

## **Investigation into Hemp Hurd-Salt Mixtures for Road De-Icing**

Nora Dawood

Lucca ...

Duck ...

Marcus ...

Julian Joaquin

Zach ...

Department of Engineering, University of British Columbia

APSC 171

November 25th, 2022

# Introduction

Road salt is commonly used during the winter, preventing both pedestrians and vehicles to safely move over frozen roads. It is estimated that, of the 54,000,000 metric tons of salt that was consumed in 2021, 42% of it was used for road deicing (U.S. Geological Survey [USGS], 2018). Such major use of salt has had a significant impact on local ecosystems by increasing the salinity of waterstreams, threatening the state of the surrounding environment (Kelly et al., 2020). Notably, excess salt can enter lakes and rivers, significantly reducing their biodiversity (Haake et al., 2022). Additionally, salt can also enter fresh drinking water, increasing the salt content such that it meets up to 33% of an adults recommended daily intake (Cruz et al., 2022). Road salt also leads to damages on infrastructure, costing an estimated \$5 billion in repairs (U.S. Environmental Protection Agency [EPA], 2020).

The affects of road deicing have been known for some time now, and many municipalities have investigated reducing the usage of salt. A common tactic is to pre-wet road salt such that vehicle tires do not throw salt off roads (Zhang et al., 2020; Usman et al., 2017). Other techniques include using a salt-sand mixture to increase road abrasion, creating biodegradable mixtures, and making porous pavement parking lots (EPA, 2020). More recently have biodegradable mixtures been explored as suitable alternatives to salt for road deicing. One such mixture suggests combining salt with hemp hurd, proposed originally by high school students in Manitoba (Kavanagh, 2021). This mixture is significant compared to other alternatives because it utilizes and promotes the locally growing hemp industry within the province.

This study aims to find the ideal mixture of hemp hurd and salt that works as an affective alternative to traditional road salt.

## References

- Cruz, Y. D., Rossi, M. L., & Goldsmith, S. T. (2022). Impacts of road deicing application on sodium and chloride concentrations in philadelphia region drinking water. *Geohealth*, 6(2). <https://doi.org/10.1029/2021GH000538>
- Haake, D. M., Krehma, S., Meyners, C. W., & Virag, R. (2022). Impacts of urbanization on chloride and stream invertebrates: A 10-year citizen science field study of road salt in stormwater runoff. *Integrated Environmental Assessment and Management*, 18(6), 1667–1677. <https://doi.org/https://doi.org/10.1002/ieam.4594>
- Kavanagh, S. (2021, June 10). *Winnipeg students hype hemp at city hall hoping to slash salt use on slippery winter roads* [CBC]. Retrieved November 11, 2022, from <https://www.cbc.ca/news/canada/manitoba/winnipeg-snow-clearing-salt-use-hemp-pilot-1.6061369>
- Kelly, V. R., S.E.G., & Weathers, K. C. (2020). *Road salt: The problem, the solution, and how to get there* (research rep.). Cary Institute of Ecosystem Studies. <https://www.caryinstitute.org/news-insights/road-salt-problem-solution-and-how-get-there-report>
- U.S. Environmental Protection Agency. (2020, November). *Winter is coming! and with it, tons of salt on our roads*. Retrieved November 11, 2022, from <https://www.epa.gov/snep/winter-coming-and-it-tons-salt-our-roads>
- U.S. Geological Survey. (2018). *Salt: Statistics and information*. Retrieved November 13, 2022, from <https://www.usgs.gov/centers/national-minerals-information-center/salt-statistics-and-information>
- Usman, T., Fu, L., Kaur, J., Perchanok, M., & McClintock, H. (2017). Optimize pre-wetting for sustainable winter road maintenance. *Investing in Winter Road Maintenance: Building Canada's Economy*. <https://www.tac-atc.ca/en/conference/papers/optimize-pre-wetting-sustainable-winter-road-maintenance>
- Zhang, Y., Akin, M., & Shi, X. (2020). Laboratory investigation of prewet deicer performance for winter mobility in the pacific northwest. *Journal of Cold Regions Engineering*, 34(4), 04020022. [https://doi.org/10.1061/\(ASCE\)CR.1943-5495.0000228](https://doi.org/10.1061/(ASCE)CR.1943-5495.0000228)