

Vector borne diseases

Virus Yellows

Introduction

Virus Yellows is one of the most economically important virus diseases in the UK. The disease affects the leaf, reducing photosynthesis and ultimately root mass and sugar content. If left uncontrolled it can cause serious levels of yield loss.

Virus yellows is a complex of three different virus species; Beet chlorosis virus, Beet mild yellowing virus and Beet yellows virus. All three viruses are vectored solely by aphids, and this is the only means of transmission of these viruses. The primary vector is *Myzus persicae*, the peach-potato aphid.

Effective management of virus yellows comes from an effective IPM strategy of regular monitoring, encouraging predatory beneficial insects and appropriate and timely use of aphicides if required.

Disease Incidence

Disease incidence is influenced by factors such as:

Timing of aphid migration and aphid numbers – Heavily influenced by winter temperatures in January and February

Infectivity of the aphids – The number of aphids migrating through sugar beet crops and carrying virus yellows is surprisingly low (<1%). The aphids do not particularly like sugar beet, instead they are trying to find better hosts such as potatoes and brassicas. As they do this, they land several times, feed (transmit virus and leave sites of primary infection and produce wingless young. Preventing primary infection is almost impossible, especially with rapidly transmitted viruses like Beet Yellows virus

Reservoirs of virus and aphids on farm – Prevent reservoirs of virus or aphids as these will increase infectivity. Check the [Cover Crop Fact File](#) for information on the ability of common cover crop species to host the three species which cause virus yellows and follow advice on following page

Secondary spread - Control of the wingless young is essential to prevent unmanageable aphid populations developing and secondary spread of disease. This is usually achieved with appropriately timed aphicides

Plant resistance - As sugar beet plants grow, they become less favourable hosts to the aphids. From the 12 true leaf stage they start to become toxic to aphids with no need to spray to manage aphids past 16 true leaves

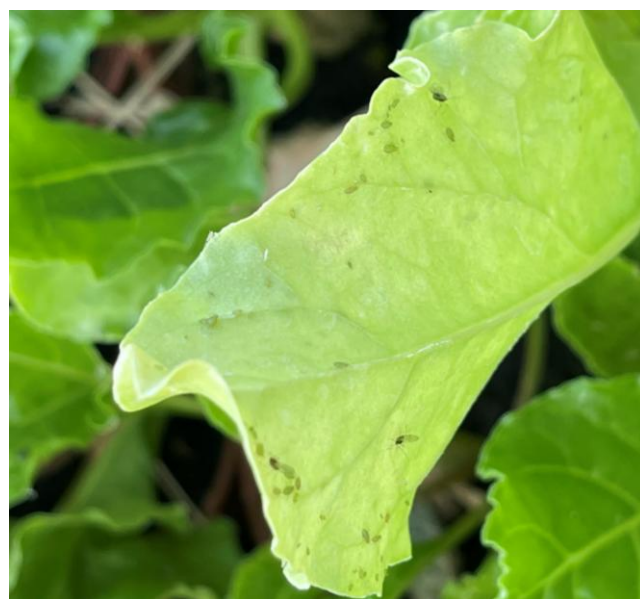


Figure 1. Aphids on sugar beet leaf



Figure 2. Virus Yellow infection

A virus yellows infection can be caused by aphids carrying one or more of the viruses which cause the disease. Whilst there are subtle differences in the appearance of infected patches, generally there are some distinct tell-tale symptoms to look out for:

General VY Leaf symptoms:

- Yellow, thickened and brittle
- Leaves make a distinct crunch when crumpled
- Loss of canopy cover
- Plants remain turgid during drought – the virus and starch build-up prevents them from wilting

Beet Chlorosis Virus (BChV):

The least damaging virus in the VY disease complex. It is a polerovirus and therefore closely related to other crop viruses such as Turnip yellows virus and Barley yellow dwarf virus.

BChV can cause up to c.20% yield loss if left uncontrolled. Leaves tend to turn a pale shade of green before senescing.

Beet Mild Yellowing Virus (BMV):

Another Polerovirus, this is a closely related sister virus to BChV. It causes distinct orangey-yellow leaf symptoms. Yield loss is more severe than BChV at up to 30%.

Both poleroviruses take up to 48 hours to transmit into a host plant from an infected aphid.

Beet Yellows Virus (BYV):

This is the most damaging virus in the VY complex. Aphids quickly transmit BYV into their hosts as it is held in the aphid's mouthparts. This makes it difficult to prevent primary transmission into crops. It turns the brightest shade of yellow of the three viruses and also is most quick to develop/show symptoms in early Summer.

Other VY species:

Whilst not found in the UK, Beet Western Yellows virus (BWYV) and Beet leaf yellowing virus (BLV) exist in other parts of the world. Both are other poleroviruses but neither are believed to occur in Europe at present.



Above: Early symptoms of VY infections: BChV (left), BMV (centre) and BYV (right)

On-farm VY Management:

Each virus has a diverse range of hosts which may be crop, weed and wild plant species. Sugar beet and other beet types are all susceptible to VY, and therefore it is essential to prevent green-bridging from one year's crop to the next.

Maintain good hygiene - Clearing cleaner loader heaps and self-propelled cleaner runs should be a priority once beet delivery is complete. Root remnants and spoil can provide a suitable climate for aphids to over-winter. Plough down or cart spoil away from fields near to next year's crops.

CropWatch - Sugar beet plants are most attractive to migrating aphids when they are small. This is also the stage when they are most susceptible to virus infection. BBRO issue alerts each spring and publish findings from the CropWatch network to guide your on-farm aphid inspections.

Tolerant varieties are now available. Whilst not immune to VY, they show reduced susceptibility to some of the viruses, although each variety may differ in its tolerance to each virus species. Check the latest BBRO RL for VY trait claims.

Beneficial insects - Encourage these onto your farm by providing habitat for them to survive over-winter and sources of nectar which most need. If present, these beneficials can predate aphids early in the season and limit VY infection in-field.

Spray threshold - Finally, if green, wingless aphid numbers exceed the **spray threshold** (5 aphids per 20 plants up to 12 leaves and 1 aphid per plant 12-16 leaves) then an aphicide should be applied. Regularly inspect crops to monitor population development.