



Grower Summary

FV427

**Outdoor lettuce: screening
crops for presence of virus**

Final Report, February 2016

Project title: Outdoor lettuce: screening crops for presence of virus

Project number: FV 427

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Report: Final Report, February 2016

Previous reports: Annual Report, January 2015
Literature Review, June 2014

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The results and conclusions in this report may be based on an investigation conducted over one year. Therefore, care must be taken with the interpretation of the results.

Use of pesticides

Only officially approved pesticides may be used in the UK. Approvals are normally granted only in relation to individual products and for specified uses. It is an offence to use non-approved products or to use approved products in a manner that does not comply with the statutory conditions of use, except where the crop or situation is the subject of an off-label extension of use.

Before using all pesticides check the approval status and conditions of use.

Read the label before use: use pesticides safely.

Further information

If you would like a copy of the full report, please email the AHDB Horticulture office (hort.info.@ahdb.org.uk), quoting your AHDB Horticulture number, alternatively contact AHDB Horticulture at the address below.

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GROWER SUMMARY

Headlines

- Virus testing using serological (ELISA) methods in 2014 and 2015 suggests that several viruses are present in lettuce crops throughout the UK.
- Continued virus testing should be considered in an effort to build up a more comprehensive database of virus risk in UK lettuce crops with an emphasis on relating virus presence to symptoms, quality, yield and marketability

Background

Some common viruses such as *Lettuce mosaic virus* and *Mirafiori lettuce big vein virus* may cause characteristic and recognisable symptoms in field lettuce. However, many other viruses that infect lettuce can either be symptomless or cause a diverse range of symptoms (especially when mixed combinations of viruses occur or when varietal susceptibility varies) that can potentially be attributed to other factors. Previous AHDB-funded research found that previously unsuspected virus infections had the potential to cause both yield and quality effects. For instance FV 365, which looked at *Turnip yellows virus* in brassicas, found that a high percentage of plants were infected and, while plants exhibited minimal symptoms, yield and shelf life were affected.

In this project, the state of knowledge regarding viruses in lettuce was determined through a literature review, an appropriate list of viruses compiled for testing using commercially available ELISA kits and a virus screen performed on samples from commercial crops in July and September 2014 and 2015. ELISA screening is limited by the need to look for pre-determined viruses using specific antisera. It means that other viruses present would not be detected if present. Next Generation Sequencing, a non-targeted diagnostic technique, was also utilised in the latter stages of the project to seek additional viruses that would not be detected by the ELISA screen, due to the specificity of that method.

Summary

Over two seasons a total of 187 composite lettuce samples were screened serologically (by ELISA) for a range of viruses. In 2014, 17 viruses were assessed over two sampling periods (July and September). In 2015, lettuce samples were again screened in July and September for 12 selected viruses.

It is important to note that most samples comprised leaves from a number of plants i.e. they were composite samples. Where multiple viruses were found in a sample it should not be assumed that all viruses were present in a single lettuce plant.

The viruses selected for testing were based on the considered risk of the virus occurring in UK lettuce crops. Virus risk was based on previous findings/reports in the UK and/or its presence in neighbouring EU Member States. The availability of appropriate commercial antisera also steered virus selection.

Eighty two samples were tested in 2014 and 105 samples tested in 2015. Screening suggested that several different viruses were present each year and a number of composite samples tested positive for multiple viruses. Across 2014 and 2015, ELISA screening suggested a total of 11 different viruses in the composite field lettuce samples received. In both years, virus incidence appeared to increase between the July and

September sample dates. A number of samples tested positive for multiple viruses in both years. Many of the viruses investigated are aphid-transmitted.

Correlations between virus incidence and symptoms, variety, lettuce type and vector presence are unclear based upon the data collected over this two year project. It is not possible to conclude that viruses were necessarily responsible, in all cases, for the poor quality and low yields/increased wastage reported in 2015. Further, more detailed investigations would be required to identify any definite correlations.

Twenty one lettuce seed samples tested by ELISA in 2015 were all negative for the four viruses screened. Weed (groundsel (*Senecio vulgaris*)) samples received in June 2015 all tested negative by ELISA for the four viruses screened. Four additional weed samples were received in July 2015 and one fat hen (*Chenopodium album*) sample tested positive by ELISA for *Lettuce mosaic virus*.

Next Generation Sequencing and supporting diagnostic testing was carried out on 20 composite lettuce samples to identify any additional viruses present. Taken together, the results of the ELISA and NGS screening suggested the presence of previously unreported viruses in UK field samples. These findings should be considered as unconfirmed reports until such time that results can be verified through further analysis.

Based on the ELISA screening results, symptomatic and asymptomatic virus remains a risk in UK lettuce crops and vector control continues to be an important factor in lettuce production. Continued virus testing should be considered in an effort to build up a more comprehensive database of virus risk in UK lettuce crops with an emphasis on relating virus presence to symptoms, quality, yield and marketability.

Financial Benefits

This project aimed to carry out an initial screen of UK lettuce crops and to provide a baseline assessment of virus present in those crops. It is not clear whether the viruses found to be present are having a financial impact on yield, but it seems likely that there would be some impact on quality and therefore on marketable yield. Increased grower awareness of the presence of virus will hopefully lead to continued and improved management of virus vectors, subsequent improvements in crop quality and therefore improvements in marketability of crops. More accurate calculations of financial benefit would require more in-depth studies of virus load and associated impact on crop quality and yield but this was outside the remit of this project.

Action Points

Basic principles of virus management should be considered by growers in order to minimise virus transmission and any potential impacts. Growers should start the season with clean seed and use tolerant and/or resistant varieties where these are available.

Crops should ideally be grown in isolation from other susceptible crops, both geographically and in time (i.e. consider crop rotations) although it is recognised that in intensive production areas this may be difficult, if not impossible, to achieve. The presence of vectors (such as aphids and nematodes) and virus reservoirs (such as weeds and other susceptible crops) should then be reduced as much as possible using integrated management practices.