

WEEDS AS RESERVOIRS OF PLANT DISEASES

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Weeds are effective and substantial reservoirs for inocula of plant pathogenic fungi, nematodes, and viruses. The ubiquitous habit of weeds ensures the continuity of infection chains for these pathogens between weed and crop hosts.

Weeds are not merely alternative host reservoirs for plant pathogens but are often the main reservoirs of inocula, and their eradication usually eliminates the disease. Some aphid transmitted viruses depend on weeds for survival. Thus lettuce necrotic yellows virus transmitted by its aphid vector (*Hyperomyzus lactucae*) depends on sow thistle (*Sonchus oleraceus*) for survival and can only be transmitted from this weed host to lettuce, but not from lettuce to lettuce. Elimination of this weed and *Lactuca serriola*, gave effective control of the disease (Stubbs and Grogan 1963).

For a weed species to be an effective virus reservoir, it must also be a suitable feeding and breeding host for the vector. Weeds are often breeding hosts for both air-borne and soil-borne vectors of the vector-dependent plant viruses. The ideal relationship obtains when the growth cycle of the weed reservoir overlaps that of the susceptible crop host. Insect vectors, especially aphids, tend to move from old plants to young succulent plants. If the old host is a weed and is virus-infected there is movement of both vector and virus to the young host if a susceptible crop plant. Eradication of the weed reservoir and the elimination of the over-lapping phases usually controls the disease. Thus broadbean wilt virus, causing a destructive disease of broad-bean (*Vicia faba*), sweet pea (*Lathyrus odorata*), lupins and other legumes was controlled by eliminating its weed reservoir, *Plantago lanceolata*, adjoining commercial crops of these legumes in the Sydney Metropolitan area. The aphid vector *Myzus persicae* of broad bean wilt virus (Stubbs 1960) breeds on *P. lanceolata* so that this weed is both virus reservoir and breeding host for vector.

Some soil-borne vectors of plant viruses, like nematodes and Chytrid fungi, have wide host ranges and commonly invade and infect weed species which ensures virus survival. Thus arabis mosaic virus, transmitted by the dagger nematode (*Xiphinema* spp.), and tobacco necrosis virus transmitted by the Chytrid fungus *Olpidium* survive in many weeds species (Cadman 1963). Weed eradication in infested soil has reduced the incidence of these viruses.

Virus-infected weeds often show only mild symptoms or are symptomless carriers of a virus infection, therefore weeds in or near virus-infected crops should be thoroughly tested as possible reservoirs. Surveys of this kind revealed that *Sonchus oleraceus* was a reservoir for five viruses, *Bidens pilosa* for at least three viruses, and *Plantago lanceolata* for four viruses.

Many epidemics of plant disease occur in new agricultural regions where the pathogen existed locally in weed reservoirs, which are often unnoticed or unsuspected. In lettuce seed-producing areas in Australia, prickly lettuce *Lactuca serriola* is a natural reservoir for the fungus *Septoria lactucae*, which becomes a seed-borne pathogen of lettuce (Trimboli 1970). Pasture weeds and grasses are natural reservoirs for the soil-borne take-all fungus (*Ophiobolus graminis*) causing root rot disease in wheat. Wheat crops are usually more seriously affected with this disease when sown in virgin land and pasture land than land of continual cultivation.

Blackthorn (*Bursaris spinosa*) is a reservoir host for eelworm root knot nematode (*Meloidogyne* spp.) which affects many crops including stone fruit when planted in land with a natural growth of blackthorn. Other natural weeds are probably reservoirs for these nematodes. Even after infected weeds are removed, these nematodes may remain dormant as egg cysts for many years.

Cruciferous weeds are commonly reservoirs of viruses and their vectors as well as the white rust fungus (*Albugo candida*) and the soil-borne club-root fungus (*Plasmidiophora brassicae*) which cause disease in Cruciferous crops.