# The 13th Dahlia Greidinger International Symposium 2019

## Nitrogen fertilization of plants in the desalinated-water era. A study of interactions of nitrogen with chloride.

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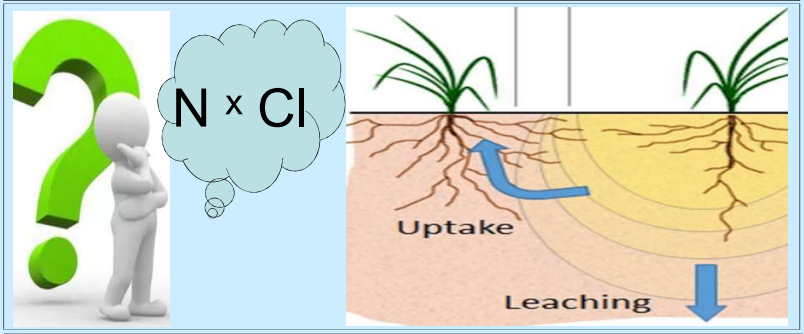
### Introduction

The use of desalinated water for irrigation is an important opportunity to optimize nitrogen (N) fertilization of plants for increased yield while reducing contamination of groundwater by nitrate. To study this, the response of lettuce and potato plants to a range of different N and chloride (Cl) concentrations were studied.




### Method

Automated lysimeter system irrigated using 24 containers of 200 liters each. Coarse sand was used as the growth medium. A 1:1 ammonium nitrate solution was used as a source of N.


### Results

- ✓ Potato and lettuce yield increased with N up to optimal N concentration of the irrigating solution and decreased with Cl (Fig 1). Optimal N at low Cl was higher than at high Cl.
- ✓ Drainage N increased with increase in N and Cl concentration in the irrigation solution for the two crops (Fig 2).
- ✓ N uptake by potato and lettuce increased significantly with increase in N concentration and with decrease in Cl concentration in the irrigation solution (Fig 3).
- ✓ Cl concentration in potato tissues increased with increase in Cl concentration and with decrease in N concentration in the irrigation solution (Fig 4).

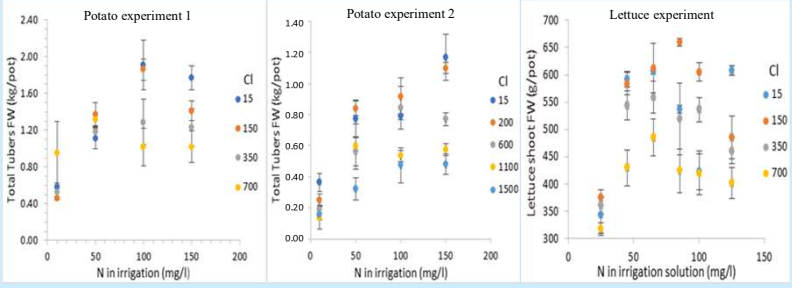



**Figure 1.** Effect of nitrogen and chloride concentrations in the irrigation solution on potato and lettuce yield measured as fresh weight (FW). Error bars represented as the standard errors of the means.

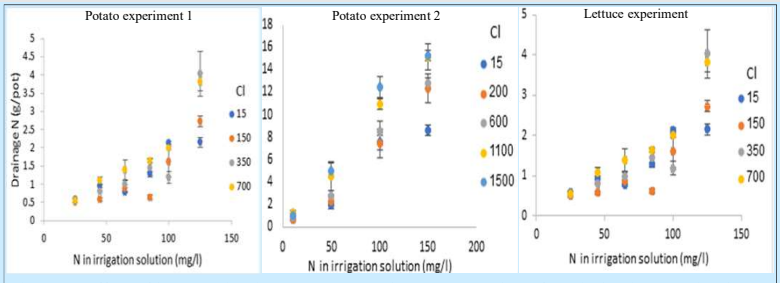



**Figure 2.** Effect of increase in nitrogen and chloride concentration of the irrigation solution in the mass of nitrogen in the drainage as measured during the three experiments. Error bars represented as the standard errors of the means.

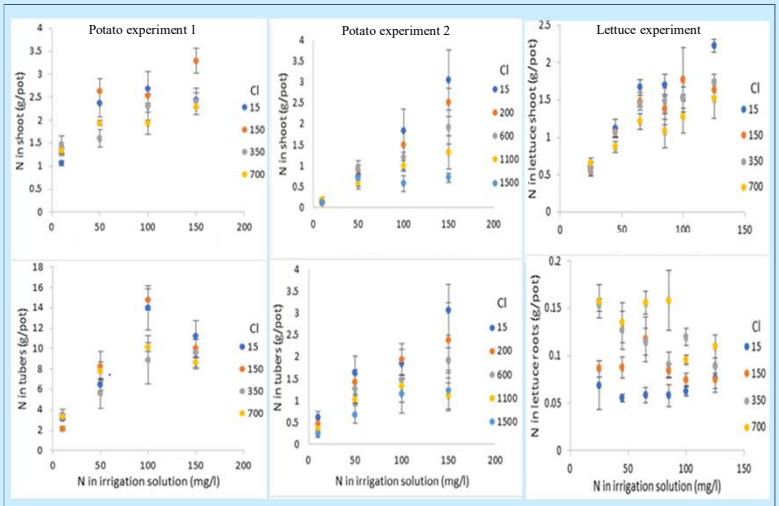



**Figure 3.** Effect of nitrogen and chloride concentration of the irrigation solution in N mass accumulation in plants tissues. Error bars represent the standard errors of the means.

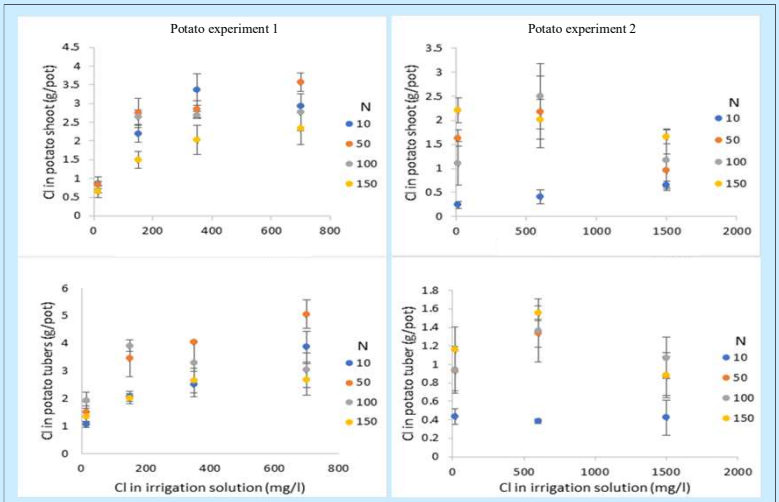



**Figure 4.** Effect of nitrogen and chloride concentration of the irrigation solution in Cl mass accumulation in potato tissues. Error bars represent the standard errors of the means.

### Conclusions

- ✓ The optimal N concentration for potato yield decreased as the Cl concentration in the irrigation solution increased.
- ✓ Downward N leaching below the root zone increased sharply as N concentration is above the optimum.
- ✓ High Cl concentration in the irrigating solution increased downward N leaching below the root zone.
- ✓ N dose in the irrigation solution should be adjusted to the Cl concentration for optimal yield and reduction of N leaching below the root zone.

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