

RECOMMENDATIONS FOR THE ESTABLISHMENT & MAINTENANCE OF A HEALTHY PEACH ORCHARD

by¹

Dr. John M. Halbrecht

Peach stem pitting (PSP) is perhaps the most insidious, and potentially costly disease affecting stone fruit in the northeast. In the most severe cases this disease can completely destroy a peach orchard in as little as 4 years after planting. Complete orchard loss is unusual but it is not uncommon for PSP to kill several trees each year in mildly infested sites. As the number of missing trees increases,

orchards become less profitable over time and eventually may justify pushing out an orchard prematurely. Because PSP is capable of significant economic loss, every grower should be familiar with the biology and management of this disease.

Biology of Peach Stem Pitting

Peach Stem Pitting is caused by the tomato ringspot virus (TmRSV) and all peach and nectarine rootstocks are susceptible. Infected trees show symptoms of stress and die within 2-3 years after infection. Trees may become infected anytime after planting and there is no treatment that can "cure" infected trees.

The natural hosts for TmRSV are common broadleaf weeds. Weeds serve as reservoirs of the virus and spread the virus through seed dispersal. Virus transmission to peach occurs only through feeding activities of the dagger nematode (*Xiphinema* species). Dagger nematodes are microscopic worms that parasitize roots and they are efficient vectors of TmRSV. They acquire the virus when they feed on infected weeds and transmit the virus when they feed on peach. Once nematodes acquire the virus they may transmit it for the remainder of their life which is estimated to be about two years. Dagger nematodes cause little damage to fruit trees if they do not carry TmRSV. (A more detailed description of PSP can be found in the Penn State Tree Fruit Production Guide.)

Principles of PSP management

It is difficult and in most cases not practical to control PSP after an orchard has become infected. The key to control is prevention and this can be effectively accomplished by practices which suppress dagger nematodes and TmRSV. The optimum time to begin preventive measures is a year or two prior to establishing a new orchard. The first step should be a nematode assay and this can be done even before the old orchard is pushed out. Knowing the population level of dagger nematodes provides a clue as to the risk of PSP and whether nematode control is recommended. Nematode control is a major component of PSP management. The other component is weed control which limits nematode access to the virus.

Methods of control

There are several options available for "cleaning-up" orchard sites. The

¹ Penn State Fruit Research and Extension Center, Biglerville, Pa

options include soil fumigation, nematicides, crop rotation and green manure treatments. Each method has advantages and disadvantages that need to be considered.

For many years the preferred treatment has been soil fumigation. When properly applied, fumigation provides a quick and efficient method of reducing both nematodes and weeds thus eliminating sources of virus and the vector. It is a very effective treatment, however, a major drawback is cost and it is the most expensive treatment for PSP prevention. Fumigants must be applied by certified applicators and most growers must hire a fumigation service. Fumigants are under review and their future availability is in question.

Nematicides are not as effective as soil fumigation but will knock down nematode populations. This alone may not be sufficient to prevent disease if virus reservoirs are available. A combination of nematicide treatments and good weed control is more effective but TmRSV may reappear if a significant number of virus infected nematodes or weed seed escape treatment.

Crop rotations can effectively minimize PSP if the alternate crop is a non-host for TmRSV, dagger nematodes or both. Gramineous crops such as wheat, oats, rye, corn or sudan grass are not hosts for TmRSV but they are good hosts for dagger nematodes. Providing that broadleaf weeds are controlled, these crops can effectively reduce the presence of TmRSV on old orchard land. The nematode population, however, will remain unaffected or increase. Thus there is a potential for reoccurrence of TmRSV. Selected green manure crops have been shown to effectively reduce the populations of both nematodes and virus. Perhaps the best crop for this purpose is rapeseed. Dagger nematodes survive on rapeseed but reproduction is low and TmRSV does not survive. However, the greatest benefit is achieved after green rapeseed tissue is incorporated into the soil as green manure and allowed to decompose. Decomposition releases toxic byproducts which knocks-down dagger nematode populations. The nematicidal activity of rapeseed green manure is not as effective as some commercial nematicides but the combined effect of population reduction plus elimination of TmRSV effectively provides a "clean" replant site for the avoidance of PSP. Thereafter a routine program of weed control and a periodic assays to monitor for dagger nematodes can maintain an orchard free of PSP.

Comments on the use of rapeseed for PSP prevention

Rapeseed green manure can be an effective treatment to reduce dagger nematodes and TmRSV in replanted orchards. Relative to nematicides, it is very economical and can provide additional benefits such as helping to reduce subsequent weed problems, increase soil organic matter, improve nutrient availability, and erosion control. Green manure and rotation crops can also improve drainage, aeration, and soil texture by creating soil channels after decomposition of the roots.

To get full benefit rapeseed must be grown in relatively pure stands without many weeds. One season of rapeseed green manure is beneficial but two summer seasons are highly recommended. A compromise between one and two seasons is to grow two crops of rapeseed within

one year. The problem with this recommendation is that growers often find it difficult to keep to the necessary timetable to accomplish this.

Suggested timetable for growing one or two crops of rapeseed:

- Prepare a seedbed by late April early May and plant rapeseed by mid May

- A) If only one crop will be produced this can be incorporated as green manure anytime in the fall but before the soil temp. falls below about 50 degrees.

- B) If a winter cover crop is planned, the rapeseed must be incorporated by late August or early September.

The seedbed must be prepared and second crop planted by mid to late September to get sufficient growth to survive the winter.

- The winter crop can be incorporated in the spring after growth has resumed and soil temperature has increased above 45-50 degrees.

Tips:

- Use only winter rapeseed varieties. A recommended variety is 'Dwarf Essex'.

- Rapeseed requires a firm, smooth seedbed that is free of weeds, heavy residue, and large clods.

- A preplant herbicide is highly recommended; Treflan® at 2pints/Acre works well.

- Seed may be drilled or broadcast. Avoid planting too deep! A seeding depth of 3/8 inch is good or if broadcast, a culti-packer may be used.

- Use a seeding rate of 7-8 lbs/acre.

- Rapeseed is sensitive to herbicide carry-over.

- Fall planted rapeseed should have 8-10 true leaves and a 5-6 inch tap root with a 3/8-inch diameter root neck before the ground freezes.

- For optimum nematode control green manure should be incorporated there is adequate soil moisture and a soil temperature above 50 degrees.



Rape Planting between peaches in October in Pennsylvania after spring planting