



Ontario Turfgrass Research Foundation Research Project Interim Report

OTRF
Project No.

Title	Use of biosolids for fertility and improvement of soil health
Principle Researcher	Dr. Katerina Jordan, University of Guelph
Date of Submission to OTRF	August, 30 ,2019
OTRF Funding Period	April 01, 2019-August 30, 2019

Executive Summary	Summary of this interim report that includes the intended goal, a very brief summary of the results to date. Explain how the research and results will benefit the turfgrass industry. The executive summary should be no more than a short paragraph in length and written in a manner appropriate for a non-scientific audience - layman's terms.
<p>We hypothesize that the bio-solids products may prove beneficial to the turfgrass industry for reducing inputs (both labour and chemical) through increased and longer lasting fertility, improved soil health and subsequently plant health. The goal of the study is to provide turfgrass managers in any sector of the turfgrass industry with a detailed evaluation of two commercially available bio-solid products as compared with an industry standard complete inorganic fertilizer and a commonly used organic fertilizer.</p> <p>During this reporting period soil samples were collected from both lawn-height trials and soil aggregate stability measurements were taken. Regular turfgrass ratings and NDVI data were also collected on both lawn-height studies. The disease suppression component of the project was initiated at the new GTI location on a creeping bentgrass putting green, and associated data collection is in progress.</p>	

Background	Description of the rationale of the project as written in the project proposal. Two sentences maximum.
<p>Bio-solids are derived from the municipal wastewater treatment process and are commonly disposed of in landfills; this process is not sustainable and alternatives exist as an end-use for use of these products. Turfgrass systems are an excellent candidate for application of nutrient-rich bio-solids and our research will evaluate their efficacy as a sole or supplementary fertilizer source for use on lawn-height turfgrass systems.</p>	

Objectives	Using the outline of expected deliverables from the project proposal, indicate the completion or progress from each objective and milestone. Report if objectives or milestones were revised and the reason for revision. May copy objectives from proposal and record completion levels for each objective.
<p>OBJECTIVE 1: Determine the potential for bio-solids as use as an alternative fertilizer either replacing or supplementing current conventional products in lawncare, sod production and on golf course turf (roughs and fairways). 60% completed</p> <p>Milestone: Following the first year of the field trial, we will be able to determine the suitability of biosolids as a replacement or supplement for commonly used inorganic fertilizers. Proposed completion time: December 2019</p> <p>OBJECTIVE 2: Determine the effect of prolonged use of biosolids on soil health in turfgrass rootzones, with emphasis on organic matter content, aggregate stability and microbial respiration. 50% completed</p> <p>Milestone: The results of this portion of the study will lead to information about the effect that addition of biosolids has on 3 parameters of soil health: organic matter content, soil aggregate stability and soil microbial respiration. This will give turfgrass managers information on whether the use of biosolids over time can improve soil quality and subsequently improve plant growth. Proposed completion time: December 2019.</p> <p>OBJECTIVE 3 (added objective): Determine if the addition of biosolids to a turfgrass system has an effect on disease development. 40% completed</p> <p>Milestone: This portion of the study will be completed in the field and greenhouse and involve inoculation of both bio-solid and non-bio-solid (negative control and inorganic) fertilized turfgrass pots inoculated with <i>Clariireedia homoeocarpa</i> (primary causal agent of dollar spot) and subsequent observation of disease presence. Proposed completion time: December, 2019.</p>	

