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Best Management Practices for Reducing the Impact of Plum Pox (Sharka) in Ontario Stone Fruit Orchards

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New anti-feeding insecticides may reduce aphid feeding on infected trees and reduce the transmission rate of plum pox. When available and if proven effective, new anti-feeding insecticides (feeding blockers) could be used early in the season to reduce the spread of plum pox by aphids.

More research into the application timing of refined oils and new anti-feeding insecticides, their safety to stone fruit trees and the seasonal susceptibility of stone fruit trees to plum pox will help growers maximize the use of these new products in the future.

5) Manage Alternative Virus Reservoirs

Reduction in potential reservoirs within and outside of commercial stone fruit orchards will help to reduce the chance of aphid transmission of the plum pox virus to uninfected trees. Abandoned orchards and plum pox host trees in minimally maintained or neglected properties should be removed. If new alternate plant hosts are identified through future research as potential reservoirs of the plum pox virus, every effort should be made to manage and remove these new hosts. Ornamental hosts such as purple leaf sand cherry and dwarf flowering almond should not be grown in orchards or on adjacent or nearby properties. Growers or their representatives should educate rural and suburban neighbours about the risks of growing plum pox hosts (fruit or ornamental) on properties adjacent to or near susceptible commercial orchards.

6) Select New Orchard Site Away from Disease Sources

The further newly planted stone fruit orchards are located from known infested areas, the less chance of the plum pox virus transmission by aphids. Isolation is an important strategy to protect clean host material from future disease transmission. New orchard sites should be chosen as far away as possible from known infected orchards and areas, and away from potential sources of plum pox (including ornamental hosts). This may include pursuing commercial production in non-traditional stone fruit production areas in Ontario. Growers outside of the quarantine zone but in close proximity should select new sites as far from the quarantine zone as possible (Figure 6).

7) Plant Tolerant and Resistant Varieties When Available

Planting plum pox tolerant or resistant varieties when identified and available is recommended. The United States Department of Agriculture has recently released the plum pox resistant plum cultivar 'Honey Sweet'. Plum pox resistant apricot cultivars 'Moirent' 'Rafet' and 'Belgida' have been developed and released in Spain. Research into developing stone fruit varieties resistant to plum pox including resistant peach and nectarine varieties continues world wide.

8) Education and Training

Knowledge on plum pox is not static, and new research may change the relative importance of various best management practices over time. Growers should become aware and familiar with new information on plum pox detection and management as new technology develops by attending information sessions, workshops and conferences that provide the latest information on plum pox management. Growers should educate their employees about the disease and management actions.

Growers should attend workshops and other information meetings to learn about plum pox symptom identification, orchard inspection and best management practices. Written materials such as fact sheets and newsletter articles are good references for growers. The OMAFRA Fact sheet "Sharka (Plum Pox Virus) of Stone Fruit and Ornamental Prunus Species" and "Plum Pox Virus and Other Diseases of Stone Fruits - A Field Guide" produced by Pennsylvania State College of Agricultural Sciences are recommended as useful visual diagnostic tools for scouts and growers.
3) Remove and Dispose of Diseased Trees Immediately

Trees infected with the plum pox virus become reservoirs which can be spread by aphids to nearby healthy trees. All symptomatic trees or trees found to be infected with the plum pox virus should be removed from the orchard immediately after identification. Cutting down and burning infected trees is a convenient method to dispose of trees, but cutting and chipping may be preferable under some conditions and in some areas (Figure 4). A registered herbicide applied to the stumps of fallen trees and as much of the root system of all infected plum trees or stone fruit cultivars with suckering rootstocks should be removed. Growers who remove trees or orchards of plums or other stone fruit trees with cultigens that have suckering rootstocks should follow a fallow period of one year before replanting back to susceptible stone fruit trees. Growers can also deep cultivate plum blocks in order to eliminate the risk of suckers.

4) Manage Aphid Vectors

Once established in a region, plum pox is spread by migrant aphids moving through orchards (Figure 5). Applying knock-down insecticides has not been a successful strategy for controlling the spread of non-persistent viruses such as the plum pox virus in stone fruit or other agricultural crops. Knock-down insecticides may kill aphids that have formed colonies in an orchard but will not kill migrant aphids that land in the orchard after spraying. Aphids that enter orchards after spraying knock-down insecticides often become agitated by spray residue, probe more frequently, and disperse to adjacent trees. This in turn, can increase the spread of the virus. Insecticides should be applied to manage aphid pests in stone fruit only when populations approach or exceed established economic thresholds.

Suckers are highly attractive to aphids. Remove suckers to discourage aphid colonization, feeding and/or attraction of migrating aphids that may be carrying the virus.

Recent research indicates that new refined summer oils reduce the acquisition and transmission of plum pox virus by aphid vectors. The use of these oils will not eliminate the spread of plum pox but can help reduce the rate of plum pox spread by aphid vectors.

