CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

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Project Number

36695

Project Title

The Effects of Silicate Applications on Drought Tolerance and Growth of Lolium perenne and Lactuca sativa var Longifolia

Abstract

Objectives/Goals

Determination of silicate's effects on drought tolerance and growth of Lactuca sativa var Longifolia and Lolium perenne.

Methods/Materials

Lactuca sativa var longifolia and lolium perenne seeds, pots, soil, plant growing racks, milligram balance, oven, autoclave, spectrophotometer, sodium metasilicate. Recorded final height, biomass, and dry weight of around 50 replicates for both plant species.Estimated silicon uptake of Lolium perenne following the Autoclave Induced Digestion method by Elliot and Snyder.

Results

In the Lactuca sativa var Longifolia study, plants treated with silicates in sufficient amounts displayed significant increases in biomass. Plants treated with silicates in drought simulated conditions generally displayed increased biomass when compared to the control. In the perennial ryegrass study, all groups treated with sufficient and drought levels of sodium metasilicate showed increases in biomass, dry weight, and height of perennial ryegrass, as well as an uptake of silicon into their plant tissues as compared to the controls.

Conclusions/Discussion

The silicate concentration that promoted optimal growth varied by plant type and watering condition. Most increases in measurements of biomass, dry weight, height, and estimated silicon uptake were statistically significant. Adding silicates to agricultural fields is possibly a cost-effective way to improve biomass yields of produce with the same amount of water used. Silicates could also be beneficial in reducing water used for landscape irrigation, even at small concentrations while increasing cost-effectiveness.

Summary Statement

By analyzing biomass, dry weight, height, and silicon uptake, I found that silicates prove to be beneficial in enhancing the growth and drought tolerance of Lactuca sativa var Longifolia and Lolium perenne.

Help Received

Got help on experiment design, data collection methods, and statistical analysis from my teacher Mrs. Messenger.