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Effect of Salinity on Growth and Ion Concentration of two Genotypes of Solanum lycopersicum L. and Cucumis sativus L. under contrasting VPD Levels

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Introduction

Salt stress causes osmotic stress, ion toxicity, and nutrient imbalances and affects thus plant growth. The atmospheric demand for moisture (Vapor Pressure Deficit) affects transpiration High VPD may increase rates. transpiration and thus increase salt uptake, resulting in aggravated salinity effects. Little is known on the combined effects of high VPD and elevated root zone salinity in tomato and cucumber.

Results and Discussion

8

6

4

2

18

16

14

12

10

8

Dry weight (g)



VPD Growth Chamber

Conclusions

EXALT

Tomato is more salt tolerant than cucumber.

MEWAC

- Up to the salinity threshold, dry air conditions increase dry matter accumulation in both species.
- VPD has no effect on ion accumulation in both species.
- Ion concentrations in tomato are higher than cucumber.



K⁺ concentrations were similar for all plants, Na⁺ concentrations were up to 5 times higher in tomato.

Higher tolerance to salinity allows tomato plants to accumulate higher concentrations of Na⁺ and Cl⁻.
Increases in Na⁺ and Cl⁻ concentrations were strongly linked to decreases in biomass accumulation.

Materials and Methods

levels of VPD.

Total plant dry weights of 48 days old

plants for 2 tomato and 2 cucumber varieties grown hydroponically under

3 levels of root zone salinity and 2

Two varieties of tomato (Sweeterno; Saluoso) and cucumber (Addison; Prolog) were grown in a hydroponic set-up in VPD-regulated growth chambers in the Phytotechnikum of the University of Hohenheim, Germany. 28-day-old seedlings were transplanted into INTEGAR nutrient solution with 40 ppm nitrate. Two VPD levels (1.9 kPa and 3.1 kPa) were maintained inside the chambers. Plants were subjected to root zone salinity at 0 mM, 15 mM, and 30 mM (cucumber), and 0 mM, 30 mM, and 60 mM (tomato) for 20 days. Plants were then dried at 65°C for 72h and dry weights determined. Dried samples were ground using a ball mill and analyzed for Na⁺, K⁺, and Cl⁻ by the flame photometer and autoanalyzer.

