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Impatiens necrotic spot virus (INSV) is a serious disease of lettuce in Monterey County. It is a tospovirus that is spread by an insect vector, the western flower thrips (*Frankliniella occidentalis*). INSV also infects a wide range of other host plants and is spread when thrips acquire the virus from infected host plants and migrate into uninfected lettuce fields. Lettuce is a key host for INSV during the lettuce production season, but during the winter when there are no lettuce fields, the virus survives in weedy host plants in a variety of habitats: roadsides, ditches, waste areas around equipment yards, and natural areas. Vineyards can also be habitat for INSV due to the presence of infected weed hosts. This article will discuss the specific role of vineyards in providing habitat for INSV host plants.

The vineyard floor in grape production in Monterey County, consists of the area under the vines (vine row) that is irrigated with drip irrigation. Weeds are managed here using herbicides or cultivation or a combination herbicides and cultivation. As a result, the area under the vine row generally has low weed populations and is not the area of concern for INSV host weeds.

Vegetation in the area between rows (row middles) is managed by mowing or discing, but it is most often vegetated with a cover crop or resident vegetation. The vegetation in this area is generally managed by mowing.

Grass cover crops or resident grass weeds are not a concern for INSV because grasses are not hosts. However, broadleaf weeds in row middles that are INSV hosts can serve as a source of INSV. Key weeds in Monterey County vineyards that are of concern include:

Species	Host rating*	Species	Host rating*
Hairy fleabane http://ipm.ucanr.edu/PMG/WEEDS/hairy_fleabane.html	Good	Little mallow (malva) http://ipm.ucanr.edu/PMG/WEEDS/little_mallow.html	Good
Annual sow thistle http://ipm.ucanr.edu/PMG/WEEDS/sowthistles.html	Good	Mare's tail http://ipm.ucanr.edu/PMG/WEEDS/horseweed.html	Good
Common lambsquarter http://ipm.ucanr.edu/PMG/WEEDS/lambsquarters.html	Good	Nettleleaf goosefoot http://ipm.ucanr.edu/PMG/WEEDS/nettleleaf_goosefoot.html	Good
Purslane http://ipm.ucanr.edu/PMG/WEEDS/purslane.html	Good	Shortpod mustard https://www.calflora.org/app/taxon?crn=4196	Fair
Field bindweed http://ipm.ucanr.edu/PMG/WEEDS/field_bindweed.html	Good	Bull Mallow https://www.calflora.org/app/taxon?crn=5353	Poor

* Based on percent of plants infected in INSV in a recent survey

Of the weeds listed above, little mallow, annual sow thistle, and nettleleaf goosefoot have the combination of being common in vineyards, having relatively high levels of infection, and being good hosts for thrips, particularly when flowering.

The row middles can have substantial populations of broadleaf host weeds if the grasses do not dominate. Increasing the density of grasses in the row middles can be accomplished by supplemental seeding of grass cover crops (various cereals) or resident grasses (e.g. Blando

brome). The herbicide Shark (carfentrazone) can be sprayed on the row middles when broadleaf weeds are small to selectively remove them and allow grasses to grow. 2,4-D is registered for use on grapes during the dormant winter period and will also remove broadleaf weeds, but extreme care would need to be taken to safeguard the grapes as well as surrounding crops to consider use of this option.

The most common weed option used in vineyards to control weeds in the row middles is mowing. In 2021 we observed a vineyard where the row middles were not mowed and which was infested with nettleleaf goosefoot, sow thistle, little mallow, and shortpod mustard. The nettleleaf goosefoot, little mallow, and sow thistle all had levels of infection >35% and the adjacent lettuce crops were highly infected with INSV, particularly on the edges adjacent to the vineyard. The shortpod mustard had a much lower level of infection with INSV, but it was flowering, supporting thrips populations. In this situation, it is not clear if mowing would have reduced levels of infection in the adjacent lettuce, but mowing would have managed the weeds by weakening them and thinning out their population.

Weed control is particularly important in the spring when thrips populations begin to increase. It is unclear how far thrips can move, but they rely heavily on the Salinas Valley winds for long distance dispersal. Monitoring efforts showed that thrips are equally distributed in the wind column up to 10 feet high and have even been detected in moderate numbers at heights above 20 feet.

Losses from INSV in 2020 exceeded $50 million. The INSV Task Force, composed of growers, PCA's, the Grower-Shipper Association, the County Agricultural Commissioner and researchers, meets weekly to discuss ways of reducing the spread of INSV. The Agricultural Commissioner in 2021 included a notification with each pesticide permit discussing the need for growers to control weeds on their properties and outlined their authority to address nuisance weed issues.

In 2021 growers undertook a coordinated efforts to aggressively control winter weeds to reduce the level of infected host plants in the county. These efforts included outreach to all vegetable growers in the valley, Cal Trans (along the 101 corridor), railroad, and the city of Salinas (municipal roadways). While it is hard to say for sure, these efforts appear to have reduced the levels of INSV infected fields in some areas.

In 2022 we hope to increase efforts to reduce over-wintering habitat for INSV host plants by continuing outreach and promoting best management efforts to all for the benefit of lettuce growers in the Salinas Valley. For more information: Contact Richard Smith, 831-759-7357 or Larry Bettiga, 831-759-7361.