Tart Cherry Mite and Mildew Control Research for 2002

by

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During the 2002 growing season our research into mite population dynamics, cherry mildew and codling moth control took a different form than originally planned. This was due to the frost that occurred on 5/8 and 5/9 which removed the entire fruit crop from several of the blocks involved in the investigation. The loss of economic crop levels in these orchards modified the "insect control program" because of changes in 'economic injury thresholds'.

Mites and Mildew Control in Tart Cherries Using Supreme Oil

It has been noted the use of supreme spray oil (oil) is effective in reducing mite populations and has also proved to be effective in controlling mildew in tart cherry trees. Results of preliminary 'trials' using these materials have been generally good, but there have been inconsistencies, and lingering questions as to the effect of oil on fruit, tree vigor, and the causes of the inconsistencies observed. The following is a report of results obtained thus far.

Tart Cherry Mildew: Effectiveness of Supreme Oil:

During the past several years, the first appearance of Tart Cherry Mildew has occurred between May 15 and May 20 in orchards in Southern Utah County. When mildew first appears it is extremely important that the application of the control agent be applied in a timely manner. At times failure to apply the material quickly has allowed mildew to infect the entire leaf surface in a matter of 5 to 7 days. The control material of choice has been Rally with other materials of the same class being used in some blocks and orchards. The effectiveness of this class of materials has decreased over the years, so growers are looking for lower cost and more effective alternatives.

During the 2001 growing season, several growers used 2 applications of 1% oil to control cherry mildew with good success. In limited areas, complete control was not obtained, but generally control was acceptable. During the 2002 growing season we examined the 'coverage' patterns within large cherry trees, and examined the effectiveness of control in small trees where the question of coverage was not a factor.

Observations on Coverage:

Following the first application of oil by growers in fully grown blocks of tart cherry trees, samples of leaves were obtained from the upper portions of the tree canopy. Samples were taken approximately 12 to 18 inches inside the upper canopy limits, in the center and on both sides of the tree. A number of trees were sampled in blocks of trees in Genola and Salem. The leaves were examined under a 30X binocular microscope and the % of the leaf surface covered with oil was estimated. Some consistent patterns were observed.

A. Blocks sprayed with conventional 'airblast' sprayers tended to have significant portions of the leaf surface in the upper center area of the tree with less than 75% leaf surface covered. In the upper canopy, toward the sides, coverage tended to be much better. Some leaves had significant gaps in the coverage on one side of the

leaf or the other. Complete coverage is essential for mildew control when a 'contact material' is being used so these gaps in coverage may be the reason that incomplete control occurred in a number of cases.

B. In fully mature cherry trees there was a significant correlation between fan size, speed and ground speed and the % of the leaf surface covered by an oil application. There is a real tendency for 'speed sprayers' to leave significant portions of large, mature tree canopies with incomplete spray coverage. It should be noted, that in many blocks which lost all or most of their fruit from the May, 8 frost, growers used 1% oil applications for mite control. In several blocks good mite control was achieved in the lower and outer portions of the tree but the mites in the upper central areas of the canopy were relatively unaffected. There were several vivid illustrations of this "inadequate coverage" as the leaves were preserved in part of the canopy and continued to turn brown in the upper central areas.

C. There were 2 blocks of mature tart cherry trees examined which were sprayed with a "CurTec" sprayer. Even though the spraying was done at approximately 30 gallons per acre in an 'every-other-row' pattern, the % of the leaf surface left uncovered in the upper areas of the tree canopy was lower than similar trees sprayed with conventional speed sprayers. The horizontal, laminar air flow patterns of this equipment, appears to give significantly better 'spray coverage'.

Observations on Treatment Effectiveness:

Following treatment, as the leaves were examined for 'degree of coverage' a rating of the degree of mildew control was also made. This was done by noting whether the new leaves that were laid down after the mildew treatment were 'mildew free' as well as whether mildew continued to progress on treated leaf surfaces. Under the 30X magnification it was easy to discern what areas of the leaf had been covered by oil, as the oil imparted a smooth, reflective character to the surface, compared to the 'dull' textured nature of the untreated surface.

The application of oil to the leaf surface appeared to bring the growth of the mildew completely under control in areas covered. There appeared to be additional growth of mildew on leaves which did not get complete coverage, in the 'non-covered' areas.

During 2002, as in 2001 the mildew control achieved with 1% oil was as effective as that achieved with "Rally". Where the results were less than desirable, it was evident that the "gaps" resulted from incomplete coverage. There are some additional questions that we hope to investigate in future years, particularly the combined use of oil along with low and moderate rates of "Rally". The use of oil does provide the tart cherry grower with a low cost material for mildew control, but complete spray coverage is essential. In some cases, it may be necessary to use 200 gallons per acre of 0.5% oil applied at a lower ground speed to assure complete coverage.

