

Crop health and pesticide resistance

Biological agents to replace chemical compounds in wheat crop protection

“There are currently many concerns about the environmental and health effects of conventional chemical pesticides and the increasing resistance of pests and pathogens to the pesticides we use. The latter has been a particular problem in controlling fungal diseases affecting wheat” - Rob Edwards from UK Operational Group Crop Health North. This project involves farmers and scientists carrying out trials to compare the effectiveness of synthetic and “biologic” products on disease control in different wheat varieties, whilst also considering their effects on crop yield and quality.



The Farmer-Scientist Network, established by the Yorkshire Agricultural Society in 2012 is made up of scientists, governmental organisations, and farmers from the region and across the UK. The group discusses farming practices, innovation, food security and sustainable productivity. It was from this group that the idea for the Operational Group came about. “The Crop Health North project was designed with farmers from the very start. And in talking to farmers at various meetings and events we realised there was a real need, a real drive to try and investigate new, different crop protection products” Dave George, University of Newcastle. “And that’s when we started to look into bioprotectants”.

“Bioprotectants [including microbial and botanical plant protection products] are substances that have been found in nature or derived from it, so they naturally break down and degrade very easily and therefore you’re having a much lower impact on the environment and on non-target organisms.” Roma Gwynn, Biorationale.

“These bioprotectants are relatively new to the UK but likely to become widely available over the next few years.” Says Rob Edwards.

The Yorkshire Agricultural Society teamed up with farmers, universities, research institutes, agricultural organisations, a technology centre and a food testing centre to carry out practice demonstration on 3 farms in the North of England (Yorkshire and Northumberland).

Between 2017 and 2019, the project followed 3 wheat harvests comparing the effectiveness of synthetic and biological disease management approaches on different wheat varieties. The project tested: spring wheat varieties – Willow and Mulika and winter wheat varieties – Skyfall, Leeds and Sundance. Tom



King from Eurofins (food testing centre) explains that “The varieties of wheat were selected due to their particular susceptibilities to diseases and their resistance ratings.”

The crops were monitored throughout the crop’s lifecycle, identifying the diseases present and managing them either with chemical compounds, biological agents, or a combination of the two. The crops were analysed in terms of disease severity, yield and quality, looking specifically at whether the biological agents were as effective as

the chemical compounds, and whether the new biological compounds work with existing agricultural practice.

By using three, independent sites the project was also able to test performance on different soils and in varied climatic conditions.

“We looked at three different programmes: a conventional programme (synthetic fungicides only); the use of bioprotectants only; and a combination of the two using an integrated pest management (IPM) approach where the chemical agents were only used under conditions of high disease, or pest pressure.” Says Tom King.

“The project has shown, over all seasons tested, that bioprotectants can perform just as well as synthetic crop protection technology. While the disease pressure from pathogens like *Septoria tritici* was not acute during the trials, these results showed very clearly that we can reduce conventional agrochemical inputs without impacts on yield or crop quality. The study is significant for UK farmers as it gives a practical demonstration of the value of developing IPM approaches that harness biological protection methods that put more emphasis on enhancing the general health of crops rather than treating disease itself. This will be increasingly important as we continue to lose access to broad-spectrum crop protection agents.” Says Rob Edwards.

“The next step for us is to diversify the applications for these biological agents in other arable crops and to look to evaluating further products. We are particularly interested in following up on some of the secondary benefits of some of these products on crop vigour and evaluating their potential value to the environment as compared with conventional pesticides. As a wider issue we want to understand how we can promote the uptake of bioprotectants and IPM, as a fundamentally different approach to agronomy is needed in protecting our crops.”

The project held several workshops and open days when farmers and others who were interested could come and learn about the trials. The results have also been widely disseminated nationally to the farming industry, government regulators, stakeholders and relevant agencies.

Dave George: “Advances in precision agriculture and disease monitoring could be especially useful in helping farmers to get the best from bioprotectants, and this is certainly something we’re looking to test in follow-on projects”.

Contact

Project coordinator, Holly Jones at the Yorkshire Agricultural Society: Email: Hollyj@yas.co.uk

Content and photos

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