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DAVEY'S PLANT HEALTH CARE[1]

by Roger Funk

Pest management is an important service offered by Arborists to protect trees and shrubs in the landscape. Concerns for public health and the environment, however, have resulted in increased insurance costs and restrictions in the use of pesticides. Many tree care companies are weighing the benefits of a pest management service against the risks involved in the continued use of pesticides.

In January 1985, the Davey Company scheduled our first Plant Health Care (PHC) Seminar to discuss a comprehensive approach to improving tree health through proper selection, planting, and care. Since the concept of PHC emphasizes preventative maintenance, the health of the tree (not pest control) is the central focus of our service.

Nielsen defines a similar concept and provides a framework for implementation in the November, 1986 issue of the *Journal of Arboriculture.*

Alternatives

One of the objectives of our PHC concept was to reduce the use of traditional pesticides. Horticultural oil was an obvious and underused alternative and we began testing its use for foliage-feeding insects. In addition, we began testing reduced rates of the registered insecticides in combination with soaps, horticultural oil, vegetable oils, and citric oils. More recently, we have begun testing Neem oil, diatomaceous earth, and detergents.

Our earliest successes were with soap plus reduced rates of insecticides. After two years of laboratory and field testing, we introduced the approved combinations in five test markets in 1987 and implemented the "program" throughout our U.S. market in 1988 (Figure 1). Our Canadian offices currently are field testing Plant Health Care with full implementation scheduled for next year. We anticipate a 75% reduction in pesticide use this year with further reductions by 1990. Additional reductions are projected through the increased use of alternatives, selective spraying and improved methods of application (Figure 2).

Testing

Efficacy. Preliminary research with Safer Insecticidal Soap indicated that soap alone would satisfactorily control most soft-bodied insects and mites, but provided no residual effect. Testing was begun on reduced rates of the petrochemical pesticides in combination with soap to determine efficacy for sucking as well as chewing insects and mites.

In most cases soap was found to enhance the control achieved with reduced rates of pesticides. This was particularly true with sucking insects and mites, but also with Japanese beetle. In one study, Tempo, a synthetic pyrethroid, was sprayed on linden trees in the field. Other trees were treated with Safer soap or Tempo plus soap. Treated foliage was collected one week later. During this period, rainfall was approximately 1½ inches. Japanese beetles were introduced onto the foliage in the laboratory. After a feeding period of two days, insect mortality rates were recorded. The results are in Table 1. Tempo alone at ¼ the recommended rate and soap alone at ½ the recommended rate did not control the beetles.

1. Presented at the annual conference of the International Society of Arboriculture in Vancouver, B.C. in August of 1988.

The same rates of Tempo and soap when combined, however, provided 92% control.

In another experiment, Tempo and soap were tested for contact control of aphids. Rose of Sharon twigs infested with aphids were brought into the lab, placed in individual vials of water and sprayed. Results of this experiment are given in Table 2. The combinations of Tempo plus soap again outperformed either component individually applied. The tests demonstrated that the rate of Tempo can be reduced when combined with soap for the control of aphids and Japanese beetles.

Tests with other insecticides, such as Dursban, Orthene, and Sevin, have shown similar results in combination with soap or horticultural oil, although the effective rates vary. In one test, Dursban at 1/16 the recommended rate in combination with horticultural oil (1 gal/100) provided mite control equal to Dursban at full rate.

Compatibility. The current soaps which are registered for ornamentals are strongly alkaline and may react differently with different insecticides or in different water sources. For example, in some of our markets, soap causes Sevin to deactivate within several hours of mixing and turn a brown to reddish-brown color—which stains! In these situations, additives are necessary to combine soap with the insecticide. Davey researchers are working with soap manufacturers to alter the formulation of soaps so that additives may not be necessary in the future.

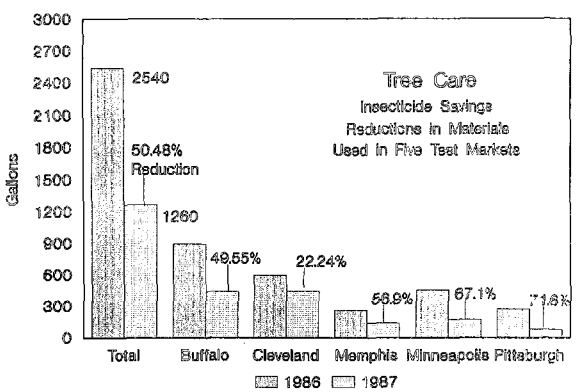

Figure 1.

