

ANALYZING THE EFFECTS OF VARYING SALT CONCENTRATION ON THE GROWTH RATE OF LAWN GRASS AND WILDFLOWERS

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Intro and Background:

During the winter, the United States spreads over 20million metric tons of Sodium chloride (salt) on the road. (Figure 1)

When the ice and salt melt in the spring and start to run off the road into the roadside soil. Salt displaces the osmotic pressure in the soil making it harder for the plants to diffuse the ions from the salt compared to regular water.

Soil electrical conductivity (EC) can be used as an indirect indicator to find the amount of chloride concentrations in the soil. Levels above 2.0 mS/cm can adversely affect plant growth, and its water with levels ≤ 0.75 mS/cm are considered quality irrigation water. [1]

The purpose of this study was to find the amount of salt in the soil and on the plant that makes it toxic.

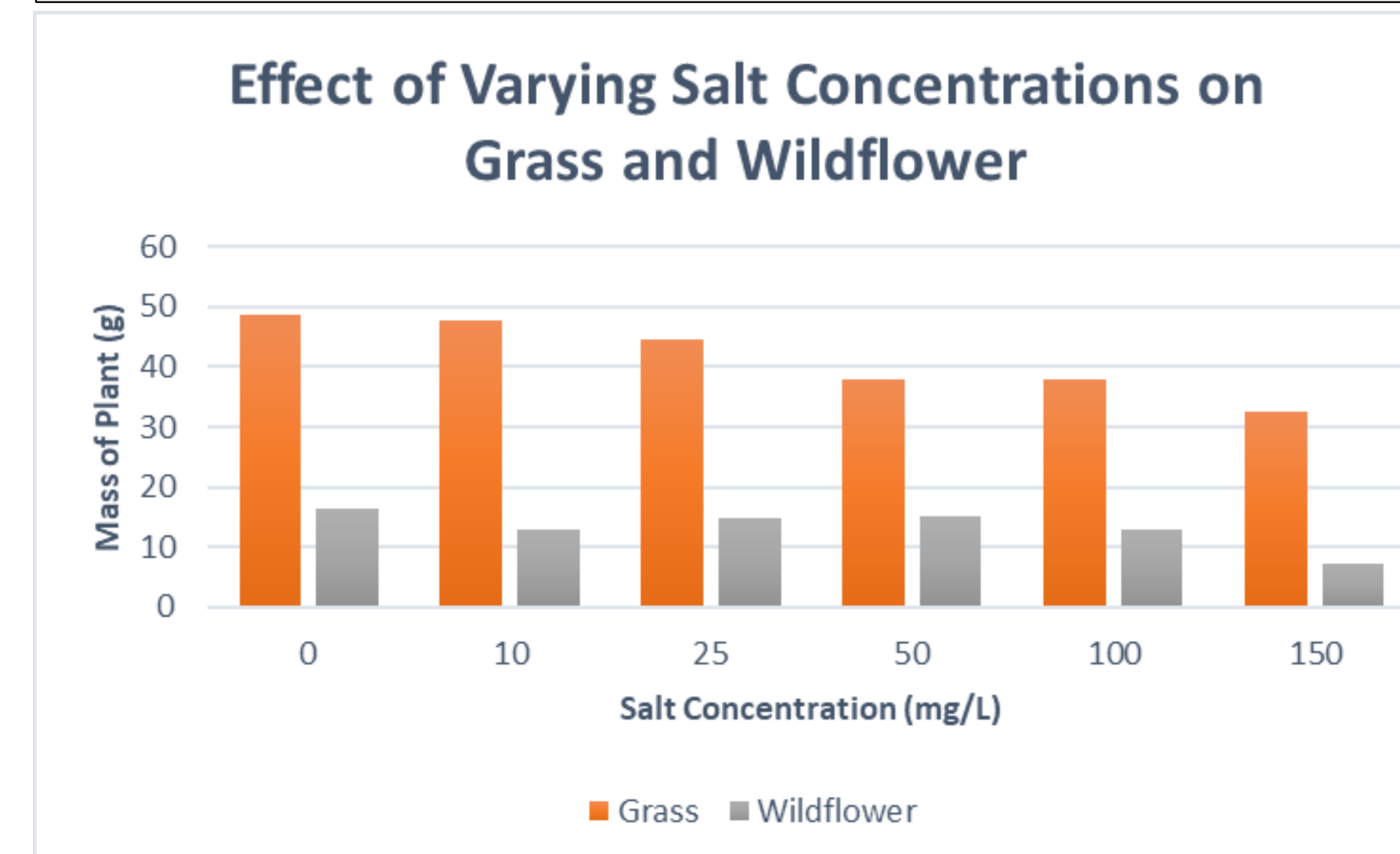


Figure 1: A road truck salting the road. [2]

Results:

For the lawn grass, the higher the salt concentration, the less the plants weighed on average. For the wildflower mix, the concentrations fluctuated until the 100mg/L and 150mg/L concentrations, then the average mass started to decreases.(Graph 1)

Graph 1: Shows the mass of the plants from each concentration.



Salt Concentration (mg/L)	Wildflower Mix (mS/cm)	Lawn Grass (mS/cm)
0	0.4	0.43
10	0.34	0.33
25	0.35	0.27
50	0.39	0.36
100	0.72	0.83
150	1.45	1.03

Table 2: Shows the EC measurements for each salt concentration.

The electrical conductivity increased as the salt concentrations soil sample levels increased, but none of the samples surpassed 2mS/cm as shown in **table 2**.

Methods:

36 pots were set up with the soil mixture which was a 2:1:1:1 ratio of peat moss as the highest ratio, then vermiculite, perlite and compost. Seeds from a wildflower mix was added to 18 pots and lawn grass seeds to the other 18. (Table 1)