Figure 1. Plum pox symptoms on infected peach leaves appear as yellow rings and lines.

Figure 2. Symptoms of plum pox on peach fruit appear as yellow rings and blisters.

Figure 3. Plum pox symptoms often first appear on the basal leaves of the current year’s growth (green colour) compared to the apical growth along the same shoot (black and white). The arrow indicates the point along the shoot that differentiates between the previous year’s growth and the current year’s growth. Source: Agriculture and Agri-Food Canada.

Figure 4. Plum pox infested trees should be destroyed immediately to prevent the spread of the virus to adjacent susceptible trees and orchards.

Figure 5. Aphids are tiny soft-bodied insects with piercing sucking mouth parts. Some aphids such as the spirea and green peach aphid are good vectors of the plum pox virus.
Plum pox (Sharla) is a serious disease of stone fruit caused by a plant virus. The virus does not affect humans or animals. The disease has spread throughout many European countries resulting in economic losses to the stone fruit industry. It was first discovered in North America on a peach farm in Pennsylvania in 1999 and subsequently in Ontario and Nova Scotia, Canada, in 2000.

Plum pox can be introduced into a region on propagation material such as rootstocks and budwood. Once plum pox becomes established in a region, elimination of the virus from the region is very difficult. Several species of virus-carrying winged aphids are vectors of the plum pox virus, resulting in the natural spread of the disease. Aphids acquire the virus through feeding-related activities and then transmit it to nearby healthy trees. The acquisition and transmission of the plum pox virus by aphids can happen in less than a minute.

Symptoms of plum pox are variable and may be confused with other disorders such as nutrient deficiencies or injury caused by pesticides. Symptoms may appear on the leaves and fruit of most stone fruit and occasionally on the petals of apricots. The expression of symptoms varies depending on the host, the cultivar, the strain of plum pox, the age of the infected tree and the environment. Although plum pox rarely causes tree mortality, the disease can reduce fruit productivity and tree longevity.

Yield loss in susceptible plum and apricot varieties can be as high as 80-100% due to premature fruit fall and poor quality of fruit. In Europe, peach and nectarine yield reductions are approximately 15%, due mainly to the loss of tree productivity.

While plum pox does not result in tree death, research has shown that in the presence of other disease agents such as prune dwarf virus, Prunus necrotic ringspot virus (causes brownning), and apple chlorotic leaf spot virus (causes yellowing), a greater economic loss including tree mortality may occur than with plum pox alone. Although there is no information available on the effect of other stresses including cold temperatures on the survival or mortality of plum pox infected trees, it is possible that once trees become severely infected, they may not be able to withstand severe winters or drought conditions.

Best Management Practices for Reducing The Spread and Impact of Plum Pox

1) Plant Certified, Virus-tested, Virus-free Nursery Stock

Growers should plant only virus-free trees produced from certified, virus-tested, virus-free budwood and rooted stock propagated outside of the plum pox quarantine zone (Q-zone). Plum pox is easily distributed and transmitted through infected nursery stock and propagation material. Planting clean nursery stock eliminates the propagation link for plum pox and other viral diseases that could potentially be present.

Planting infected trees results in less efficient production because young trees are infected earlier, produce symptoms earlier and may have to be removed before they produce any fruit or enough fruit to be economical. Large gaps in orchards when replant areas are removed would have additional impacts on production and profitability. Infected trees become a reservoir of the virus for subsequent spread by aphids to nearby susceptible trees. Certified, virus tested, virus free bud wood of most popular susceptible stone fruit cultivars are available from nurseries located in southwestern Ontario.

2) Scout and Inspect Orchards for Symptomatic Trees

All trees should be visually inspected for symptoms of plum pox at least twice per year at appropriate times (Figure 1 and 2). More frequent visual inspections are encouraged. Tree inspections should be conducted by qualified, trained personnel familiar with plum pox symptoms and other tree disorders.

Research has shown that plum pox symptoms initially show up on the basal leaves of the newest year’s growth, that is the leaves on the lower one third of the shoot or on non-elongated spurs (Figure 3).

Twice-yearly inspections will allow identification of symptomatic trees in a timely fashion. Early June inspections allow removal of symptomatic trees before significant aphid spread from infected trees during the growth season. Late August and early September inspections allow identification of trees that became symptomatic during the season and were unnoticed during previous inspections.

Inspections should not be performed during sustained periods of hot weather (over 30°C) because the levels of the virus inside trees and symptoms of the disease tend to be lower and less obvious during periods of prolonged hot weather. However, symptoms should still be present on the basal leaves of the newest year’s growth despite temperature. It should be noted that symptoms of plum pox often show up several years after infection and that trees with symptoms have acted as a reservoir of the disease for several years.