

Fear of tuber blight: a significant barrier to industry's uptake of IPM

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Introduction

Cultivar resistance should be a crucial component of late blight IPM. However, a major obstacle to the UK potato industry's uptake of cultivar resistance-based IPM is concern that reduced fungicide inputs may increase the risk of tuber blight for many cultivars. The aim of this work was to investigate the suitability of some cultivars for IPM in relation to their 1 to 9 resistance ratings. Field trials were used to determine which combinations of leaf resistance and tuber resistance ratings have the potential to offer acceptable control of tuber blight in a system of reduced fungicide inputs. All cultivars received the same blight fungicide programme which was designed to allow controlled foliar blight development towards the end of the growing season (to simulate the IPM situation that growers are concerned about) coupled with poor direct protection of the tubers through fungicide product choice.

Methods

Test cultivars were selected to give a range of combinations of foliar and tuber blight resistance ratings. The ratings, to genotype 13_A2, were relatively recent (last updated between July 2014 and July 2018 on the AHDB Potato Variety database). It should be noted that cultivar Setanta had two ratings for tuber blight resistance. Not all cultivars were tested in both 2017 and 2018. There were two cultivars that represented susceptible references.

During the tuber protection phase of the trial fungicide programme, fungicides with zero, or very little, efficacy against tuber blight, i.e. mandipropamid or mancozeb, without or with cymoxanil, were applied at full UK label rates at a target 7-day interval. In 2017 the risk of tuber infection was raised by crop desiccation being deliberately delayed until 14 days after the final application of fungicide. All tubers from the centre two rows of the four-row plots were harvested, washed and assessed twice, after weeks and then months of ambient storage. In 2017 240 tubers from each of five replicate plots were assessed per cultivar. In 2018 the corresponding number was 184.

Results

In both 2017 and 2018, conditions were very favourable for tuber infection, as indicated by 4.7% and 12.3% tuber blight respectively in the reference cultivar Shepody (Figures 1 & 2). Very good to good control of tuber blight was achieved in 2017 for Setanta, Harmony, and Gatsby and in 2018 for Carolus, Harmony, Orla, Setanta and Gatsby.

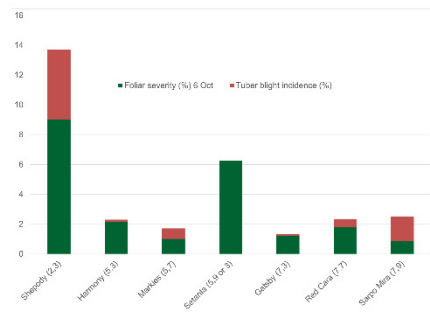


Figure 1 Tuber blight incidence in relation to foliar blight severity for six test cultivars (2017 trial). Values in parentheses are (foliar blight resistance rating, tuber blight resistance rating).

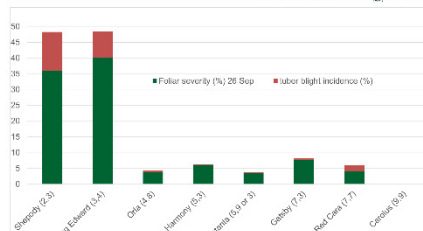


Figure 2 Tuber blight incidence in relation to foliar blight severity for six test cultivars (2018 trial)

Discussion and Conclusions

These preliminary results suggest that the risk of tuber blight was acceptably low in a simulated IPM system for five of the eight test cultivars. The very good control of tuber disease by cultivars rated 9 for tuber blight (Setanta) or 9 for both phases of the disease (Carolus) was expected but there are few agronomically acceptable cultivars with such high ratings.

The hypothesis being tested in this work was whether cultivars with a combination of moderate ratings for both foliar and tuber blight offered sufficiently effective control of tuber blight through a reduction in inoculum density (because of foliage that is more resistant) to a value below the threshold for infection of tubers with a moderate level of resistance. The hypothesis was correct but the trial results were more complex than anticipated. Suitably effective control of tuber blight was achieved by cultivars with the following combinations of cultivar resistance: 5.3 (Harmony), 7.3 (Gatsby) or 4.8 (Orla) whereas control of tuber blight by the combinations 7.9 (Sarpa Mira), 7.7 (Red Cara) and 5.7 (Markies) was poorer. The discrepancy between official resistance ratings and some of the results obtained may have been due to the ratings being for 13_A2. Although both trials were inoculated with a single isolate of 13_A2 only, by the end of the growing season genotype frequencies had changed substantially. In 2017, from 100% 13_A2 (presumably) to 68% 13_A2, 27% 6_A1 and 5% 8_A1 and in 2018 the corresponding genotype percentages in September were 8% 13_A2, 79% 6_A1 and 13% 37_A2.

Cultivars with a reduced risk of tuber infection could also help to prevent or delay the emergence of resistance to OI fungicides and fluopicolide by allowing fungicides with different modes of action (generally considered to be less effective) to be used for tuber blight control on these cultivars.

Further experiments in 2019 and 2020 are planned to allow more robust conclusions to be reached.

References

Agriculture and Horticulture Development Board. AHDB Potatoes Potato Variety Database. URL <http://varieties.ahdb.org.uk/> [25 April 2019].

Acknowledgements

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