

**FROM IDEA TO IMPACT:**

# The journey to commercialization for a crop disease detector





## Introduction

Over a hundred billion dollars is lost worldwide to fungal disease every year. Growers spray fungicides on their crops to protect the overall yield of their harvest, but they don't always know the best time to spray. While these chemicals are effective for preventing fungal disease when sprayed at the right time, they're not very effective for treating the crops once disease has taken hold. Kristine White and Mike Saleh wanted to find a solution.

## How do you detect diseases in crops before they become infected?

Kristine White is the CEO of Spornado, an early alert system for crop disease created in Ontario. Along with co-founder Mike Saleh, the lead designer of the Spornado air sampler, she's developed an outdoor air monitoring system placed directly in fields to get growers the data they need to make better fungal pesticide spraying decisions.

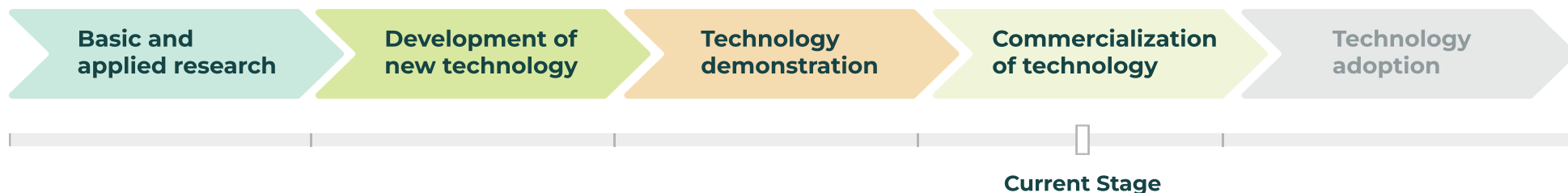
“The problem is that there's so much guesswork involved in knowing when to spray. Growers didn't have a lot of tools to predict when the disease was going to strike. The big idea was to take air monitoring and use it outdoors to help provide growers with the data they needed.”

— *Kristine White, Spornado CEO*

Funded in part by the Ontario Agri-food Research Initiative (OAFRI), under the Sustainable Canadian Agricultural Partnership (Sustainable CAP), a five-year federal-provincial-territorial initiative, Spornado is one of the many agricultural projects supporting the provincial government's research priorities, such as plant health and protection, sustainable production systems, and innovative practices. The project is an exciting example of a technology entering the commercialization stage and working with government, industry, and early adopters to grow.

*Kristine White, CEO and Co-founder, Spornado*

## OAFRI's Innovation Continuum



*Sporometrics, a partner lab testing Spornado spore samples*

### From indoor testing to outdoor applications

Kristine originally worked at an environmental engineering firm that did indoor air monitoring by taking air samples and sending them to a microbiology lab for testing. Eventually, she found herself working at that very lab, alongside Mike Saleh, where she received a request from a crop protection company looking for a simple air sampler that farmers could use outdoors.

With years of experience in indoor air sampling between them, Kristine and Mike were surprised to learn there weren't any simple solutions to this problem on the market. However, they felt confident they could develop one. They got to work, and their outdoor air sampling system was born.

“It’s kind of like a funnel. It takes air and forces it through, and at the end of the funnel, you have a really fine mesh. The mesh is so fine that we’re capturing tiny microscopic spores in the air that you wouldn’t be able to see with the naked eye.”

—*Amanda Tracey, Ontario Vegetable Crop Specialist, OMAFA*

After a week in the field, the grower pops out a small cassette containing the fine mesh and sends it to a laboratory, which extracts DNA from the sample and does targeted testing for diseases. The grower gets their information back in just 24 hours.

“The same equipment can be used for virtually any airborne crop disease. Only the molecular test in the lab needs to change. That keeps it very inexpensive compared to an approach where you design tests for everything and allows us to expand into new diseases very quickly.”

—*Kristine White, Spornado CEO*

Now branded as Spornado, word of mouth began to spread about their technology. Kristine and Mike were approached by clients to start applying the system to different crops with different diseases. This led to their first meeting with a specialist from the Ontario Ministry of Agriculture, Food, and Agribusiness (OMAFRA), who suggested the technology could even be developed to look at whether a fungicide-resistant disease was forming.

### Getting support to grow

The next step in Spornado’s growth was applying for government funding. OAFRI is an initiative jointly funded by the governments of Canada and Ontario under the Sustainable CAP and overseen by OMAFA. It provides funding for agri-food research and innovation projects in Ontario, with a focus on making Canada a world leader in agricultural research and innovation.