Effect of Summer Oil Sprays on Tree Growth:

There have been reports and observations indicating that repeated applications of oil sprays during the growing season could have a negative effect on the growth and development of deciduous fruit trees. To determine whether or not the use of oil sprays

during the early growing season for the control of mildew and/or mites would have a negative effect on tree growth and 'vitality', 25 trees at each of 2 locations were given 1, 2, or 3 applications of 1% oil spray beginning on May 22. The second and third applications occurred approximately 10 and 20 days latter.

Trees were grouped into 25 replicates of 4 trees each and the treatments were assigned randomly within these replicates (Treatments were: 1 = control, 2 = one application, 3 = two applications, and 4 = three applications). Trunk cross-sectional area was determined at the beginning of the treatments by measuring the diameter of the tree trunk at a marked point and the cross-sectional area calculated. At the end of the growing season the trunks were measured at the same point and the increase in the trunk-cross sectional area was calculated.

Because of the time, cost and variations faced in yield studies in deciduous fruit trees, we chose the simple "model" of young non-bearing trees to test for possible negative effects. Realizing that this simple model may not give 'conclusive' results, it was felt that, unless significant growth reductions were observed, any negative effects on growth and yield would be small enough to be acceptable.

Analysis of the data showed no significant change in the vegetative growth rate of young, non-producing tart cherry trees given 1, 2, or 3 applications of 1% oil. This experiment should be repeated on the same trees for another year to look for accumulative effects. This finding is significant because it indicates that oil can be used in a mildew and/or mite control program on tart cherries without severe effects on growth of the tree, and without a significant reduction in yield.

Mite Control Challenges in Utah County:

Over the past 8 to 10 years there have been significant changes in the mite population dynamics in Southern Utah County. The beginning of these changes manifested itself as a dramatic decrease in early season rust mite numbers. Historically, there have been significant rust mite populations during the early portions of the growing season. These populations seldom reached economic treatment thresholds, but they were present and served as an early season food source for developing populations of predatory mites. This allowed for the establishment of predator populations in the canopy before migrations of leaf feeding mites from the cover occurred. This relationship served as the cornerstone of the IPM program. For unknown reasons rust mite populations have plummeted during the last several years. Analysis of changes in spray programs, have not been found to explain this basic change. For example, some growers have not used dormant oil sprays for several years, but some have and are still experiencing the same problems.

A second contributor to the change in population dynamics in Southern Utah County is the increased level of particulate matter in the atmosphere. By mid season, there are significant deposits of "dust and dirt" particles on the leaf surfaces throughout the orchards. This results in the 'road side mite problems', experienced by most growers over the years, being area wide instead of confined to one or two trees next to the road.

A possible third factor we may be dealing with may be subtle changes in the predatory mite population, and/or genetics. Two observations that may indicate this could be a factor are: 1. There has been a significant contribution to early season mite control by *Zetzillia* which decreased rapidly as the weather warmed in late May and early June. This sub-species appears to persist latter into the year than they did 10 years ago, raising questions as to how they may be interacting with the Typh. and 2. There seems to be subtle changes in the coloration, mobility, and size of the predominant Typh. of 2002 versus how they appeared and acted 10 years ago and/or in other areas of the state or Washington State.

Because of the above changes in the mite population dynamics, (there may be other factors not known or understood) growers in Southern Utah County have had to shift more and more toward chemical control of mites. As this shift has occurred we have attempted to keep current with the best way to maintain an effective mite control program. We have experimented with several materials under a variety of conditions and have reached the conclusion that there are 2 best choices. They are:

1. The material Apollo has been available for mite control during the growing season for a number of years. The material is expensive ($10 per ounce at label rates of 8 to 16 ounces per acre). Beginning 9 years ago we conducted experiments using this material in combination with oil at reduced rates and determined that 4 to 5 ounces per acre in 200 gallons of 0.5% oil applied as the first significant migration of mites into the tree canopy occurs resulted in season long mite control (because this treatment did not seem to adversely affect the predators but slowed down the development of the leaf-feeding mite populations resulting in a predator-prey 'balance').

2. Beginning with the 2002 crop year a material named Acramite has become available for mite control in Utah. This material, like Apollo, acts to limit the number and viability of eggs. During 2002 use of this material at the rate of 12 ounces per acre in 200 gallons of 0.5% oil resulted in season long control of mites when it was applied as the first significant migration of mites into the tree canopy occurred.
3. Other materials such as Pyramite, and Omite (post harvest on stone fruits) are available and effective, but experience indicates that in most cases require multiple applications to attain season long control.

Because of the above mentioned factors most growers in Utah County should expect they will need to use chemical means to control mites.