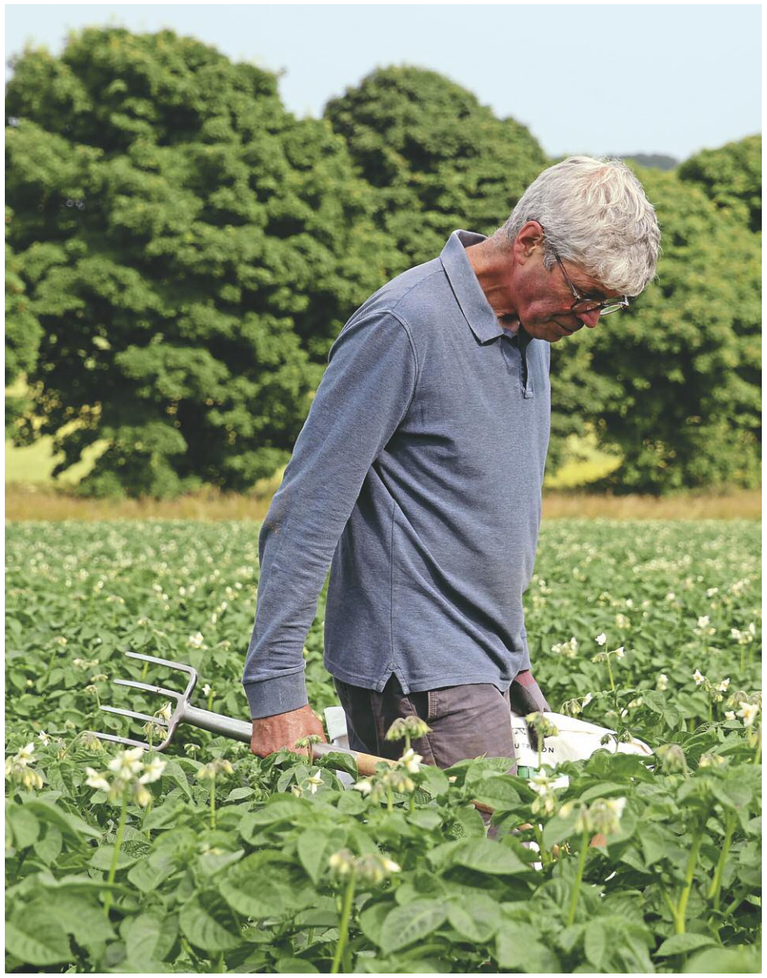

Credit: Eric Anderson, Scottish Agronomy Ltd.

Digital copies of this factsheet can be downloaded at:

Acknowledgements

This factsheet was compiled by the Virus Technical Working Group for and on behalf of the industry funded by GB Potatoes through a grant from AHDB, utilising the remaining potato levy funds. With particular thanks to Adrian Fox (Fera Science Ltd.), Christophe Lacomme (SASA), Eric Anderson (Scottish Agronomy Ltd.), Gerard Croft (BPTA), Graham Bannister (GB Potatoes), Graham Tomalin (VCS Potatoes Ltd.), Ian Toth (JHI & NPIC), Kerry Leslie (SAC Consulting).

Enquiries:
info@gb-potatoes.co.uk

Scottish Aphid-Borne Virus Working Group:
Christophe.Lacomme@sasa.gov.scot

A Guide to Managing Aphid-Transmitted Potato Viruses in Great Britain

Essential Facts

The Pest

1. Aphid transmitted potato viruses can be split into two categories based on the mechanism of transmission within the aphid:
   a. Persistent viruses, e.g. potato leafroll virus (PLRV)
   b. Non-Persistent viruses, e.g. potato virus Y (PVY), potato virus A (PVA), potato virus V (PVV), potato virus M (PVM)

2. Recently the threat of virus has been increasing, in particular PLRV, partially as a result of a changing climate and the restriction of insecticide controls.

3. Infections may occur from primary infection into crops by aphids in the current growing season, or via secondary infection arising from infected tubers in the crop.

