Plant Science into Practice

FUNGICIDE RESISTANCE RESEARCH AT NIAB

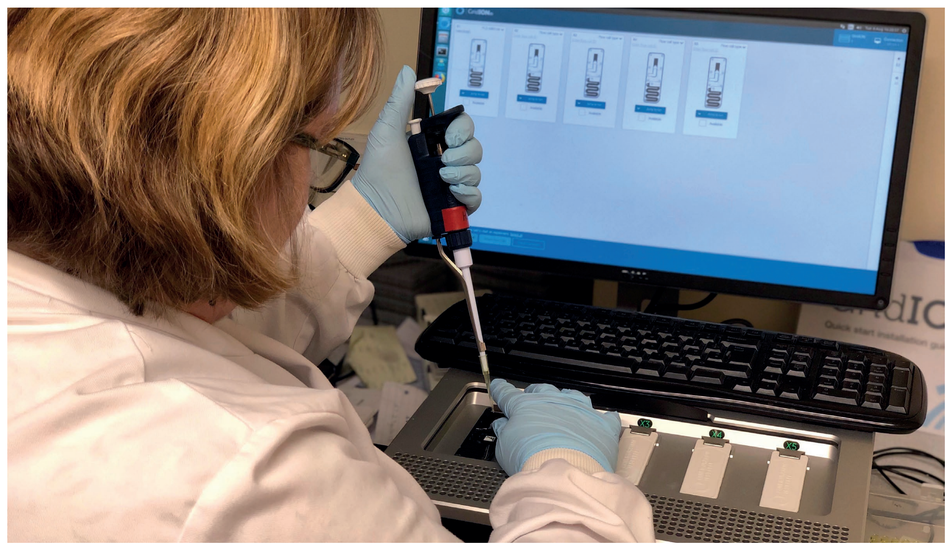
NIAB carries out wide-ranging research to help manage fungicide resistance – from monitoring current pathogen populations in the field, to better predicting the risk of new resistance evolving in the future.

Fungicide performance and fungicide resistance

NIAB receives Septoria (*Zymoseptoria tritici*) infected wheat samples from the AHDB Fungicide Performance Trials and other sites around Britain and Ireland, and tests the fungus with azole, SDHI and QiI fungicides. If the in-field fungicide performance shows any cases of reduced control, NIAB checks whether this is due to resistance or other factors such as disease pressure or weather conditions. When resistance is found, the genetic mutations responsible are identified and tested for cross-resistance to different fungicides.

Next-generation DNA tests for resistance

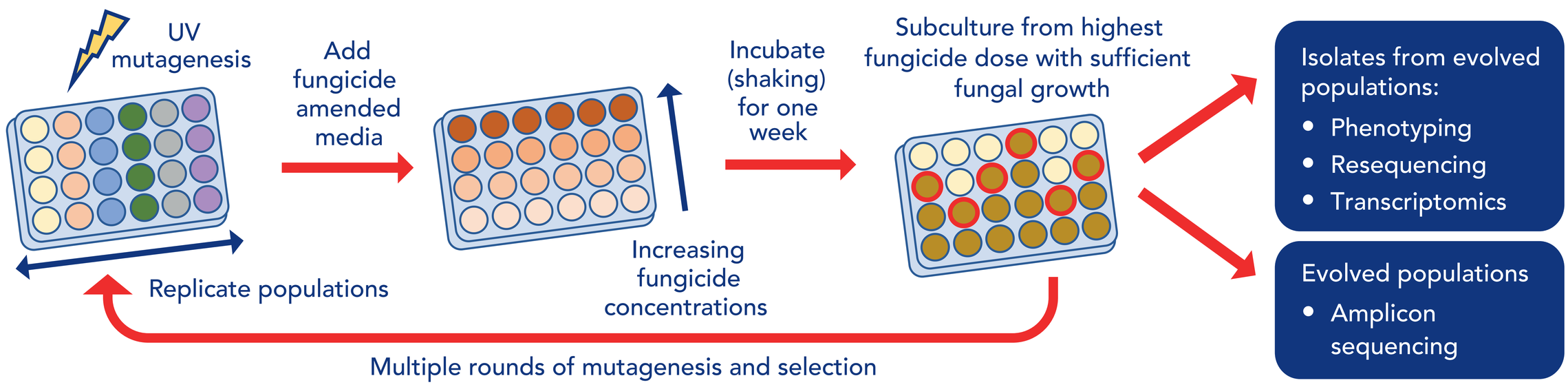
Supported by BBSRC's Follow-on Fund, NIAB is using nanopore sequencing technology to rapidly test pathogen populations for resistance-associated genes. This new technology reads longer stretches of DNA, detecting both known and new mutations at any point in a gene. DNA from infected leaves can be directly tested without the need to isolate the fungus and wait for it to grow. This enables rapid, high-throughput, cost-effective testing of thousands of samples, and will be developed as a commercial service.



Nanopore sequencing can rapidly detect any mutations in a fungicide target site gene

Predicting future evolution of resistance

Pathogen populations are monitored to detect fungicide resistance as it evolves, but it would be more useful to predict resistance before it evolves and tailor resistance management advice accordingly. However, the genetic mutations causing resistance are more predictable for some fungicides than others. A BBSRC Discovery Fellowship project at NIAB is studying the evolution of fungicide resistance under controlled lab conditions; what factors make resistance mutations more unpredictable, and how accurate predictions for future fungicides can be made.



Method for studying the evolution of resistance under controlled lab conditions

Tracking soil fungi

Fungicides are used to treat disease-causing fungi in the crop. But, they can also affect other fungi in the crop and surrounding environment, killing beneficial fungi or selecting for resistance in opportunistic human pathogens such as *Aspergillus fumigatus*. In NERC-supported research, in partnership with Imperial College London, CEH and the Open University, NIAB is looking at which farming practices can help to reduce the risk from azole-resistant *Aspergillus*, and how the overall soil fungal microbiome is affected by fungicides.

Sign up for a sampling kit and find out more about the fungi in your soils, compost and air.