

Tobacco rattle virus (TRV)

Tobacco rattle virus (TRV) is the type member of the *Tobravirus* group, in the family *Virgaviridae*. Particles are rod-shaped, composed of positive sense single-stranded RNA. Two RNA particles, RNA-1 contains all genes needed for replication, RNA-2 contains coat protein gene. M-type isolates contain both RNAs and are nematode and mechanically transmissible. NM-type isolates only contain RNA-1, are not nematode transmissible, and more difficult to transmit mechanically.

Symptoms: TRV causes a wide range of symptoms in various hosts. In peony, TRV infection may cause ringspots (concentric yellow and green rings), line patterns, or chevrons. Symptoms in potato are dependent on cultivar. Stem mottle strains of the virus can cause stem mottling in potato, as well as leaf mottling, pucker, or other distortions. Leaves of potato may also show chevrons or ring patterns. Spraing strains cause a condition in potato known as spraing (or corky ringspot) in tubers. Necrotic arcs or rings may develop on the tuber surface or in the flesh, formed by necrotic flecks. Many host plants are symptomless.

Host Range: TRV has a wide host range of over 400 species, including: peony, sunflower, *Allium* spp., iris, tulip, barley, corn, potato, beets, spinach, peppers, cucumbers, beans, peas, faba beans, brassicas, and many weed hosts. Many of these hosts are symptomless. The virus often remains localized to the roots of infected hosts, but in the case of peony and potato may express in the leaves.

Vectors & Epidemiology: TRV is transmitted by nematodes in the genera *Paratrichodorus* and *Trichodorus* (many species), known collectively as stubby root nematodes. The nematodes are highly mobile throughout the soil profile and may be found from the surface to below 40" deep. It is unclear how far they will travel horizontally. Completion of their lifecycle may take greater than six weeks in cold soils. The nematodes are favored by abundant soil moisture, and have difficulty penetrating densely packed soils with high clay, silt, or very fine sand particles (<50µm). TRV is also transmissible by mechanical inoculation and grafting. It is not thought to spread from plant to plant by touching. Spread to new areas is typically by movement of infected plant material (vegetative or seed), or movement of infected nematodes in soil, plant residue, water, or manure (containing infected seed).

Management: Vector control by fumigation has not been successful for many crops due to the deep distribution and high mobility of the nematode. In the past, systemic carbamates such as aldicarb (Temik) and oxamyl (Vydate) have worked fairly well in potato cultivation, but are not available in Alaska. No nematicides are currently listed (March, 2014) for stubby-root nematodes. Plant virus-free materials, control weeds, and rogue out suspected infected plants. Avoid movement of soils, water, plant detritus, or manure from areas with TRV.