

Rothamsted Repository Download

A - Papers appearing in refereed journals

Milne, A., Gottwald, T., Parnell, S. R., Alonso Chavez, V. and
Vandenbosch, F. 2020. What makes or breaks an effective disease
control campaign? *PLOS Computational Biology*. 16 (2), p. e1007570.

The publisher's version can be accessed at:

- <https://dx.doi.org/10.1371/journal.pcbi.1007570>

The output can be accessed at: <https://repository.rothamsted.ac.uk/item/847v8/what-makes-or-breaks-an-effective-disease-control-campaign>.

© 6 February 2020, Please contact library@rothamsted.ac.uk for copyright queries.

RRes Press Release 6 Feb 2020 **People's views determine success of disease control strategies**

Emphasising the effectiveness of control – and not risk from infection – may be key to combating pathogens

When it comes to crop diseases, educating growers about the effectiveness of control strategies is more important than emphasising the risks posed by the disease, according to new research led by Rothamsted.

Disease-control campaigns help to combat plant pathogens that threaten crops, but are only successful if they are sufficiently well coordinated and if enough growers and other stakeholders comply.

However, most mathematical models of disease control have neglected how people's opinions of disease-control strategies influence their decisions to participate.

To better understand how opinions affect the success of a control campaign, Dr Alice Milne and colleagues coupled a mathematical model of the spread of citrus huanglongbing disease (HLB) with a model of human behavior that incorporates findings from a survey of growers.

HLB threatens citrus production around the world, and can only be controlled if neighboring growers coordinate use of pesticides and other control strategies.

A CLas-infected orange tree in the foreground with healthy trees in the background. The yellow shoots or "Dragons" are a prominent symptom giving huanglongbing (HLB) [Chinese for 'yellow dragon disease'] its name.



Analysis of the combined models' predictions highlights the importance of maintaining frequent engagement between growers and people who provide advice and support on HLB control.

It also suggests that educating growers about the effectiveness of control strategies may be far more important than emphasizing how much of a risk HLB poses to crops.

Dr Milne said: "Many campaigns focus on disease risk, but doing so may be unnecessary and lead to loss of trust if an epidemic never actually occurs.

"This study shows the importance of cross-disciplinary approaches to tackle serious disease outbreaks. We used an infectious disease of citrus trees, but our results are likely applicable to serious human diseases, as well."

Next, the researchers plan to investigate other systems in which human behavior plays an important role in programs to monitor and control invasive pests or diseases.

This will involve deeper exploration of stakeholder values and motivation, as well as development of new methods to represent these viewpoints in mathematical models.

These current findings appear in [PLOS Computational Biology](#) and also involved researchers from the USDA, the University of Salford, and Curtin University.

Publication Milne AE, Gottwald T, Parnell SR, Alonso Chavez V, van den Bosch F (2020) What makes or breaks a campaign to stop an invading plant pathogen? *PLoS Comput Biol* 16(2): e1007570. <https://doi.org/10.1371/journal.pcbi.1007570>