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Shamrock Chlorotic Ringspot Virus, a Potyvirus[1]

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INTRODUCTION: No viral pathogen was known to infect *Oxalis regnelli* or *Oxalis triangularis* (Wikipedia 2013) as it is now called, until it was reported in a paper published in 1981. Commonly known as the Shamrock plant or wood sorrel (Wikipedia 2013), *O. triangularis* is grown as an ornamental plant for marketing in the United States in the spring around St. Patrick's Day. These plants are known for having symptoms of interveinal chlorosis which are believed to be caused by nutrient deficiency problems (Miller and Miller 2010). However, in 1977, a grower of these plants noticed unfamiliar chlorotic ring-like symptoms that he had not seen in 30 years of growing the plant and submitted these plants for diagnosis. The plants were eventually diagnosed as having a viral infection and this new disease of ornamental shamrocks was named *Shamrock chlorotic ringspot virus* (SCRV), a member of the virus family *Potyviridae* (Coyier 1981).

In 2012, plants with similar symptoms (Fig.1) were sent to the Division of Plant Industry in Gainesville, Florida for diagnosis.

Fig. 1. Symptoms of *Shamrock chlorotic ringspot virus in Oxalis triangularis*.
Photography credit: Mariana Beckman, FDACS-DPI

SYMPTOMS: The appearance of infected plants changes over time (Miller *et al* 2009). The initial symptoms are a general chlorosis that looks like a nutrient deficiency. Eventually, the symptoms have more recognizable chlorotic rings surrounding areas of healthy-looking green spots (Fig. 1). The symptoms fade overtime into more indistinct chlorotic blotches (Fig. 2). In addition, the rhizomes of these plants become black or dark brown in color (see Fig. 1 in Coyier 1981). Infected plants gradually decline and frequently die after 1-2 years.

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Fig. 2. Infected leaf of *Oxalis triangularis* with chlorotic blotching.
Photography credit: Mariana Beckman, FDACS-DPI

VIRUS SPREAD: The virus can be spread by aphids and mechanical transmission. In addition, the study by Covier (1981) showed that the virus is readily transmitted when the roots of healthy plants and infected plants are grown together.

DETECTION AND DIAGNOSIS: Diagnosis of SCRV can be made using the appearance of yellowish rings on the leaves and by electron microscopy (EM). Leaf dip preparation for the EM will reveal flexuous rods of 800-900 nm long which is typical for a potyvirus. There are no specific antisera or sequence data for this virus.

CONTROL: As with all plant viruses, there is no practical cure for virus-infected plants. Careful observation for the presence of the distinctive chlorotic ringspots and the rouging of plants exhibiting these symptoms are the only recommended control measures. Maintaining proper plant nutrition may also help distinguish chlorosis caused by micronutrient deficiency from that caused by a viral infection.

VIRUS DISTRIBUTION AND HOST RANGE: As far as is known, *Oxalis triangularis* is the only host this virus infects.

SUMMARY: No virus was known to naturally infect *Oxalis triangularis* (synonym *O. regnelli*) until SCRV was reported in 1981. The symptoms observed were not distinguishable from nutritional chlorosis in the early stages of the infection. Flexuous particles the size of a potyvirus were found and it was shown that healthy plants could become infected when grown in the same soil as those of infected plants. To avoid further spread of this virus, plants with the ringspot symptoms should be destroyed.

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