

# Rapid Diagnosis of Beet Yellow Virus Disease

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There are three major virus diseases of beets in Arizona other than curly top. They are beet mosaic, western yellows and beet yellows. Beet mosaic can be readily diagnosed in the field by very prominent mosaic symptoms. The other two, however, are much more difficult to diagnose either by symptoms or isolation to indicator plants. The latter two must be isolated with insects. Western yellows is the most widely distributed but beet yellows is by far the most damaging to the crop. By current methods of insect transfers to indicator plants, it takes from seven to ten days for positive identification to take place. With our new rapid method, 50 - 20 minutes is all that is required for a positive answer.

This new procedure relies on the electron microscope. Because beet yellows virus is in high concentrations in plants and has a very distinctively shaped particle, it is readily and quickly spotted in crude extracts of infected beets. By exploiting these features, it is possible with a skilled operator to process and have positive diagnosis of 20-30 samples in a day.

## Procedure:

1. Collect beet leaves suspected of infection by beet yellows.
2. Cut leaves into small stacked strips.
3. Place in pH 7.0 phosphate buffer and slice under buffer with a sharp razor blade. Virus particles are released into solution as cells are sliced open.
4. Mix a drop of virus containing buffer with a drop of 2% phosphotungstic acid (PTA) to stain and fix virus particles. Place a drop of mixture on a carbon coated grid and dry.
5. Place in microscope and scan for five minutes.
6. If no virus particles are found in this period of time, the sample will be considered negative. Experience has shown that five minutes is adequate scan time. Most of the time is used in putting the sample in the microscope.

Summary of diagnosis procedures for sugarbeet viruses

Method of Diagnosis

	<u>Symptoms</u>	<u>Indicator Plants</u>	<u>Sap Trans- mission</u>	<u>Insect Trans- mission Required</u>	<u>Electron Microscope</u>
Curly top	yes	yes	no	yes	no
Western yellows	no	yes	no	yes	no
Beet yellows	no	yes	no	yes	yes
Beet mosaic	yes	yes	yes	no	*yes
Cucumber mosaic	no	yes	yes	no	no

\*Low concentration - very difficult to find particles.