yield quality			
		Fruit weight (g)	Fruit length (cm)	Fruit width (cm)	Total soluble solid (°Brix)
PSB	2.64	10.29	3.02	2.42	7.20
Non-PSB	2.14	10.68	3.18	2.35	6.07
LSD	*	ns	ns	ns	*
CV(%)	10.50	14.15	9.39	5.11	9.72

Note: Letters show significant difference at P< 0.005

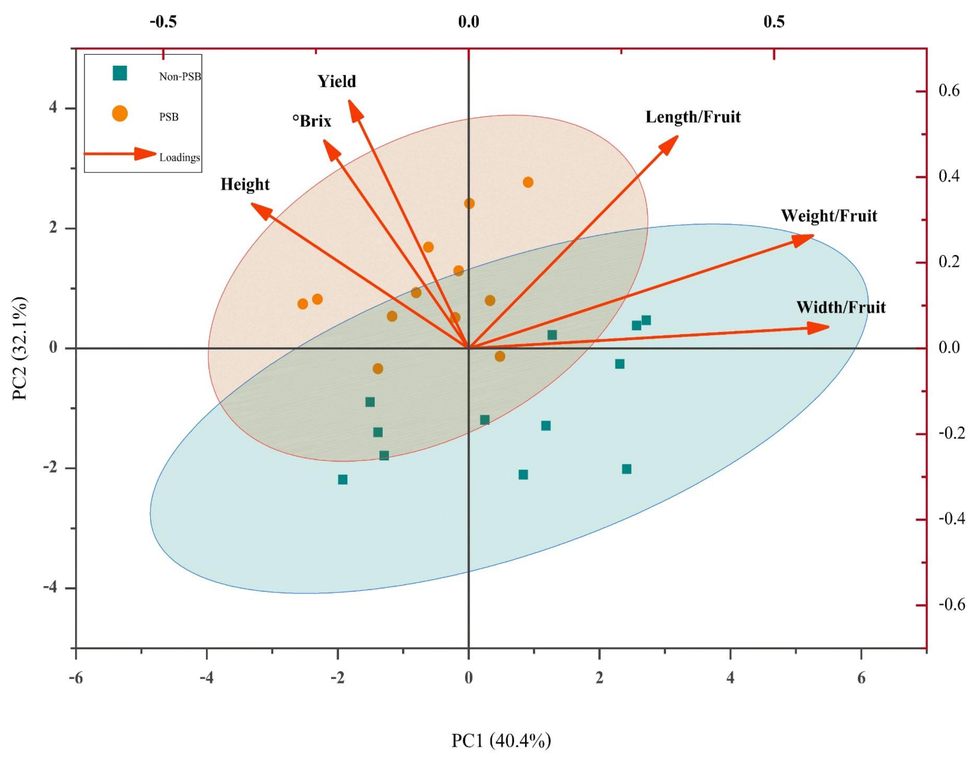


Fig 2. Effect of photosynthetic bacteria on yield, fruit weight, fruit length, fruit width and total soluble solid

- PSB application increased fruit yield (2.64 and 2.14 kg plant^{-1}; p = 0.001).
- Higher total soluble solids (TSS) were observed in PSB-treated fruits (7.2 and 6.0 ◦Brix; p = 0.001).

References

Winogradsky S.N. 1952. Microbiologie du sol, Problèmes et méthodes; cinquante ans de recherches (Soil Microbiology: Problems and Methods, Fifty Years of Investigations). House of the Academy of Science of USSR, Moscow. 861 p.