“The grant truly has been critical in our development. A lot of the money goes to lab costs. That’s extremely expensive. It enabled the lab to hire summer co-ops for molecular science. A couple of them have gone on to do post-grad work in other labs. It was also the first time we were able to look at the resistance piece. We had never done that before and probably couldn’t have seriously done it on our own.”

—*Kristine White, Spornado CEO*



*Prototype Spornado devices*



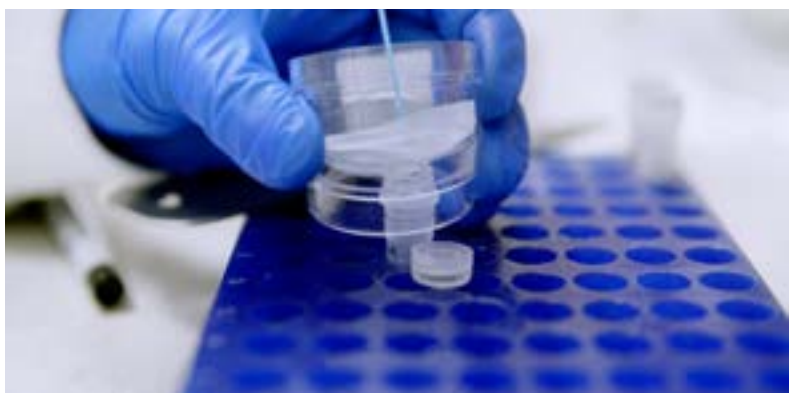
*Mike Saleh, CTO, Co-founder, and lead designer, Spornado*



*A diseased leaf on a soybean plant*



*A Spornado cassette being removed from the device*



*The fine mesh from the Spornado cassette is transferred into a test tube for analysis*

What proved to be even more important, however, were the connections they made. Their contacts at OMAFA could allow their product to find its place in the world of agribusiness. With the help of Crop Specialists, like Amanda Tracey, and Crop Pathologists, like Albert Tenuta, Spornado is now able to put the product right into the hands of early adopters willing to try a new technology on their own farms.

“Being a provincial plant pathologist, I have contacts throughout the industry in terms of both growers and [agricultural] retailers to assess what issues are present. We can determine which diseases are important and which we should be targeting. In terms of tech transfer abilities, we also bring our ability to monitor field locations for real-time assessment and validation of this equipment and technology.”

—*Albert Tenuta, Ontario Field Crop Pathologist, OMAFA*

Additionally, OMAFA specialists give them valuable advice and direction to help improve the product and expand within Ontario. While Spornado is in the commercialization phase, it's still a new technology trying to prove itself in the industry.



**Spornado is a global company:**

**1000+**  
units

**25**  
countries

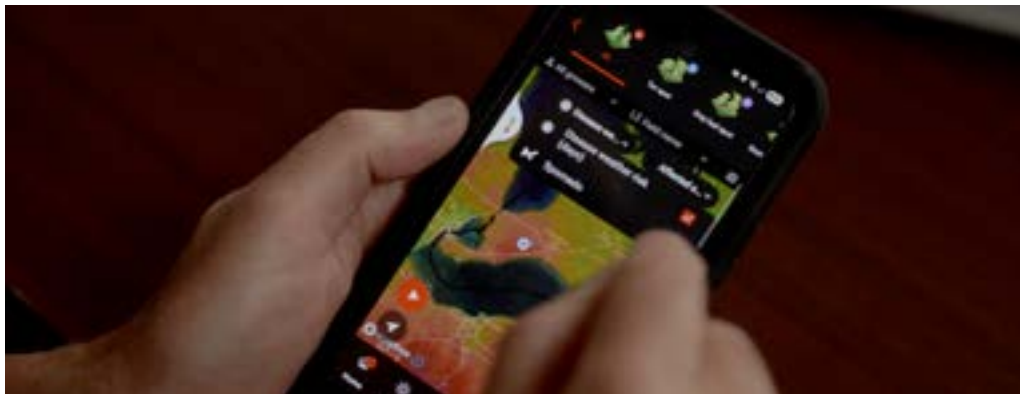
“I can help companies understand the practicality of their technology. Can the growers use these? Is the information they’re providing gonna be something the growers want to use? Is it valuable to them?”

[With Spornado], once we start capturing spores and validating the tests, then we can also look at how we’re presenting the information. Is that usable to the growers? I started working with Spornado in the summer of 2020. [That’s] the first time I had traps actually set up in fields. I’ve definitely already seen some improvement in the product itself.

—Amanda Tracey, Ontario Vegetable Crop Specialist, OMAFA

### The future of fighting disease

Throughout its life, Spornado has deployed over a thousand units across twenty-five countries and applied the technology to fifteen different crops. Currently, Spornado is being tested as a potential piece in a large-scale digital strategy for risk assessment in crops, which is used by both Canadian and American agricultural co-ops.



