Grain Cart Compaction Impact

Tyler Ehlers  
*Iowa State University*, tpehlers@iastate.edu

Kyle Lafrenz  
*Iowa State University*, klafrenz@iastate.edu

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Grain Cart Compaction Impact

Client: John Deere Intelligent Solutions Group; Urbandale, IA

Problem Statement
- Soil compaction poses a large threat in potential yield reduction in row crop operations across the globe.
- The tractor and grain cart is the heaviest piece of machinery pulled through a field, making it the most likely to leave highest level of compaction.

Objectives
- Correlate soil compaction caused by grain cart traffic to potential crop yield loss
- Use aerial imagery to help visualize impact behind compaction
- Analyze difference in crop root growth at different levels of compaction

Constraints
- Budget – covered by John Deere
- Timeline – data gathered before the ground freezes
- Materials – Penetrometer, drone, John Deere Operations Center

Scope
- The scope is to measure the impact of compaction caused by grain cart activity in row crop operations.

Methods
- Traveled to field to measure soil pressure in and out of grain cart path
- Utilize John Deere Operations Center capabilities for in-field data
- Plant growth boxes to show root growth and plant health at different compaction levels

Proposed Solutions
- Eliminate miscellaneous grain cart and semi truck activity when not necessary
- Adjust seeding rates and crop input methods to accommodate economic loss from yield reduction of high compaction areas
- Connect John Deere Operations Center to changing real-time grain cart weight levels

Major Outcomes
- Translate yield impact of crop from compaction caused by grain cart
- Show the difference in root growth in different levels of soil compaction
- Find economic impact of compaction caused by grain cart

Benefit to Client
- Possible confirmation of theory behind grain cart compaction
- Help John Deere to better understand and visualize compaction levels to be better informed on the subject

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