

## Abstract and Background

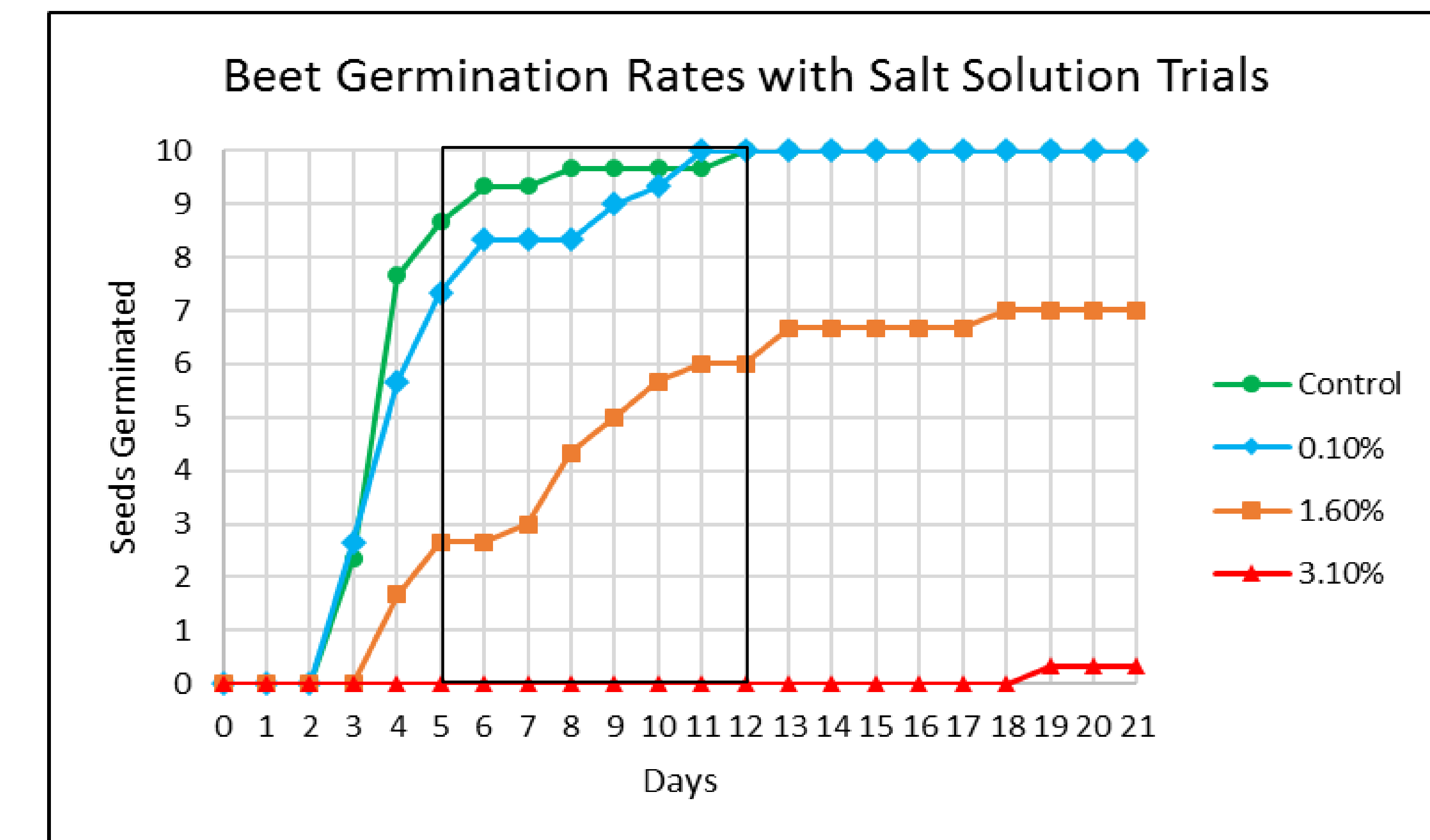
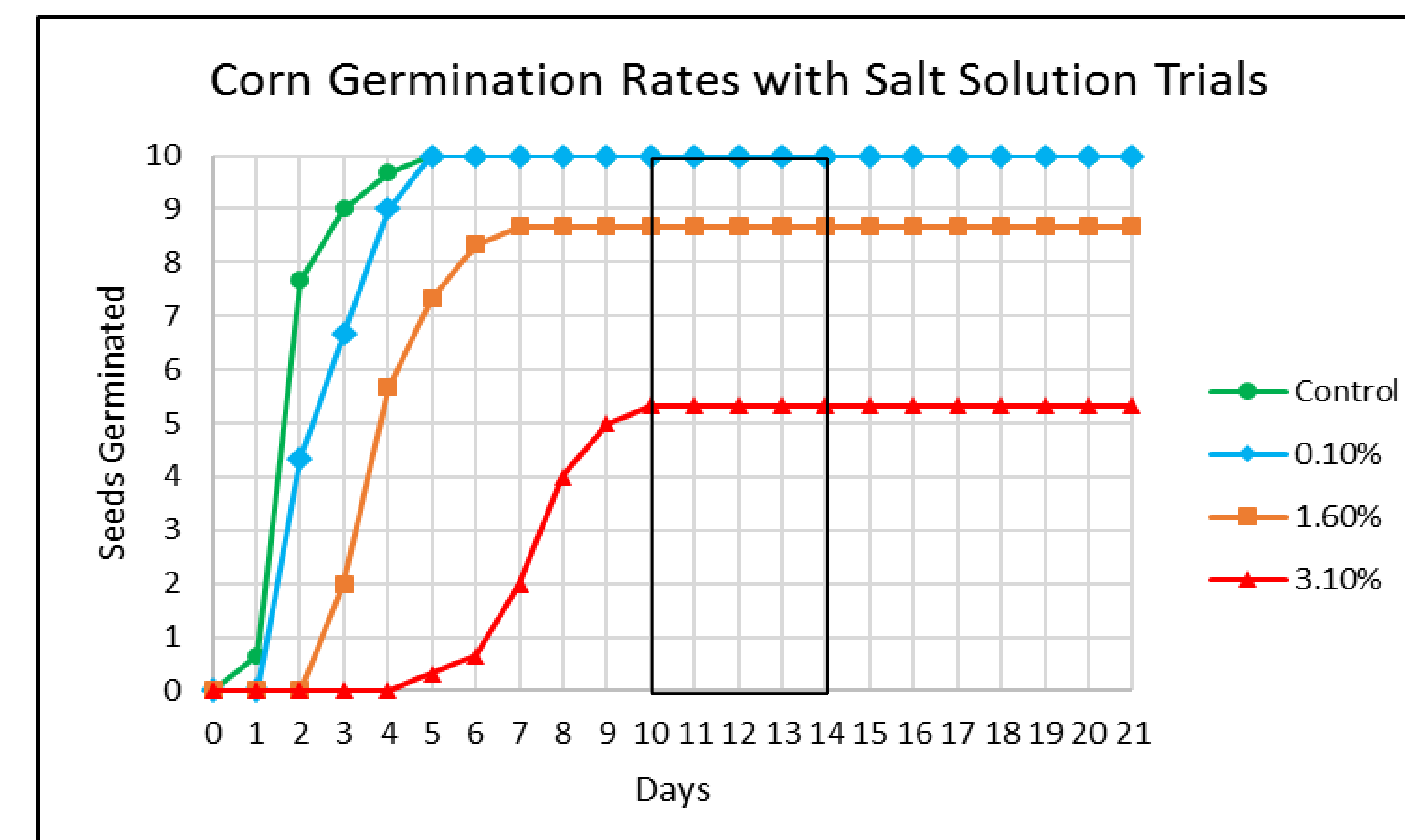
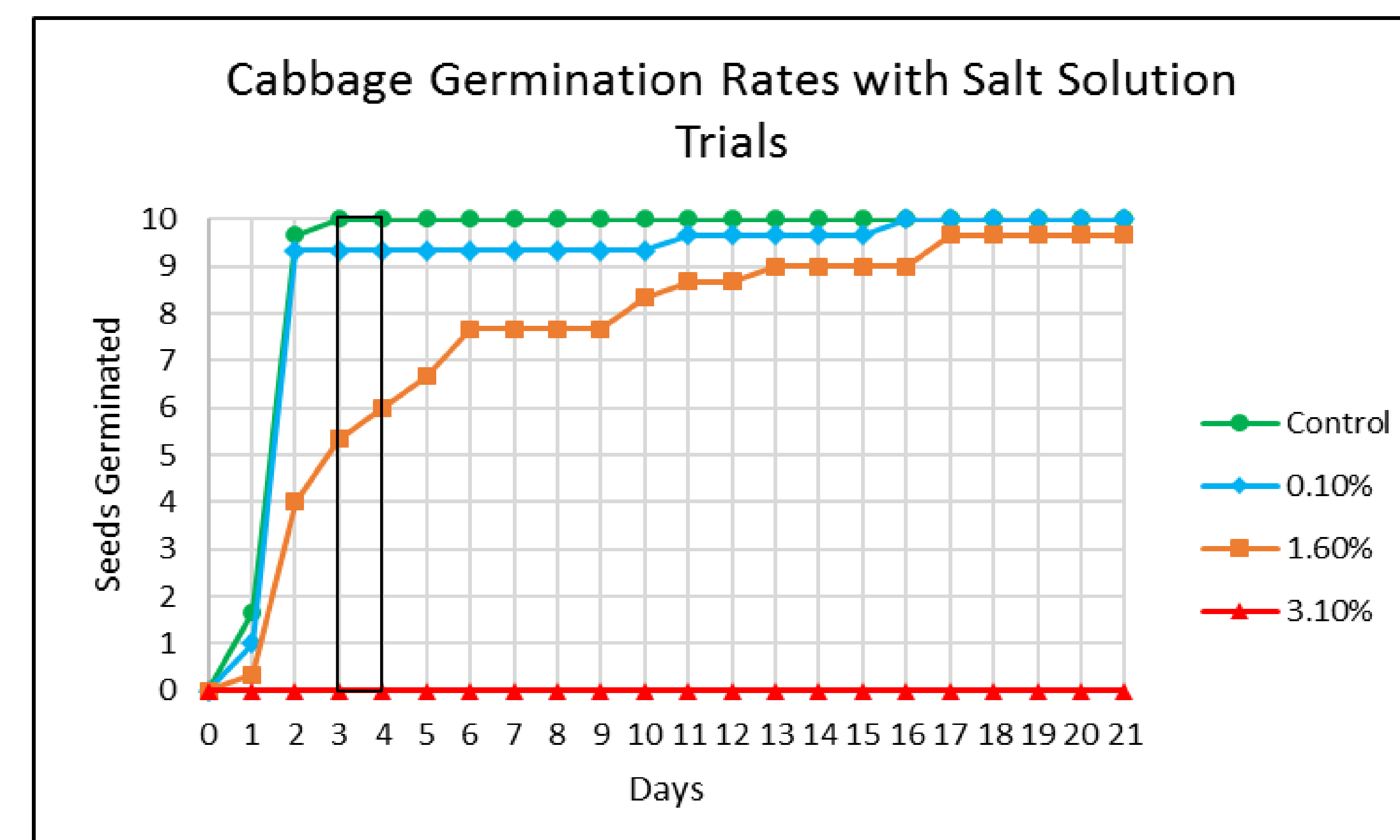
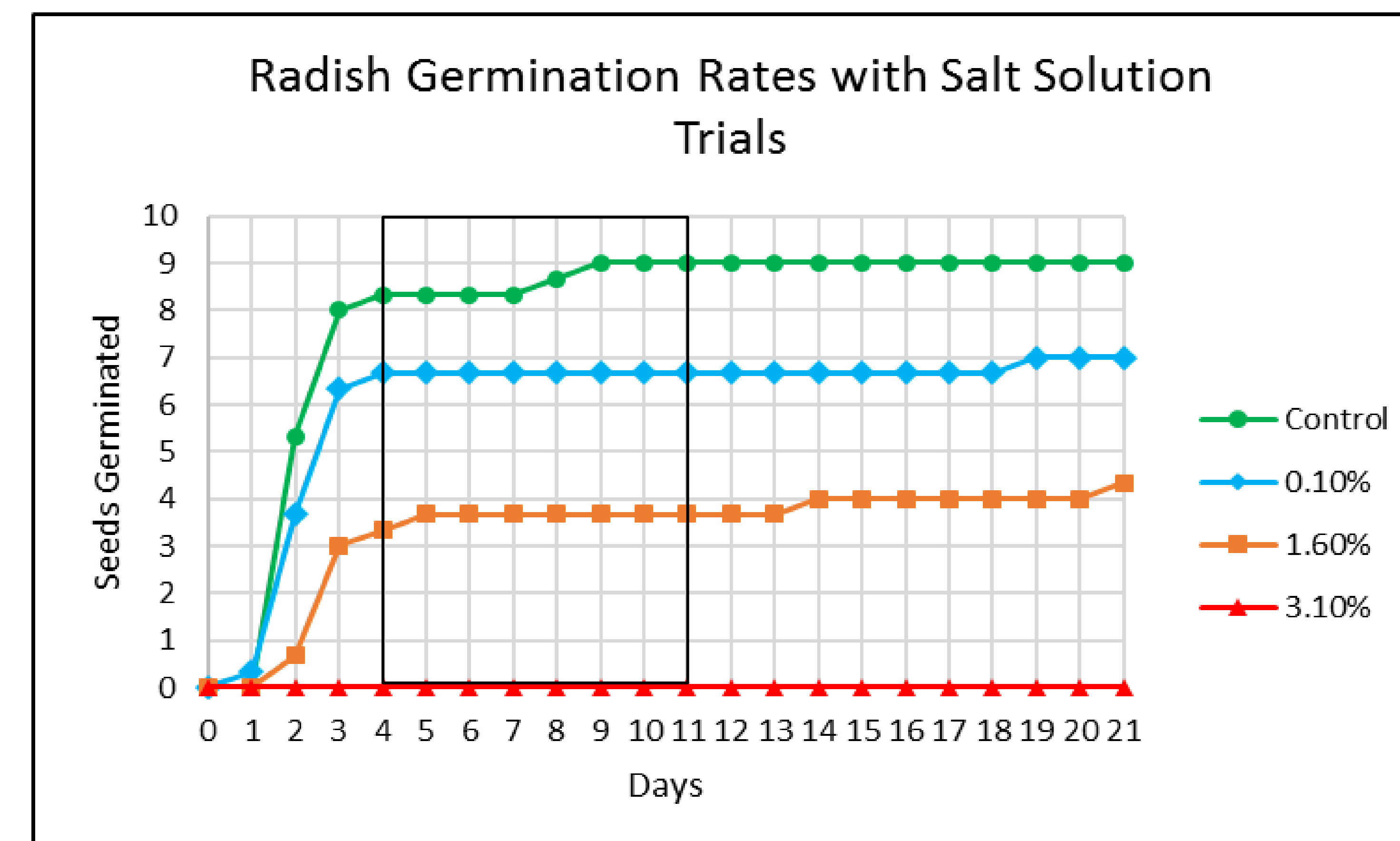
Halite (sodium chloride) rock salt is frequently used in areas that experience large amounts of snow, as a means to melt ice, making it easier to clear and clean roadways. Much of this rock salt is usually picked up as runoff, where it can make its way into the local soil, and affect the local environment. From here it can interact with root systems and produce adverse effects in the local plant life. Because of this, an experiment was put together to test the effects of this on seed germination. Research has shown that different plants can have different tolerances for sodium chloride<sup>[2]</sup>, so to encompass this spectrum of tolerances, four different plants were chosen, with different tolerances, ranging from low, to moderate/high, in order to develop a broader sense of the effects which using halite has on the local environment.