All plants were watered on the same day and given 150mL of its specific salt/water concentration on an average of three times a week for two months. After two months, plants were Removed, weighed and visible leaf damage was recorded.

Salt Concentration	Wildflower Mix			Lawn Grass		
0 mg/L	WF 0-1	WF 0-2	WF 0-3	LG 0-1	LG 0-2	LG 0-3
10 mg/L	WF 10-4	WF 10-5	WF 10-6	LG 10-4	LG 10-5	LG 10-6
25 mg/L	WF 25-7	WF 25-8	WF 25-9	LG 25-7	LG 25-8	LG 25-9
50 mg/L	WF 50-10	WF 50-11	WF 50-12	LG 50-10	LG 50-11	LG 50-12
100 mg/L	WF 100-13	WF 100-14	WF 100-15	LG 100-13	LG 100-14	LG 100-15
150 mg/L	WF 150-16	WF 150-17	WF 150-18	LG 150-16	LG 150-17	LG 150-18

Table 1: Above shows the treatment each plant received.

The last three weeks of the study, granulated salt was spread on the plants to simulate how salt trucks spread salt in the winter. The first row received 0 mg of salt per pot then, 10 mg per pot, 25 mg, 50 mg, 100 mg, and 150 mg.

Conclusion:

By the end of the study, it was concluded that although there was damage to some of the leaves and yellowing of plants in the higher concentrations, none of the plants died completely. This could be because none of the EC soil reading reach 2.0 mS/cm. (Figure 2)

If this study was to be conducted again, the concentrations should be raised to see how the plants will reach to the higher concentrations, especially the ones that would make the soil higher then 2.0 mS/cm.



Figure 2: All plants alive on the last week of the study.

References:

- South Dakota Soil Health Coalition.(2023). Soil Electrical Conductivity. [Soil Electrical Conductivity | South Dakota Soil Health Coalition \(sdsoilhealthcoalition.org\)](https://sdsoilhealthcoalition.org/)
- Urethane Molding Experts.(2020). Dura-Trax Salt / Grit Spreaders for Trucks. [Salt Spreaders for Trucks - Urethane Salt and Grit Spreaders \(cue-inc.com\)](https://cue-inc.com/)