Goals for completion	Outline the goals and milestones left to complete the project. Will the original objectives be delivered as outlined in the project proposal?
<p>Objectives 1 and 2 are in progress and will continue for the duration of 2019. Objective 3 will be evaluated in the greenhouse this spring and in the 2019 field season.</p> <p>Data Collection Summary April 01-August 30, 2019:</p> <p>Objective 1 update: Biosolid fertilizer applications are in progress in the field on both a fescue lawn-height plot area at GTI and on the new lawn mixture plot area at GTI we identified for use last fall. Visual turfgrass colour and quality measures will be recorded (based on the National Turfgrass Evaluation Protocol (NTEP), as will regular canopy reflectance measurements (NDVI), clippings (biomass). Data on weed encroachment (measured by point-quadrat) will also be collected where applicable throughout the 2019 season.</p> <p>Objective 2 update: Spring pre-treatment soil microbial respiration samples have been taken and analyzed. Soil microbial respiration will be evaluated from the plot areas again in the coming weeks to track any differences. End of season organic matter content is planned to be documented.</p>	

Objective 3 update: Inoculum preparation in the lab was successful and the field component of this study has been initiated at the new GTI location. Greenhouse studies are to be seeded in the fall19/winter20 semesters. These greenhouse studies will be conducted to examine the effect of biosolid fertilizers on disease incidence and to examine if there are any phytotoxic effects of the biosolid fertilizers on bentgrass turf.

Graduate Student	Provide a brief update of the status of any graduate student involved on project.
	Vighnesh Sukhu, M.Sc. Candidate studying under the guidance of Dr. Katerina Jordan began his studies in September, 2018. Vighnesh will be the primary individual working on the biosolids project moving forward. Vighnesh has had a busy winter semester course load. While not in class, our student has been diligently planning the disease studies for both the greenhouse and field. Vighnesh will be conducting his field studies on two research areas at the Guelph Research Station, one on a mature lawn stand of turf on Range #9 at the GTI this year and one on a primarily fine fescue stand of turf. Vighnesh will also be performing lab and greenhouse work as part of the biosolids project and has also initiated a field disease study at the new GTI location. John Watson, Research Technician with Dr. Jordan, will continue providing technical assistance for Vighnesh for the duration of the project and his tenure as an M.Sc. Candidate.

Project Communication	List all industry and academic presentations and submitted publications
There are no publications to date on the project as we are still in the active field season and data collection phases. Potential communications in the future may include but are not limited to educational sessions at the Ontario Turfgrass Symposium, publication in turfgrass trade journals (ONCourse, Turf and Rec, Sports Turf manager, etc.) and project updates on the GTI website/social media feeds.	

2019 Q2+Q3 RESULTS:

Quarter Results Summary

Establishing the 2019 field season

Three field trials were established to collectively complete the objectives. Field trials 1 & 2 are linked to objectives 1 & 2, whereas field trial 3 fulfils objective 3. Field trial 1 started in April 2018 and is ongoing. Field trial 2 & 3 started in May 2019.

Soil Sampling

All soil samples taken are from the 100% fertilizer treatments. Soil samples for field trial # 1 were taken in May & August of 2019. Pre-trial quadrant soil samples for field trial # 2 were also taken in May.

Data Collection

Objective 1

Monthly recordings of colour & quality ratings, and weed percentage were done for both field trials. Performed one clipping collection on each field trial between July & August.

Objective 2

Organic matter content will be analyzed from soil samples. Aggregate stability has been evaluated for all soil samples except for the ones taken in August 2019. Microbial respiration has been assessed using a LI-COR Soil Respiration Chamber, and Solvita CO2 Burst, for all soil samples.

Objective 3

Weekly visual assessment of disease severity has been done. After fertilization, there were variation among plots in their leaf growth. Leaf elongation using a turfgrass prism was done 7 to 10 days after fertilization. This was done once in August and will continue in September.

Future Plans:

Overall, research will continue to remain on schedule and data collection will happen until the end of the field season (October 31, 2019). Additional soil samples from field trials 1 & 2 will be taken in October. All corresponding evaluations will be conducted after. Also, an end of season clipping collection will be done on field trial 3 to assess leaf tissue nitrogen content. Going forward, additional greenhouse experiments will be designed and established for the winter season.

CONCLUSIONS:

There are no conclusions to date as we have not completed data collection and analysis for the 2019 season.

NOTE: Portions of this report will be posted on the OTRF website