## Methods

- Seeds from four plant varieties were chosen by their recorded sensitivities to sodium chloride<sup>[1]</sup>. These include:
  - Radish: Low tolerance
  - Cabbage: Medium tolerance
  - Corn: Medium tolerance
  - Beet: Moderate/High tolerance
- Three solutions were put together using a set salt value, and varying water values, corresponding to 2016-2017 Cleveland, Ohio snowfall data<sup>[7]</sup>. This yielded mass concentrations of around 0.1%, 1.6%, and 3.1%.
- Tests were broken up by plant variety, and by salt concentration. Each test consisted of a sealable plastic bag, with a folded paper towel, containing the ten seeds, and a fixed volume (18 mL) of solution.
- Three runs of tests were done, providing 48 data sets, and using 480 seeds, and data was recorded over a 21 day period.

## Results

The plots show averages from the 3 runs of trials for each test and were broken up by plant variety, with black boxes representing normal germination periods.



## Conclusion

- The data from these tests appears to generally agree that sodium chloride can have an impact on some plant species.
- The data also appears to show that sodium chloride may affect germination times, with higher concentrations having a greater effect on the germination periods.
- This is shown by how germination times increased in the lower tolerance plants.

## Future Work

- This initial tests were to obtain a broad overview of the effects; however, in the future, more focused research could be done on individual species, over larger arrays of salt levels.
- The current model was heavily idealized, and in the future, salt diffusivity equations for soil could be used to provide more accurate data.

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## References

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