

Virus diseases of trifolium species in temperate Australia

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Most improved pastures in temperate Australia have one or more *Trifolium* spp. as a legume component of the pasture mix. Subterranean clover (*T. subterraneum*) is grown most widely because of its annual growth pattern and adaptation to prolonged summer drought. The main perennial species grown in the irrigated and wetter coastal areas are white clover (*T. repens*) and red clover (*T. pratense*). Several different viruses cause sporadic disease problems in one or more of these three species.

Subterranean clover red leaf virus (SCRLV) is common in white clover but has little effect on its growth. However the infected plants serve as a reservoir from which the virus spreads with its aphid vector to subterranean clover which is very susceptible and sensitive.

SCRLV also enhances the accumulation of oestrogens in infected plants. Beet western yellows virus infects and spreads between subterranean and white clover in the same way but its effects are less severe than those of SCRLV.

Subterranean clover stunt virus (SCSV) drastically reduces the growth of infected subterranean clover plants. However its vector (*Aphis craccivora*) is intolerant of cold conditions and mostly overwinters in northern NSW and southern Queensland. Outbreaks of SCSV depend upon the southward migration of *A. craccivora*.

Subterranean clover mottle virus was first discovered in 1980. It has only been reported from Western Australia. It is confined to a few locations there and is spreading very slowly, being transmitted only through seed.

Alfalfa mosaic (AMV) and cucumber mosaic (CMV) viruses infect *Trifolium* species and these have recently been recorded infecting subterranean clover in southern Australia. Their effects on clovers are not severe and infected plants are generally only found sporadically in pastures close to lucerne fields from which these viruses spread with lucerne and pea aphids.

Clover yellow vein virus is spread by aphids in a non-persistent manner like AMV and CMV. It does not infect white clover but has been reported as a problem of subterranean clover, particularly when present in combination with SCSV. There are good sources of resistance to this virus.

The most important virus disease of white clover is white clover mosaic. It is not important in other species. The virus is spread only by mechanical means and is therefore most common in pastures which are cut regularly for hay and silage.

Red clover necrotic mosaic virus is soil-borne and was isolated in 1965 from white clover plants in Melbourne. It appears to be of no economic importance.

Pea enation mosaic (pea pimple pod) virus was identified causing a disease of pea in Tasmania several years ago when intolerant varieties were cultivated. It seemed that red clover, a symptomless host, was probably the major source of the virus.

Several viruses not yet recorded in Australia are known to affect *Trifolium* spp. in other parts of the world. These include members of the bean leaf roll virus group, clover mild mosaic, clover yellow mosaic, clover yellows, pea streak, peanut stunt, red clover enation mosaic, red clover mottle, red clover vein mosaic, soybean stunt and wound tumour viruses. Some of these are seed-borne and all are potential threats to the productivity of legumes in Australia.

