

# Possible Effects of Magnesium Chloride - Based Gravel Road Stabilizers and Dust Suppressants on Vegetation and Water

Betsy A. Goodrich, Dr. William R. Jacobi, and Ronda D. Koski

MS Student, Professor, and Research Associate, Dept. of Bioagricultural Sciences and Pest Management, Colorado State University, Fort Collins, CO. 80523-1177

## Why Are We Interested in $MgCl_2$ ?

Besides its use for snow and ice control, magnesium chloride ( $MgCl_2$ ) is used on gravel roads during summer months for dust suppression and road stabilization.



$MgCl_2$  treated gravel road in Larimer County, Colorado



Gravel road after  $MgCl_2$  application in Grand County, Colorado

Research on  $MgCl_2$  is limited. Previous research of sodium chloride ( $NaCl$ ) indicates it may cause marginal scorch, increased dieback, and allow less water to be available to plants.



Needle scorch on a lodgepole pine



Marginal burn on alder leaves

Unhealthy roadside trees occur along some gravel roads in Larimer and Grand Counties, CO. This project investigates causes of tree health decline, including insect pests, fungal/bacterial pathogens, and abiotic damages (such as drought).



Spruce - fir forest along gravel road



Lodgepole pines along gravel road

## Data Collection and Analysis

Study Question: Do  $MgCl_2$  compounds have detrimental effects on roadside vegetation and riparian systems?

In summer 2004 a roadside survey was conducted, vegetation health plots were established, and soil, foliage, and water samples were collected for chemical analysis in Larimer and Grand Counties.



Collecting foliage and twig samples



Assessing ground vegetation health



Stream sampling in Grand County

Two more years of field and laboratory data analysis will allow us to determine if  $MgCl_2$  is moving from the roads into the roadside environments and if it is affecting vegetation and riparian systems.



Foliage samples in the CSU Greenhouse



Soil samples in the CSU Greenhouse

Cooperators: Larimer County Road and Bridge Dept., Grand County Dept. of Road and Bridge, Colorado State Forest Service, and USDA Forest Service - Arapahoe and Roosevelt National Forests - Canyon Lakes and Sulfur Districts.

## Future and Continued Work

Because  $MgCl_2$  is mobile and abiotic factors can mediate the impact of salts on plants, it is necessary to replicate this study over time.

**Project goals in the next two field seasons:**



Collecting foliage and twig samples

- Resample soil, foliage, and water.
- Reassess vegetation health plots for changes.
- Analyze soil, foliage, and water for chemical content.
- Establish drainage plots throughout Larimer and Grand Counties.
- Assess possible movement of salts down drainages into roadside environments.



Crossroad culvert

**Data collected will allow us to determine if:**



Drainage embankment from road

- $MgCl_2$  has adverse effects on vegetation and water quality.
- $MgCl_2$  compounds move into roadside ecosystems.
- Site factors impact salt movement or roadside environment health.
- There is reason to implement best management practices or possible mitigation actions.