Project Summary

EMILI BioScout

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BioScout Airborne Spore Monitoring System

About the technology

BioScout provides near real-time airborne spore monitoring to enable precision fungicide management in crops. BioScout's automated spore traps sample the air daily in the field, identify and quantify a range of disease-causing spores, and present that information on a user-friendly dashboard.



BioScout spore monitoring device (Photo credit: EMILI)

EMILI objectives

EMILI installed two BioScout units in a potato field at its Innovation Farms MacGregor site to:

- Monitor a field for key diseases such as early blight (*Alternaria* spp.) and late blight (*Phytophthora* spp.).
- Determine if spray applications could be timed differently based on the knowledge of spore counts and infection risk provided by BioScout.

What we learned

Real-time spore monitoring

The BioScout device samples the air throughout the day and images are taken of the sample tape. Through machine learning, the spores are identified and the data is presented in graphs on the platform. Infection risk graphs combine the spore counts with current and forecasted weather data.

Simple set up

This technology can be used in a multitude of crops and the device is installed at the edge of the field. Set up is simple and there is no additional work required to get continuous spore count information throughout the growing season. A brief daily text summary can be sent to mobile devices.

A tool in the toolbox

High spore counts does not mean that disease has infected the crop. This is a useful tool so that growers and agronomists have more information about the environment and the potential for disease, but is unlikely to fully replace traditional scouting and agronomic knowledge required to determine the spray schedule.



What this technology could unlock

The BioScout airborne spore monitoring could help farmers dial in on when to spray, whether that be increasing the frequency of spray applications when spore levels and infection risk is high, or reducing sprays when the risk is low. This could lead to greater profits from increased yield and potentially reduce chemical inputs.

Summary of analyses

Materials and methods

Two BioScout units were installed at the NE and SW edges of a potato field in the direction of typical prevailing winds. The units monitored the conditions at the field site continuously and the platform was monitored by EMILI staff and J.P. Wiebe's agronomist. The agronomist entered spray logs and observations about disease into the platform, and EMILI staff scouted the field weekly for signs of disease.



Figure 1. Early blight spore concentration (top) and infection risk graphs (bottom).

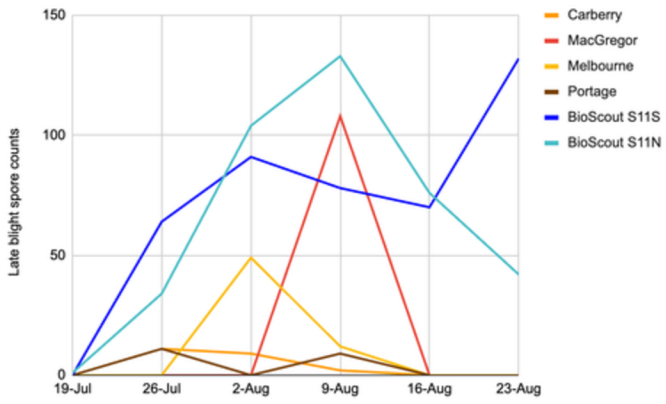


Figure 2. Weekly late blight spore trap counts from four locations (MB Ag) compared to the counts from the BioScout units.

Next steps

EMILI will be moving the units into the potato storage sheds over winter to monitor spores, and will deploy the BioScout units in potato fields again in 2027.

Results

The BioScout units in the field showed spores for all diseases we tracked during the growing season, like early blight (Figure 1), although we did not see much disease presence in this field. Healthy plants are less susceptible to infection, so even when spore counts are high, there may not be disease. When the plants experience stress, or when the environmental conditions are favourable, disease begins to show up.

The agronomist found the BioScout daily text summary useful when scouting fields, as he knew what types of spores were there and could look for signs of those diseases specifically. Spornado spore traps are used in this area by the Manitoba Agriculture to monitor late blight. These are analyzed for DNA weekly and a report is published by the provincial specialist to inform growers if there are high counts of spores in the area. The provincial spore tracking ended on August 24, but rains in early September caused the disease severity values (DSVs) to increase, which indicate a very high risk of late blight infection at this time. BioScout does not require the more labour intensive DNA analysis, so it may be more feasible to leave in the field longer to monitor at the end of the year when plants are susceptible to disease as the vines die.

When comparing the BioScout unit to the Spornado traps, they show a similar trend to the MacGregor and Melbourne trap locations (Figure 2), but experienced higher spore counts. The late blight BioScout model is in beta and it may be over-identifying the spores in our samples, but it also actively pulls in air so it may collect more spores due to the air volume it is analyzing. BioScout is incorporating new spore samples to improve the identification of late blight.

The cost of inputs impacts whether producers will spray preemptively based on spore counts. Potato growers already have a robust spray schedule, typically weekly. Most producers would want to see evidence of a disease in the field or know it is present nearby before doing additional applications with more targeted products that have a higher cost.