Spornado trap counts being integrated into a digital risk assessment tool for crops

**Spornado has been applied to over 15 different crops, including:**



Wheat



Barley



Canola



Soy



Corn



Potato



Grapes



Strawberries



Blueberries



Sugar Beets



And more!

## 💰 Fungicide Financials 💰

Some diseases hurt profits by killing entire crops

Other diseases reduce sales by hurting the quality, flavour, or appearance of crops

More money put into growing a crop equals less profit on each sale

Most fungicides cost around \$30 per acre to spray

Depending on the product, fungicides could cost less (\$20/acre) or more (\$50/acre)

Choosing not to spray can lead to big savings

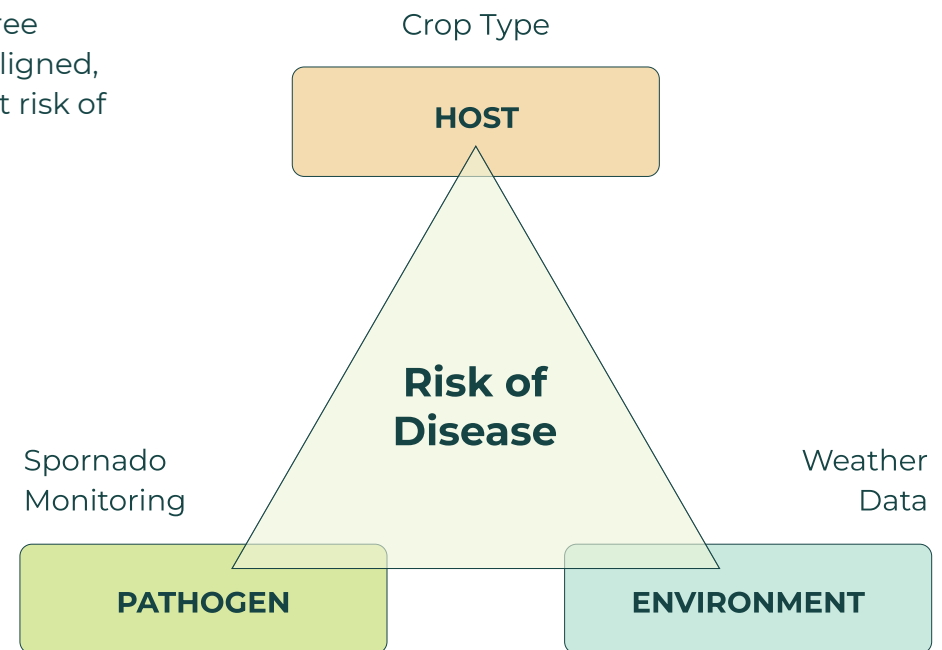
Losing a crop to disease, however, is a much larger loss (e.g., \$300/acre for corn)

“We’re implementing Spornado into our system, which was developed by Growmark [in Bloomington, Illinois]. It is a disease risk model, so it takes into account a number of important pieces of information.

The disease triangle, of course, involves having a host or susceptible crop. [Then], the most important part of the disease triangle is the environmental side. And then the other side of the triangle is the pathogen. When all three things are aligned, you have a high risk for infection. Spornado gives us the quantification of the disease side of that triangle.”

—Dale Cowan, Agronomy Strategy Manager and Senior Agronomist, AGRIS Cooperative

When all three factors are aligned, the crop is at risk of disease





Albert Tenuta, Ontario Field Crop Pathologist from OMAFA, assessing a Spornado device in a corn field

The long-term goal for Spornado is to be able to both advise growers on when to spray their crops and help them decide what to spray to avoid fungicide-resistant diseases. In addition, Kristine and Mike are now doing research and development on a unit that can give growers results in real time. This will be particularly useful for crops that need to be sprayed more often, like grapes. The classic model will always have a place, however, as the devices can take a beating out in the field.

Spornado is now starting a second government grant, which is helping them with further commercialization and knowledge transfer efforts, such as participating in Canada's Outdoor Farm Show and potentially developing a series of testimonial videos. It also allowed them to hire a developer to digitize their submission forms, making the process much easier for growers. And, of course, they continue to move forward on resistance testing. While it's still in the research stage, it's quickly become a priority, given the environmental implications.

“We would have never even thought of the resistance piece. That's why we really see the value of partnering with researchers. Whether they're academics, grower group researchers, or government researchers, they're generally our first partners in a new crop or region because they're the experts.”

—*Kristine White, Spornado CEO*

Learn more about Ontario research and innovation at [Ontario.ca/AgResearch](https://Ontario.ca/AgResearch)