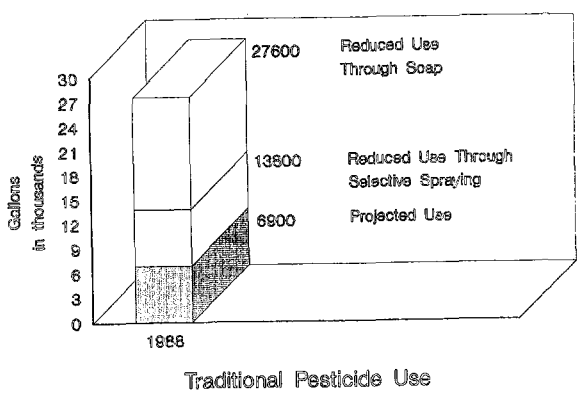

Figure 2.

Phytotoxicity. There are a number of plants listed as being injured by Safer's soap. In addition, we have found that drought-stressed trees are more susceptible to injury from soap than standard pesticides and that, under certain conditions, the new growth of evergreens may be injured. In most cases, we did not find that the addition of a reduced rate of pesticide altered the occurrences or severity of the phytotoxicity.

Although precautionary statements regarding phytotoxicity from horticultural oil persist, Johnson has not observed injury when light, superior oil is applied to deciduous foliage, provided that the proper rate is applied and that the tree is not under moisture stress. Injury which we observed occurred only when oil was combined with Sevin and may have been related to drought stress and/or excessive heat and pressure.

Selective Spraying

Another objective of Plant Health Care is selective spraying, which involves monitoring to determine the population levels of insects, and spraying

Table 1. Japanese beetle on linden

Insecticide	*Rate/100 gal.*	*% Control (residual)*
Tempo	0.5 oz.	17
Soap	128 oz.	0
Tempo + Soap	0.5 oz. + 128 oz.	92

Table 2. Aphids on rose of sharon

Insecticide	*Rate/100 gal.*	*% Control (contact)*
Tempo	0.5 oz.	40
Soap	64 oz.	90
Tempo + Soap	0.5 oz. + 64 oz.	98

only those trees and shrubs that have a pest problem.

Personnel training and resource information is essential since the technician making the application normally determines which trees and shrubs will be sprayed. The Technical & Research staff developed pest/host timing charts for each of our field offices which are being refined with phenological information (Figure 3). The charts provide a guideline for anticipated insect and disease problems. To facilitate information-gathering, as well as training on a local basis, PHC Trainers were selected in each Davey office. The trainers attend week-long classes at our headquarters in Kent, Ohio, each year to enable them to train and monitor the effectiveness of the technician in the field. Extension courses developed in-house are part of the training supervised by the PHC trainer. The Technical staff also visits each territory each year to further train and motivate the field staff.

Educating clients is necessary, not only as a potential participant in the monitoring process, but also to accept the concept of selective spraying. Clients who have been on a program where all the trees and shrubs have been sprayed are often reluctant to accept selective sprays. Literature which explains Davey's approach to Plant Health Care is provided to clients as well as Fact Sheets which discuss any major problems on the property. Information is also available to help clients select the proper plants for site conditions and the proper transplant procedures and cultural requirements for those plants.

Improved application. Application techniques can reduce the potential for drift and reduce the volume of pesticide used. Davey researchers tested various pressures and disc sizes to determine the effect on drift. Trees should be sprayed with a large disc or nozzle and only sufficient pressure at the gun to reach the top of the tree. A ball valve or similar control at the spray gun will allow the technician to adjust the flow rate and pressure at the nozzle without returning to the truck.

Excess spray volume applied to trees and shrubs is a common problem, particularly with new technicians. Guidelines were developed by Davey researchers indicating the spray volume needed for coverage of different size canopies. For example, a tree 50-ft high and 60-ft wide would require 25 gallons of spray mix. This gives the technician and his manager a tool for comparing the actual with the estimated material usage.

A survey of all field managers was conducted in 1987 to estimate material savings from the improved application techniques. Although the actual material savings varied, depending upon the pest problem and the experience of technician, the least savings reported was 5%.

In summary, Davey's Plant Health Care program enabled us to reduce our use of traditional pesticides by 75-80% in five test markets in 1987. Fifty percent of the savings was achieved through the use of alternative materials, 25% by selective spraying, and 5% by improved application techniques. Based on our findings we are projecting a reduction in use of over 20,000 gallons of pesticides in 1988 for our tree care markets—with no reduction in the quality of service to our customers.

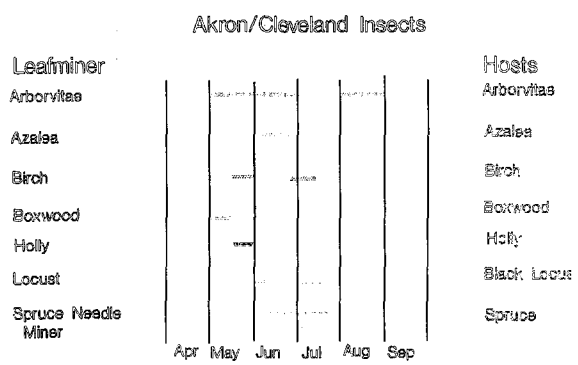

Figure 3.

Literature Cited

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