

DNA Auto Sampler



Picture is for indicative purposes only

DNA Auto Sampler is a unique air sampler that for the first time allows pathogen spore detection before crop disease is established by fully-automated air-sampling, analysis and interpretation. This "SpraySaver" serves as the first in-field or on-farm surveillance system that predicts disease risk based on locally gathered pathogen data to inform a pro-active spraying routine allowing for minimal pesticide spraying only when the risk for infection is real. By preventing unnecessary pesticide use, SpraySaver presents a sustainable solution for precision agriculture that improves crop yields, productivity and quality, saves farmers costs and time in pesticide spraying, improves soil and water quality, while following DEFRA and UK policies. As such, SpraySaver has the potential to revolutionize spraying routines, and boost precision agriculture.

This new automatic spore sampler has been designed with funding from Innovate UK and AHDB to warn growers of imminent Infection risk to crops. The sampler uses a novel way of sampling airborne spores and depositing them into a pot prepared for downstream analysis. The device samples

300 litres of air per minute, collecting particles in the air, such as fungal spores. At the end of the user-defined sampling period, the instrument is able to detect the number of spores of a target species that were in the air during the sampling period. The instrument does this by using a DNA assay, which could be either an RPA or LAMP assay, and the reagents are supplied freeze dried in small vials these are specific to each pathogen. Growers or farmers will use the assays that will detect the pathogen they are interested in. Up to four different assays can be loaded into the units. This allows the instrument to check and report up to 4 different diseases. So, each unit can be customised for each individual user.

This reading is transmitted automatically over-the-air using the unit's internal 4G router fitted with an AnyNet Secure SIM, over a gsm network back to the AWS Cloud where it is analysed and reported in a matter of minutes on to the "SpraySaver" website, to advise growers on their crop protection risk long before any infection has taken place.

The unit also has its own onboard weather station which relays the weather data to a database. As the weather data and spore release have such a bearing on infection risk, it is possible for the weather data to be combined with risk models and processed to inform on infection risk, this is already available for some diseases and more will be added. The information is then overlaid on a map on the "SpraySaver" website so a disease risk is then available to growers via the website. Currently, it is possible to detect potato late blight (*Phytophthora infestans*) and we are currently developing a range of other different DNA assays to detect *Sclerotinia* spores, which affect oilseed rape (canola) and a range of vegetables, Yellow Rust of wheat, and we're currently developing Sugar beet pathogens. More assays including Lateral Flow Detection (LFD) are being developed to detect more and more plant pathogens.

Without any changes, the instrument can be used in other crops that are affected by many other diseases. The instrument is set up to run multiple separate assays using the same sample,

so it can monitor for several different pathogens every day. Therefore, it can help protect multiple crops on a farm throughout key times of the year. The instrument is powered by mains electricity so can be placed on a farm close to the crop ready to detect and report the first signs of spore release long before crop infection.

The instrument is fitted with an AnyNet Secure SIM, this means it is not tied to any one network so it will use the best available network in the area where it is located. Growers will be warned in time so they can protect their crops. This information could also be used by the growers to delay the application of pesticides when there is no risk, therefore reducing the number of pesticides applied to crops and saving money.

The instrument is extremely simple to operate and is designed to run without intervention by the user for periods up to 8 days. Through the website, the instrument will inform the operators of its status, and when it will need refilling with consumables. If the unit has an error or is running very low on consumables, it can get the website to email the operators to get

these issues resolved. The user can set up sampling periods to suit their requirements through a simple user menu in-built into the unit. The DNA test vials can be supplied pre-filled with reagents. The user simply loads these into the instrument along with a small amount of liquid and new sample collection pots.

General Specification

(Excluding Legs)

L W H excluding weather station
0.50m x 0.50m x 0.50m

L W H including weather station
0.85m x 0.74m x 1.10m

Total Weight 46.0Kg

Power Requirements

2 x AA 1.5v Alkaline Batteries
for weather transmitter

Mains 110v 60Hz / 220v 50Hz

Unattended Sampling periods
up to 8 days

Weather data

Temperature

Pressure

Wind speed

Wind direction

Rain fall volume

Humidity

Light Intensity

Specifications are subject to change without notice.

