



Stage 2 - Research Topic Statement

Print Form

RESEARCH PROGRAMS USE ONLY

RESEARCH IDEA NO:	24-005
DATE OF RECEIPT:	12-5-23
TOTAL MDT COST W/ICAP:	

RESEARCH PROGRAMS

Please submit completed forms via e-mail to MDTResearch@mt.gov. All fields are required, except the last field: XVIII, Sponsor(s). Incomplete forms will not be accepted.

TITLE (required): Remediation of deicer contaminated soils using Native Montana Plants

TOPIC STATEMENT: MDT uses deicing salts in winter operations to ensure roadways are safe and passable for the driving public. These same deicing salts, once in the environment, can accumulate in the soils, surface and ground water. One promising method to remediate soils and reduce the amount of deicing salts in surface and ground water, is the use of salt tolerant plants to remove the salt from the soils and shallow water sources.

RELATED RESEARCH SUMMARY FROM STAGE 1:

MDT conducted a preliminary literature search that found salt tolerant species may be used to aid in remediation of soils, surface and shallow ground water contamination from salts. While the bulk of the literature was related to agricultural saline contamination, a few research projects assessed the feasibility of using salt tolerant plant species for remediation of deicer contaminated soils. Greenhouse and laboratory results were promising, but the next step of finding significant results in field were limited to non-existent.

RESEARCH PROPOSED:

The research effort will 1) identify potential native and non-native salt tolerant plant species that could be used for remediation of deicer contaminated soils in Montana, 2) conducted a systematic greenhouse study to determine ideal performing plant species and remediation rates, and 3) make recommendations on field trials locations and methods.

RESEARCH PERIOD (Time to complete research project.):

18 month - 2 years to conduct the three tasks.

IT COMPONENT: Identify if the project includes an IT component (purchasing of IT hardware, development of databases, acquisition of existing applications, etc.). If so, describe IT component in as much detail as possible.

No additional IT component will be required by MDT.

FEASIBILITY, PROBABILITY OF SUCCESS, AND RISK:

The feasibility of each tasks are as follows;
Task 1 - Identify native and non-native salt tolerant plant species - Very feasible, High probability of success, Low risk
Task 2 - Greenhouse Study - While conducting a greenhouse study is very feasible there are inherent challenges when using plants due in part to the Montana climate, dosing of the plants using deicers, and potential for error. The probability of success of this task is difficult to quantify. The more prepared the research team is to adequately design the

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greenhouse study to account for plant loss/death, build in sufficient number of samples to allow for statistically valid results, and in general a well thought out research plan that considers potential challenges; the greater potential for success. Given all of this, things happen in lab and field studies that the research team will face head on and communicate to MDT as they occur. The overall risk of this effort is low, but the potential reward is high.
Task 3 - Recommendations for Field Trial Locations and Methods - Very feasibility, High probability of success, Low risk

URGENCY, IMPORTANCE, AND EXPECTED BENEFITS/PAY-OFF: Address urgency, timeliness, and importance of the research. Identify if the research is required for any federal or state initiative or compliance. This section must include a description of how this research will help to meet MDT’s mission (i.e., serve the public by providing a transportation system and services that emphasize quality, safety, cost effectiveness, economic vitality and/or sensitivity to the environment).

Sodium chloride contamination of soils, surface and groundwater from the use of deicers is well documented. Identifying sustainable solutions are urgently needed to reduce the impacts of winter operations and preserve Montana's high quality soil for agriculture, surface and ground water. Additionally, this research can also aid in designing appropriate mitigation measures to comply with evolving storm water pollution regulations (e.g., retention basins, roadside ditches, etc.). Lastly, sodium currently has a health advisory level and is being considered by USEPA for regulatory determination as an emerging contaminant. Should a regulatory drinking water contaminant level be determined in the near future, MDT would be expected to be a contributor to sodium chloride contamination to soils, surface water and groundwater. Therefore, finding innovative remedial solutions to address sodium (and chloride) impacts to soils and water is beneficial to the State of Montana.

IMPLEMENTABILITY, IMPLEMENTATION PLAN, AND RESPONSIBILITY: Address the implementability of the expected results from the proposed project. Identify products that will enhance implementation. Identify any known implementation barriers and how these barriers might be eliminated or reduced. Identify MDT office or entity outside of MDT responsible for implementation. Describe initial implementation plan, include timeframe for implementation.

Based on the results of Task 2 - Greenhouse study, a detailed field trial testing plan will be developed. The top performing plant species will be tested in the field, and the salt removal rates or remediation rates will be reported. Barriers to this effort may include challenges with greenhouse study. The research team at Western Transportation Institute-Montana State University would include a WTI senior scientist researcher, MSU professor and MSU graduate students, whom are anticipated to run the experiments and analyze the preliminary data. The research team will work the MDT project panel to identify and assess any foreseeable challenges. MDT's Environmental Services Bureau and Winter Maintenance Operations staff will support this project.

MDT PRIORITY FOCUS AREAS: MDT may, as often as annually, identify priority research focus areas. These focus areas will be listed on <http://www.mdt.mt.gov/research/unique/solicit.shtml>.

TOTAL COST ESTIMATE (If the project proposal comes in at a higher cost, it may require further approval and may be delayed.):
\$200,000

MDT FUNDING SOURCE (If MDT Research, enter SPR): SPR

FUNDING MATCH SOURCE AND AMOUNT:

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FUNDING PARTNER(S):

POTENTIAL TECHNICAL PANEL MEMBERS (At this time, individuals do not necessarily need to be identified; rather, MDT offices and outside entities can be named. However, if known, individuals may be named):

MDT - Tracy Deeds, Doug McBroom, Darcy Goodson; Montana Salinity Control Assoc. - Scott Brown; NRCS - Monika Pokorny

SUBMITTED BY: (required)	
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CHAMPION: Must be internal to MDT, feel strongly that the research will benefit the Department, and is willing to chair the technical panel. Note: If a champion is not identified by you or Research staff, this topic statement will not move forward.

NAME:	Darcy Goodson	Tracy Deeds
TITLE:	Reclamation Specialist	Environmental Scientist
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SPONSOR(S) (optional): Must be internal to MDT (Division Administrator or higher) and willing to ensure implementation occurs, as appropriate. If a sponsor is not identified by you or Research staff, this topic statement will not move forward.

NAME:	
TITLE:	
AFFILIATION:	
ADDRESS:	
PHONE NO.:	
E-MAIL:	

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