# The Effects of Irrigation Water Salinity on Germination Rate and Early Root Growth on Crop Plants Under Simulated Sea-level Rise Conditions

Caprisha Brown and Dr. Ashley Spring
Eastern Florida State College

## Introduction

Saltwater intrusion driven by rising sea levels can increase irrigation of water salinity, impairing plants' intake of water and nutrients and threatening crop growth. Studies of radish plants, Raphanus sativus, reported increasing salinity reduced germination and root length, delayed root emergence, and decreased root and shoot growth (Ghosh, 2014). It is hypothesized radish, R. Sativus seeds irrigated with water of 0 ppt salinity will germinate significantly faster and develop longer roots after 30 days than seeds irrigated with water of 5, 10, and 15 ppt salinity.

## Materials

- 60 Radish (*R. sativus)* seeds
- Non-iodized sea salt (200 grams)
- Distilled water (3 liters)
- Potting containers of volume 355 mL (3 per salinity level)
- Potting soil
- Plastic bottles for storing salinity solutions
- Metric ruler, digital scale, hydrometer

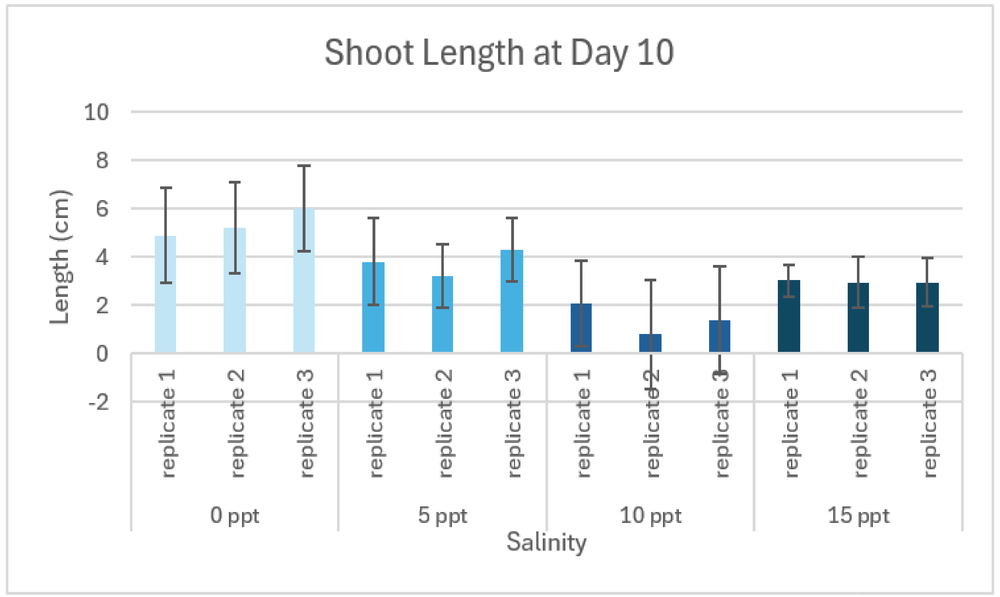



Figure 1. The shoot lengths at 10 dof radish (H. sapiens) hydrated with 0, 5, 10, and 15 ppt saline water (mean ± SD, N = 10).



## Methods

Seeds of each species were planted and watered with distilled water or saltwater solutions at 0, 5, 10, or 15 ppt, and germination rate and average root length were measured and compared with the freshwater controls.

## Results

Germination rate was significantly higher in the 0 ppt control than the 5,10, 15 ppt treatments.



## Discussion

The data support the alternative hypothesis that radish and arugula seeds irrigated with 0 ppt water would have higher germination rates and longer roots than seeds irrigated with 5, 10, and 15 ppt saltwater, with growth declining as salinity increased. This agrees with earlier work showing that salinity reduces germination and root growth in crop plants (Munns 2002; Munns and Tester 2008; [author et al. year]). These findings suggest that saltwater intrusion from sea-level rise could threaten crops grown in coastal soils, and that salt-tolerant crops or alternative irrigation sources may be needed in vulnerable areas.