

# Applied epidemiology

## Protecting crops from aphid attack and virus transmission



Aphid transmitted viruses are responsible for losses in potato, carrot, parsnip, sugar beet, cereal and oilseed crops. Aphid transmitted viruses are the major reason for potato crops failing seed certification.



In potatoes, viruses cause a range of haulm and tuber symptoms and the potential yield loss may be up to 85% dependent upon potato variety and growing conditions. Direct feeding damage also causes yield losses, particularly when large colonies of aphids build up on plants.

Many species of aphid move between different host plants, migrating into crops at various times of year. Some aphid species also transmit viruses better than others. For these reasons, it is important to monitor which aphids are moving around throughout the growing season and to know how much of a threat these are to crops as vectors of viruses.

### Supporting the UK grower through:

- Reduced and better targeted aphicide applications save time and cost
- Demonstration of good management practices
- Optimised timing of agronomic decisions to preserve crop value
- The assessment of home-grown seed potential

**Our expertise:** Fera's expertise in this area is multidisciplinary. We use all of the following expertise to increase our knowledge of the mechanisms and efficiency of virus transmission and feed this directly into real-time virus transmission risk reports to our customers.

- Design and management of insect monitoring schemes and with same-day reporting of results so that crop management decisions can be made quickly
- Immunological and molecular methods for virus testing of crops for known viruses
- Molecular methods for the identification of new viruses
- Applied entomological research into virus transmission in glasshouse and field plots
- Research into the physiology and behaviour of disease vectors using laboratory behaviour tests and electro-penetration graphs (to measure feeding behaviour)



**For more information**  
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### Relevant publications:

Fenton, B., Lacomme, C., Collins, L.E., Fox, A., Pickup, J., Evans, A., Northing, P., Anderson, E. 2013. R428 Aphids & Virus Transmission in Seed Crops. Potato Council, AHDB report no 2013/2. 135 pages.

Adams I.P., Abidrabo P., Miano D.W., Alicai T., Kinyua Z.M., Clarke J, Macarthur R., Weekes R., Laurenson L., Hany U., Peters D., Potts M., Glover R., Boonham N., Smith J (2013) High throughput real-time RT-PCR assays for specific detection of cassava brown streak disease causal viruses, and their application to testing of planting material *Plant Pathology* 62(1),233-242.

Adams I.P., Glover R., Souza-Richards R., Bennett S., Hany U., Boonham N (2013) Complete genome sequence of arracacha virus B: a novel cheravirus *Archives of Virology* 158(4),909-913.

Northing, P.; Dale, F. Extensive field based aphid monitoring as an information tool for the UK seed potato industry. *Association of Applied Biologists, Wellesbourne, UK, Aspects of Applied Biology, 2009, 94, pp 31-34, 9 ref.*

### Future challenges

As the active ingredients which are available for the control of aphids become fewer, the risk of the development of resistance is increasing. It is therefore important to target aphicide treatments properly and avoid prophylactic applications of aphicide when the risk to the crop is low. Development of resistance monitoring and reporting is essential. Viruses new to crops are still being discovered by Fera and much work is required on identification of transmission routes and vectors. There are also new threats from other insect transmitted diseases such as psyllid-transmitted bacteria.