
Apple Union Necrosis and Decline

Apple Union Necrosis Virus

I. Introduction: Apple union necrosis and decline (AUND) is caused by tomato ringspot virus (TmRSV). TmRSV also causes disease in other fruit trees (see [Prunus stem pitting](#) of peach and nectarine, and [brownline/constriction disease](#) of Stanley prune) as well as in many herbaceous plants. AUND is of economic importance in commercial apple orchards, where the virus is most often isolated from clonally propagated, size-controlling rootstocks. This disease is only a problem on grafted trees where the fruiting variety is resistant to TmRSV and the rootstock is tolerant. Apple cultivars vary in resistance or tolerance to TmRSV. Rootstocks tolerant to TmRSV include MM. 106, EM7A, EM26, EM9, MAC39, MAC9, P2 and Budogovsky 9, while resistant rootstocks include M.4, M.7, Ottawa 3 and Novole. Fruiting varieties resistant to TmRSV include 'Delicious', 'Quinte', 'Tydeman's Red', 'Jerseymac' and 'Jonathan', while 'Golden Delicious', 'Empire' and York Imperial' are tolerant. Ornamental crab apples and other *Malus* species appear unaffected, as are most apple cultivars on seedling rootstocks.

II. Symptoms. Symptoms of AUND appear as infected trees reach bearing age. Bud break is often delayed in the spring, and leaves are small and sparse, their color a dull, pale green. Terminal shoot growth is reduced, with shortened internodes. Infected trees flower heavily and set large numbers of small, highly colored fruit. Leaf discoloration and leaf drop occurs prematurely in infected trees. Affected trees often produce large numbers of sprouts from the rootstock. Swelling may occur above the graft union. Partial to complete separation of the graft union is common on severely affected trees; sometimes the top breaks off at the union in strong winds (photo 2-25). Decline and death is possible, although infection is not always lethal. Removal of the bark above and below the graft union reveals it to be abnormally thick, spongy, and orange-colored, and there is a distinct necrotic line at the scion/rootstock union (photo 2-26). Symptom severity is influenced by scion/rootstock combination; 'Delicious' on MM. 106 rootstock produces extreme symptoms when infected, while 'Golden Delicious', 'Empire' and 'York' seldom show symptoms even when the rootstock is infected with TmRSV.

III. Disease Cycle: The virus is present in common broadleaf orchard weeds, such as dandelion, and may be spread from weeds to apple trees by dagger nematodes. Virus may also be spread through grafting and from orchard to orchard by seeds from infected dandelion. The extent to which orchards planted with tolerant apple rootstocks

and cultivars serve as reservoirs of TMRSV, and serve as reservoirs of inoculum for neighboring stone fruit orchards, has not been determined, but is a valid concern.



IV. Monitoring: There is no monitoring schedule for AUND.

V. Management: To avoid introducing the virus into new plantings, purchase certified virus-free trees grown in soil fumigated to control nematodes. Reduce populations of nematode vectors and weed hosts by cultivating the future orchard sites for two years before planting. Soil fumigation can be used to reduce nematode and weed levels but is neither economically efficient nor environmentally desirable.

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