

## THE EFFECT OF OIL SPRAYS ON TREE GROWTH OF TART CHERRIES

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By

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Over the past several years sprays of “Supreme Oil” have been used to aid in the control of mildew and mites in tart cherries and other tree fruit crops. A definite adverse effect has been observed when repeated oil sprays (5-8 applications per year) have been applied for Codling Moth control in both conventional and organic production. These adverse effects begin as decreased fruit size, followed by lower vigor and after several years lower levels of bloom. The purpose of this research has been to determine how many applications of oil could be applied to tart cherry trees without ‘significant’ adverse effects.

Research work dating back to the mid 1970’s has shown that application of ‘spray oil’ to the foliage of deciduous fruit trees will adversely affect the photosynthetic rate of the treated foliage. The adverse effects have been shown to be related to concentration of the solution applied and the number of applications made over time. When adverse effects of repeated oil applications have been observed in apple trees, it has been assumed that the suppression of the photosynthetic process is the most likely mechanism to ‘cause’ the observed results. In the complex systems of bearing deciduous fruit trees it is extremely difficult to correlate ‘photosynthetic rate’ and fruit production so the model of ‘vegetative growth rate’ in non-bearing trees was chosen. It is recognized that the vegetative growth of a tree may not be as sensitive to decreased photosynthesis as production of fruit, but we attempted to ‘compensate’ for this difference by including higher numbers of ‘applications’ in the experiment than would normally be used in commercial orchards. Also the treatments were repeated on the same trees in 2 consecutive years and the applications were made early in the growing season when it is thought the effects would be most pronounced.

In the summer of 2002 sprays of 1% ‘supreme oil’ were applied to 2<sup>nd</sup> year tart cherry trees growing in 2 different sites Southern Utah County. Treatments consisted of; untreated controls, and 1, 2, 3, and 4 applications of 1% oil, applied beginning in mid-May and then at approximately 14 day intervals. The trees were marked and the trunk cross-sectional-area of the trees was determined before treatments began. At the end of the growing season the tcsa was again measured and ‘annual growth increment of treated trees were compared to untreated controls. The cross-sectional-area of the trunk of a tree is a good measure of the ‘mass’ of the tree canopy and was thought to be a good ‘model’

for testing for adverse effects of repeated applications oil on tart cherry production. During 2003, the same trees were again treated in the same manner and at approximately the same dates.

The 2002 experiments resulted in no measurable decrease in tree growth for any of the treatments. In fact, differences in the tree growth of each of the treatments appeared to be totally random. When data from 2003 was analyzed it was found that 1 or 2 applications of 1% oil in each of 2 subsequent years had no significant effect on the growth of the tree. The means of the treatments were truly 'random'. In the trees that received 3 treatments of 1% oil in each of 2 consecutive years the 'mean vegetative growth increment' was smaller than the control during the second growing season, but due to the degree of variation within the treatment the difference could not be judged to be scientifically significant (as a grower I feel this 'degree' of effect is a caution).

Trees that received 4 applications of 1% oil in each of 2 consecutive years did show a measurable and scientifically significant decrease in vegetative growth in the 2<sup>nd</sup> season. The decrease amounted to approximately 8% of the growth increment of the untreated control trees. The results of these experiments appear to be consistent with prior observations and experiments that found that: 1. Application of 'oil sprays' do result in decreased photosynthesis and 2. That repeated applications of 'oil sprays' over a number of years may result in decreased tree growth and productivity.

While it is apparent from the results of this study that there is an adverse effect of repeated oil sprays on vegetative growth (and assumed on fruiting) the number of sprays required to bring about measurable effects, and the degree of those effects suggest that oil sprays may be very useful.

When limited numbers of oil spray applications are used, as for example, if 1 or 2 sprays are used early in the season for mildew or mite control the reduction in photosynthesis and/or vegetative growth could be expected to be small. In fact, compared to widespread mildew or mite problems it would be insignificant. Given seasonal patterns of photosynthetic rate changes, the latter in the season oil sprays are used, the less the expected effect on growth or productivity would be.

It appears evident, that oil sprays, or addition of oil in a mildew or mite control spray to enhance the effectiveness of the control is a viable practice. For example, we have seen that when 0.5% supreme oil is included in sprays containing Apollo or Acramite the control of mites is more rapid, more complete, and lasts longer. This means that the mite damage to the foliage is limited more by inclusion of the oil than if it is left out. The expected result would suggest that the more rapid and complete control of the mite damage would significantly outweigh the adverse effects of low level, and limited applications of oil by itself or in combinations with mite and mildew control agents.

Based on the results of these experiments, the author would feel very comfortable in recommending the inclusion of oil at 0.5% levels in up to 4 spray applications in any growing season. I would also feel comfortable including 1 application of 1% oil (at 100 g.p.a. or 0.5% at 200 g.p.a.) in the mildew and/or mite control program during the pre-harvest portion of the growing season.

Based on the results of this experiment and previous observations the author would recommend that no more than 2 gallons of spray oil per acre be used in the pre-harvest and harvest period. In the post harvest period, an additional usage of up to 2 gallons of oil per acre (in 1 or 2 sprays as needed) should not result in significant impediments to production. As a general rule, the author would recommend that, on an on-going year to year basis, oil usage during the growing season should be limited to 2 gallons per acre or less. If the alternative is to have serious mite or mildew populations during harvest or the post-harvest period use of additional applications of oil will probably have much smaller adverse effects than the premature loss of a major portion of the leaf surface function.

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