UNIVERSITY OF HOHENHEIM

Institute of Agricultural Sciences in the Tropics (Hans-Ruthenberg-Institute) (490)

Effects of Microbial Inoculants on Growth and Salinity Tolerance of Hydroponically-Grown Tomatoes

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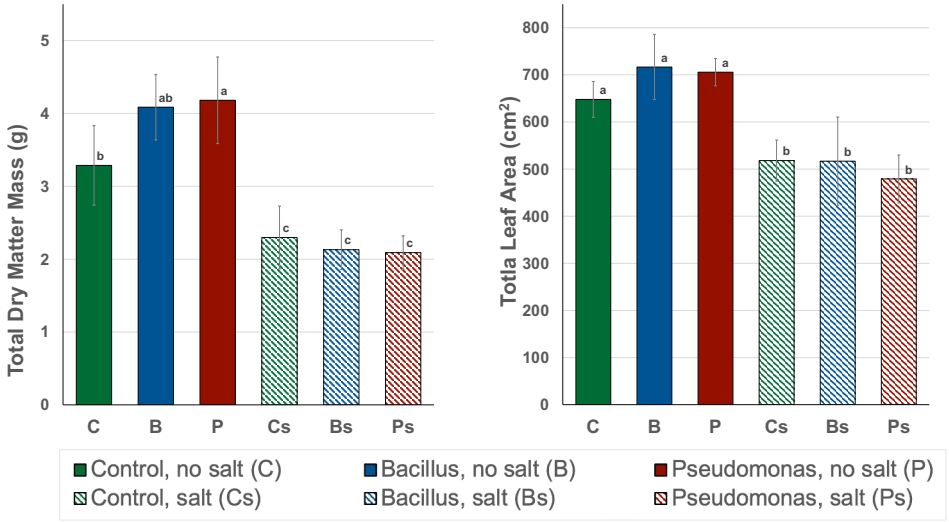
Introduction

Hydroponic production is thought to be most sustainable when based on marginal waters that may contain salts at levels detrimental to plants. Some microorganisms are known to confer a certain degree of salt tolerance to plants. Little is known on the effects of microorganisms on plants grown in hydroponics and the impact of salinity on the effectiveness of such micro-organisms in hydroponic production.

Conclusions

- In the absence of salt, inoculated plants performed better than non-inoculated plants.
- In saline conditions, inoculation with micro-organisms had no effect
- Plant – microbe interactions may be highly variable
- Hydroponics may serve to identify beneficial micro-organisms

Results and Discussion



Data is shown as means of the six treatments. Error bars = Standard deviation. Labels show the mean groupings by Tukey's HSD test.

- Inoculated plants outperformed non-inoculated plants (dry weight) in non-saline conditions; grew more non-leaf tissue (Table)
- No significant differences in dry weight or leaf area among plants grown under saline conditions
- Bacillus has a significant effect on leaf greenness (SPAD) compared to control, across salt treatments
- Salt stressed plants had significantly less mass and area but had darker, greener leaves (higher SPAD)

Treatment	tot. dry mass (g)	group	root mass (g)	group	stem mass (g)	group	petiole mass (g)	group	leaf mass (g)	group
Control, no salt	3.29	b	0.51	b	0.56	b	0.41	b	1.80	a
Bacillus, no salt	4.09	ab	0.66	a	0.75	a	0.50	a	2.19	a
Pseudomonas, no salt	4.18	a	0.67	a	0.73	a	0.51	a	2.28	a
Control, salt	2.30	c	0.46	b	0.43	bc	0.27	c	1.14	b
Bacillus, salt	2.13	c	0.41	b	0.39	c	0.25	c	1.07	b
Pseudomonas, salt	2.09	c	0.40	b	0.37	c	0.24	c	1.08	b

Materials and Methods

Plant Material: *Solanum lycopersicum L.* var. Sweeterno (supplied by Rijk Zwaan)
Hydroponic setup: 36 Deep pool hydroponic pots, with 50% INTEGAR nutrient solution (commercial tomato formulation). Aeration by bubbled air pumped through pipet tips on rubber tubing. Pots closed with foil (not airtight) Transplanted at 1-true-leaf stage; grown for 18 days in treatment pot. Plants grown on a set supply of nutrients – no solution change; experiment ended when solution ran low. Bacterial inoculants: Two bacterial inoculants, both previously identified as beneficial:
Pseudomonas brassicacaerum 3Re2-7 (supplied by Sourcon Padena), and *Bacillus megaterium* Ni-5-SO-11 (from Hans-Ruthenberg institute). Inoculation concentration 1.0E6 CFU/ml of nutrient solution
Salt treatment concentration: 60 mM NaCl. This research was supported by the HypoWave+ project funded by the German Federal Ministry of Education and Research (funding code: 02WV1562D).