4. Symptoms arising from primary and secondary infection can differ.

5. Varieties express marked differences in their susceptibility to virus infection:
   a. Varietal resistance to one virus is not an indicator of resistance to other viruses or strains and recombinants, particularly of PVY
   b. Infection with multiple viruses often exacerbates symptoms

Varieties with a tolerance to virus exhibit few, if any, visual symptoms but may still act as a reservoir for other crops nearby.

PLRV: Primary symptoms include tops of plants looking pale/yellow, take a bronze/purple tinge, top roll or erect habit.
Credit: Kyran Maloney, SAC Consulting.

PVY: Symptoms from late primary infection may not be seen in season, but early infection may result in mosaics. Secondary symptoms include mild to severe mosaic or may be asymptomatic in the haulm.
Credit: Adrian Fox, Fera Science Ltd.

PLRV secondary symptoms in lower foliage.
Credit Eric Anderson, Scottish Agronomy Ltd.

Spread and Multiplication of Potato Viruses

1. For effective management, it is important to understand the key differences between the two transmission types, **see table below**:

2. Aphid populations can double every 2-3 days in ideal conditions and individual aphids may produce up to 50 offspring in their lifetime.

3. Non-persistent viruses are spread quickly by a broad range of colonising and non-colonising aphid species. Persistently transmitted viruses are spread by a more limited range of colonising aphids.

4. There may be several reservoirs for the virus and/or vector. This can include infected seed, groundkeepers within the crop and in neighbouring crops other than potatoes, and potentially alternate host plants including some common weeds, e.g. nightshade species and shepherd's purse.

5. Virus pressure/transmission within and between crops is dictated by several factors:
   a. The size and distribution of the local virus reservoir mainly from infected potato plants within potato crops and infected groundkeepers within potato and other crops
   b. The arrival time of aphid populations within the area (species and numbers)
   c. Whether the virus is transmitted in a persistent or non-persistent manner
   d. Environmental factors, e.g. temperature, precipitation, wind and topography directly impacting both aphid population and the distance of aphid migration

Virus and Vector Comparison Table

PERSISTENT VIRUS, E.G. PLRV	NON-PERSISTENT VIRUSES, E.G. PVY
Survives within the aphid gut and saliva therefore the aphid, once infected, remains a virus vector throughout its life.	Carried on the aphid mouthparts therefore the aphid does not remain infective without regular acquisition of the virus.
Requires a period of several minutes feeding by the aphid to acquire the virus, and then several hours to circulate before transmission.	The aphid rapidly transmits the virus between infected and non-infected plants by probing with its mouthparts.
Potential to be transmitted over large distances through aphid migration hence isolation from an infection source is not always effective as a control measure.	Spreads locally from the infection source therefore isolation from infection sources can be used as a control measure.
Spread by several potato colonising aphids. Some species are more effective than others as a vector.	Spread by both colonising and non-colonising aphids. Some species are more effective than others as a vector.
Potential control through the effective use of an **appropriate systemic** insecticide program.	Poorly controlled by using systemic insecticides. Mineral oils and pyrethroids can reduce transmission of non-persistently transmitted viruses. Most peach potato aphids and willow carrot aphids are resistant to pyrethroids.

Management

Management approaches focus on planting clean seed, isolating crops from the reservoirs of virus, and/or from the vector aphids. There is no single solution to provide effective virus management but there are several approaches that give partial control and limit onward transmission of the virus. The cumulative effect of combining these approaches should give effective control. Ideally these measures should be applied on an industry wide basis.

The following is a summary of *"The six steps to effective virus management"* which has been produced by the Scottish Aphid Borne Virus Working Group.

PLRV: Secondary symptoms include stunting, upward/ inward rolling of lower leaves, leaves become leathery in feel and brittle.
Credit: Gavin Prentice, SAC Consulting.

1. **Plant healthy seed and isolate crops from virus infection.**
2. **Remove virus infected plants before virus can spread by aphids.**
3. **Understand your varieties and their virus risks.**
4. **Act on aphid monitoring.**
5. **Target your spray programmes.**
6. **Continue control measures until the haulm is dead.**

More details can be found here: