Summary of Research Projects and Activities for 1999

Cornell University's
Hudson Valley Laboratory
Highland, NY

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Improving Cold Hardiness of Apple

Investigator: Jim Schupp

Project started: September 1999

Objective:

The primary objective of this research is to induce earlier cold hardiness in young apple trees. A second goal is to determine what effect the treatments have on mid-winter hardiness. Reducing the risk of cold injury will lessen the risk of losses in orchard profitability that occur when trees are damaged or killed outright.

Project summary:

The most frequent form of cold injury to fruit trees occurs in late fall or early winter, before the trees become fully cold hardy. Trees that fail to cease growth in autumn are susceptible to cold injury at air temperatures just a few degrees below freezing. After growth is stopped, the trees can initiate acclimation and will become increasingly hardy with exposure to gradual drops in temperature. In young orchards, where trees are being pushed to develop full canopy volume, spring applied nitrogen may not be fully utilized by the end of summer. In a drought season, trees of any age can have a second flush of growth that causes them to grow late and become susceptible to cold injury. This may result in winter injury if low temperatures suddenly occur in late fall or early winter.

Dr. Ed Stover initiated studies to encourage earlier dormancy to address the lack of cold hardiness in young apple trees that is associated with delayed dormancy. The results were encouraging, but are preliminary. Dilute foliar sprays of copper chelate, (Cu-EDTA), plus ultrafine spray oil, applied in mid-October, accelerated leaf drop of apple trees by three to four weeks compared to untreated trees. Copper-EDTA sprays increased early winter cold hardiness as measured in laboratory cold chamber studies with detached twigs. Mid-winter hardiness was not adversely affected, and there was less visible bud injury on Cu-EDTA treated trees. Additional research is needed to confirm his results and to make the transition from small plots applied by handgun to full-scale orchard treatments applied by air-blast sprayer. I resumed this line of research in 1999. In addition to testing four concentrations of Cu-EDTA applied by handgun, we evaluated air-blast sprays of 150 and 75 gallons per acre. Results of this research, when completed, will enable further refinement of rate and application method.

Factors that reduce storage carbohydrates, such as heavy cropping, also reduce cold hardiness. Trees in the third through the sixth leaf, especially those that bore a heavy crop for the first time, are especially vulnerable. Owens and Stover (1999) reported that apple nursery stock treated with Apogee defoliated one week earlier and had higher N and carbohydrate reserves than untreated stock.

In this proposed study I plan to compare these two promising chemical treatments, alone and in combination, to determine the best procedure for reducing the risk of cold injury to young apple orchards in New York State. Although this study focuses on the most susceptible class of trees, the results would be applicable to assist growers in preventing winter injury to trees of any age or size.

Source of project funding:

New York State Apple Research and Development Program (proposed).

Fall Foliar Nitrogen to Improve Apple Yield and Fruit Quality

Investigators: Jim Schupp, Hudson Valley Lab, and Lialiang Cheng, Dept of Fruit and Vegetable Sci, Cornell University

Project started: October 1999

Objective:

To look for the best nitrogen management regime to improve apple yield and quality in commercial apple orchards under our soil and climate conditions. To determine if foliar urea application after harvesting is a better alternative to the traditional soil applied nitrogen in the spring.

Project summary:

Nitrogen management plays an important role in determining apple yield and quality. Currently most orchard N is soil applied in the spring. However, nitrogen applied to the soil may not be taken up by the tree until early summer. Because most of our orchard soils contain high organic matter, which releases a substantial amount of N during the summer, the combination of soil applied N in the spring, with natural release of N from the soil during the summer can potentially elevate tree N status to a high level during fruit quality development. High tree N status leads to poor fruit color development and storage quality. Excessive N also promotes vigorous vegetative growth, which reduces flower bud initiation and fruit set and shades fruits. Vigorous trees are more susceptible to diseases during the growing season, and freezing damage in the winter.

Spring growth and fruit set are supported mainly by the reserve nitrogen that has accumulated in the tree from the previous growing season. So, an ideal pattern of seasonal changes of tree nitrogen status is that trees have relatively high reserve nitrogen to start with early in the season to promote rapid leaf development and early fruit growth. As season progresses, nitrogen status declines gradually to guarantee fruit quality development and wood maturity. Then, the reserve nitrogen status is brought up to a high level at the end of the growing season.

Dr. Cheng's research has shown that postharvest foliar urea sprays are very effective in improving reserve N status of apple trees. Considering that soil mineralization alone can provide 40 to 80 pounds of nitrogen per acre during the summer and fall in most orchard soils in New York, an alternative N management strategy would be to use foliar urea application after harvesting to increase N reserves for development and early fruit growth in the spring, while relying on soil mineralization to provide maintenance N supply for the rest of the growing season. This fall foliar urea based N management may help to control vegetative growth and improve fruit quality.

One of the concerns associated with foliar urea application late in the season is that tree cold hardiness may be affected. One goal of this study is to thoroughly evaluate the relationship between time of N fertilization and cold hardiness.

To evaluate the effects of spring vs. fall applied N on reserve N status and tree performance, an experiment was set up at both Cornell Experimental Orchard at Lansing and Crist Bros. Orchard in the Hudson Valley. The trees at Lansing are Marshall Mac on M9; the trees at Crist's are Empire/ M. 7. The treatments are: 1) Spring soil applied N: 46 pounds of nitrogen per acre; 2) Fall foliar N: 3% foliar urea sprayed twice at weekly intervals after harvesting, providing 46 pounds of nitrogen/acre; 3) Split between spring soil-applied and fall foliar; 4) Foliar urea in the spring.

Source of project funding:

New York State Apple Research and Development Program (proposed)

Optimizing Honeycrisp Yield and Fruit Quality

Investigator: Jim Schupp

Cooperators: Chris Watkins, Dept. of Fruit and Vegetable Sci., and Martin Goffinet, Dept. of Horticultural Sci., NYSAES

Project started: May 1999

Objectives:

To evaluate the effect of chemical thinners and ReTain on yield, fruit size, and post-harvest fruit quality of Honeycrisp. A second objective is to evaluate the effect of crop load on Honeycrisp leaf disorders, photosynthesis and water relations.

Project summary:

Honeycrisp is being extensively planted, as growers seek profitable new cultivars to diversify their variety mix. Being new, Honeycrisp has not been well studied and there is little information for making recommendations about specific horticultural practices. Honeycrisp fruits are prone to pre-harvest drop, bitter pit, and soft scald. Each of these problems has already caused major financial losses to growers who have planted the variety, and it is essential that we identify ways to reduce losses at harvest and during storage. These issues are exacerbated by production of fruit over a wide range of maturity, requiring multiple harvests and increasing the difficulties in storage caused by over-mature or under-mature fruit. Crop load appears to affect Honeycrisp red color development as well as fruit maturity fairly dramatically. Studies with other varieties also indicate that crop load has a major impact on bitter pit, but no information on soft scald incidence is available.

Honeycrisp leaves often develop a zonal chlorosis that resembles the damage caused by potato leafhopper. The specific nature of this chlorosis and its significance in terms of tree growth and productivity are unknown.

Studies on the effects of chemical thinners on Honeycrisp yield, fruit size, and fruit quality have been initiated: In 1999, a study was conducted in a commercial orchard in Milton, NY on six-year-old Honeycrisp / M.26 trees to determine the effect of chemical thinners on fruit set, yield and fruit quality. All the chemical thinners tested in this study provided thinning activity on Honeycrisp. Generally, thinning activity increased with increasing NAA concentration. The tank mix sprays of 5 ppm NAA plus Sevin, and Accel plus Sevin both overthinned Honeycrisp severely. Average fruit diameter exceeded 3 inches for all thinning treatments. Fruit from excessively thinned trees was especially large and more prone to bitter pit at harvest than fruit from moderately thinned trees. The trees in this study were rated for symptoms of leaf chlorosis. Zonal chlorosis increased as yield per tree declined.

Based upon this preliminary research, Honeycrisp appears to be easy to thin chemically at the traditional 10-12 mm growth stage. Honeycrisp appears to be very sensitive to Accel used in combination with Sevin XLR. Further research is planned in 2000 to confirm these results. The effect of crop load on Honeycrisp fruit size, maturity and post-harvest quality will also be studied to reduce losses in grower returns caused by fruit disorders. Many of the problems with Honeycrisp relate to maturity and harvest management, suggesting that ReTain should be tested on Honeycrisp.

The results of these studies will be used to make recommendations to apple growers regarding chemical thinning and use of ReTain on Honeycrisp This will help growers to optimize production of marketable fruit and to avoid the loss of fruit quality in storage. Understanding the effects of crop load on Honeycrisp leaf chlorosis will help us to determine the cause of this symptom and gauge its importance in limiting productivity.

Source of project funding:

New York State Apple Research and Development Program (proposed)

Abbott Labs (proposed)

Evaluation of New Apple Cultivars and Rootstocks

Investigator: Jim Schupp

Project started: 1994 (rootstocks), 1995 (cultivars)

Objectives:

To evaluate survival, growth, productivity and fruit quality characteristics of new apple varieties and rootstocks in New York's Hudson Valley, using a standardized system, so that results can be compared with those from other regions in NY and with other cooperating states.

Project summary:

The New York apple industry needs timely information about the attributes and regional adaptability of new varieties and rootstocks. Survival, growth, productivity and fruit quality characteristics of new selections are being tested in New York's Hudson Valley, using a standardized system, so that results can be compared with those from other cooperating states. Specific horticultural practices for promising varieties will also be tested.

Two rootstock plantings were established at a commercial orchard in 1994 as part of the NC-140 uniform plantings of new dwarf and semi-dwarf rootstocks. In 1999, the trees received management practices consistent with the protocol established by the NC-140 Technical Committee. All field horticultural data was collected and submitted to the project coordinator.

A new cultivar planting was established at the Hudson Valley Lab in 1995 as one of the uniform plantings of promising apple cultivars. In 1999, the trees received management practices consistent with the protocol developed by the Horticultural Subcommittee, and best management practices for the region On September 16, 1999, Tropical Storm Floyd caused substantial breakage to limbs and leaders of all cultivars still holding fruit. All field horticultural data was collected and fruit quality data was collected using the protocol developed by the Fruit Quality Subcommittee. All horticultural, yield, and fruit quality data will be submitted to the project statistician, using the standardized data format. Mid-winter cold hardiness of 16 new and promising apple varieties is currently being evaluated and compared with that of McIntosh and Golden Delicious.

Source of project funding:

USDA/CSRS Regional Project NE-183

USDA/CSRS Regional Project NC-140

Orchard Storm Damage Recovery

Investigator: Jim Schupp

Project started: September 1999

Objectives:

1) To evaluate the effect of time of up-righting storm damaged apple trees, and to evaluate the effect of heavy pruning versus de-fruiting on recovery of storm damaged trees; 2) to evaluate the effect of foliar or soil applied nitrogen and boron fertilizers, with and without heavy pruning, on the recovery of storm damaged trees.

Project summary:

Orchards in eastern New York occasionally suffer damage from hurricanes that have deteriorated into tropical storms. Such severe storms are not frequent or predictable; consequently there has been no research on how to treat damaged trees after a storm. All the information that is available concerning how injured trees should be treated following a storm is based upon orchard observations.

One recommendation is to up-right the trees as soon as possible. Root regeneration begins immediately after the damage occurs, and is critical to tree recovery. Hurricanes and tropical storms often occur just before or during the harvest season, when farm labor is focused upon harvest. Often growers decide to up-right their trees after harvest, which can be six or more weeks after the storm. The consequences of this long of a delay are unknown.

Another recommendation frequently given after trees have been propped up is to prune the canopy severely to bring the canopy volume into balance with the reduced root volume. The benefit of severe pruning as a storm damage recovery practice has not been documented, and the opposite suggestion (minimal pruning) has also been given. The primary benefit of severe pruning may be in reducing the potential for cropping, as presence of fruit has been shown to dramatically reduce root regeneration.

A third question centers on mineral nutrition. Nitrogen and boron are key elements for root growth, and soil-applied fertilizer is considered to be more beneficial for stimulating roots that foliar applied fertilizer. The possible loss of winter hardiness, especially from late applications of N to the soil needs to be weighed against the potential tree loss, poor growth and loss of productivity that would result from slow root development following storm damage, but again, there is no research-based information to help in making this judgment.

On September 16, 1999, a tropical storm, the remnants of Hurricane Floyd, passed through eastern NY, causing substantial damage to orchards in the Hudson Valley and southern Champlain Valley. Several orchards in the Marlboro area were especially hard hit, due to the exposure to high winds and open textured, shale soils. This storm damage provided an opportunity to establish experiments to provide some data on the effects of various treatments and combinations on storm damage recovery, which can then be used to develop recommendations for treating injured trees.

To evaluate the timing of up-righting and the effect of heavy pruning versus crop removal, a 2 year old block of Jonagold/ M. 9 was selected. The block had not been trellised at the time of the storm. The treatments are: 1) up-righted and staked on October 1, 1999; 2) up-righted and staked on November 12, 1999. A second set of treatments will be imposed within each timing plot, consisting of: 1) normal pruning; 2) severe pruning; and 3) normal pruning, with trees de-fruited in 2000.

To evaluate the effects of mineral nutrition and pruning severity, a bearing block of semi-dwarf spur Delicious was selected. These trees had been free standing at the time of the storm and were up-righted and attached to wooden posts within a week after the storm. The following fertilizer treatments were applied to each of ten pairs of trees: 1) none; 2) urea (3%) and solubor (2 lb/100 gal.) sprayed on the foliage on 10/1/99 and 10/8/99; and 3) the equivalent amount of urea and solubor applied in dry form to the ground. Within each pair of fertilizer plots one tree will be pruned to normal severity and one severely pruned. The effect of the fertilizer treatments on cold hardiness will be evaluated in early winter and mid-winter.

Tree survival, tree growth, fruit set, yield and fruit size will be evaluated over the next two growing seasons. Leaf water potential, photosynthesis, and transpiration will be measured periodically throughout the 2000 growing season to evaluate the effects of the treatments on tree water status and physiology.

Source of project funding:

New York State Apple Research and Development Program (proposed).

Thinning Bosc Pears with a Blossom Thinner and Post-bloom NAA

Investigator: Jim Schupp

Cooperator: Mike Fargione

Project Started: May 1999

Objectives:

To evaluate the effect of endothal as a blossom thinner, with and without post-bloom NAA, on fruit set, yield, and fruit size of Bosc pears. A second objective was to compare the thinning activity of a new formulation of NAA with that of Fruitone N.

Project summary:

The effect of chemical thinning treatments on fruit set, yield and fruit size of Bosc/OHF 97 trees was evaluated in a commercial orchard in Marlboro, NY. This study compared the thinning efficacy of a blossom thinner, endothal, post-bloom applications of two formulations of NAA, Fruitone N and AMV-901, and blossom-plus-post-bloom combinations. Endothal, 1.5 pt./100 gal., was applied at 70% bloom on May 3, 1999. Post-bloom NAA was applied at 7.5 ppm on May 17, 1999. All spray applications were made at dilute rate, using a high-pressure handgun with a low output nozzle to simulate air-blast spraying by spraying out a square around the tree. Each treatment was replicated five times.

The stage of bloom was quite variable from tree to tree at the time of the blossom thinner spray. This has been observed previously and points out the difficulty in timing blossom thinner applications. Some leaf spotting was observed with endothal use, particularly on leaf tips where droplets collected. The data is still being analyzed, but some preliminary conclusions can be drawn. All treatments provided thinning activity. Both endothal and post-bloom NAA reduced fruit number per tree by about 40% and yield by about 20%. There was no difference in efficacy between the two formulations of NAA, and no interaction between blossom and post-bloom thinners. Endothal increased mean fruit weight by 9%, Fruitone N by 19% and AMV-901 by 11%, respectively. Differences in mean fruit diameter were less apparent, with only Fruitone N showing an increase relative to the control.

Blossom thinning continues to show promise as a thinning strategy for pear. It removes fruit competition earlier than conventional post-bloom treatments, creating the potential for increased fruit size. Having one or more thinner options for blossom thinning would expand the grower's range of thinning options, so that thinning success isn't dependant upon a single spray timing. Blossom thinning also has some disadvantages. The treatment is applied before fruit set is evident. Determining the proper time of application in blocks with variable bloom stages and getting the spray applied within a narrow window of opportunity can be problems. Phytotoxicity from dilute handgun applications of endothal has been present in two years of study. Although no economic losses are as yet attributed to this leaf burn, its presence is cause for caution. Further study is needed to test the efficacy and safety of air-blast sprayer applications and the efficacy of lower rates of endothal.

Endothal shows promise as a blossom thinner for pear. This year's study shows that blossom-thinned trees can be safely treated with post-bloom NAA where additional thinning is warranted. The new formulation of NAA, AMV-901, was equivalent to, but no better than Fruitone N as a post-bloom thinner for pear.

Source of project funding:

New York Pear Growers

Elf-Atochem

Improving the Quality and Re-growth Potential of Apple Nursery Stock

Investigators: Jim Schupp, Hudson Valley Lab, and Lailiang Cheng, Dept. of Fruit and Vegetable Sci.

Cooperators: Steve Hoying, Lake Ontario Fruit Team, Wafler Nurseries, Adams County Nursery

Project started: August 1999

Objective:

To evaluate the effect of late season applications of Apogee and foliar urea, alone and in combination, on the growth, reserve nitrogen and reserve carbohydrate of apple nursery stock, and on the subsequent re-growth and fruiting of the young trees in the orchard.

Project summary:

Rapid establishment of canopy volume is critical for obtaining an early return on investment from a high density orchard. Techniques that enhance tree recovery following transplanting and promote rapid re-growth of fruit trees benefit the grower through promoting earlier production. Much progress toward these goals has been made in recent years, through the selection of large caliper, feathered trees, improved orchard site preparation, earlier planting dates, minimum pruning and more intensive tree training following transplanting. Our approach to improving the growth potential of fruit tree nursery stock still further is to increase the carbohydrate and nitrogen reserves in the tree.

Dr. Cheng's research has shown that the re-growth of apple nursery stock can be increased through increasing reserve nitrogen, however, this practice reduces the reserve carbohydrate in the tree. Apogee is a new plant growth regulator that blocks GA synthesis. Trees treated with Apogee have reduced extension growth, while stem thickening is unaffected or increased by Apogee treatment. By reducing shoot growth of nursery stock late in the season before digging, it may be possible to increase the amount of carbohydrate reserves available for root regeneration and early growth after transplanting. This project is designed to evaluate the importance of both reserve nitrogen and carbohydrates to rapid re-growth of young fruit trees.

The study was conducted at two commercial nurseries in the northeastern US, on 'Gala' and 'McIntosh' cultivars, both on M.9 rootstock. Apogee was applied twice in the fall to inhibit growth for the remainder of the growing season. Urea was applied at 7-day intervals, beginning in early October. The trees were harvested in November, and stored under standard commercial conditions. Ten trees/treatment of each cultivar will be harvested for destructive sampling of reserve carbohydrates and reserve nitrogen. Twenty trees of each treatment will be transplanted in the spring in commercial orchards throughout the state for evaluation of re-growth. Ten trees per treatment will receive soil-applied nitrogen after transplanting, and ten will receive no nitrogen in the year of planting. Vegetative growth, flowering, photosynthesis, water status, mineral nutrient status, and carbohydrate status of the trees will be evaluated over the first two growing seasons.

Source of project funding:

International Dwarf Fruit Tree Assn. (proposed)

Field Evaluations of New Apple Fungicides

Investigator: Dave Rosenberger

Cooperators: Agrichemical companies, Mike Fargione, various fruit growers

Project started: Annually since 1978.

Objectives:

1. Evaluate new fungicides and numbered products for effectiveness against common apple diseases.
2. Develop improved IPM strategies utilizing new fungicides and/or new approaches for older fungicides.

Project summary:

During the 1999 growing season, a total of 31 different treatments were compared in two large field trials conducted at the Hudson Valley Lab. All treatments were replicated four times in plots containing either two or three different cultivars. Treatments involved 8-10 applications in a seasonal program extending from bud-break through mid-August. Sprays were applied with a handgun so as to ensure complete coverage while limiting drift to adjacent plots. Effectiveness of treatments was quantified by evaluating leaves and/or fruit for apple scab, powdery mildew, cedar apple rust, quince rust, black rot, sooty blotch, flyspeck, and fruit finish. Results were provided to the sponsoring chemical companies and are also used to formulate cost-effective disease control programs for apple growers.

The strobilurin fungicides kresoxim-methyl (Sovran) and trifloxystrobin (Flint) provided excellent control of apple scab, powdery mildew, flyspeck, and sooty blotch, but they failed to control quince rust during a severe rust infection period on May 3-4 when apple trees were at king bloom. Results from 1999 supported previous work showing that the strobilurin fungicides used alone will provide scab and mildew control similar to that provided by combinations of SI and contact fungicides. Using the strobilurin fungicides in two scab sprays per year will reduce selection pressure for resistance to SI fungicides. In regions where rust diseases are prevalent, the strobilurin fungicides should not be used at tight cluster and pink, the growth stages during which most rust infections on fruit are initiated.

In another trial, the new "Rainshield NT" formulation of Dithane 75DF provided surprisingly effective suppression of powdery mildew and was significantly more effective against mildew than a comparable rate of Penncozeb. However, Penncozeb and Dithane 75DF were equally effective for controlling scab and rust. Thiram used at 2 lb/100 gal. was also very effective against apple scab and rust diseases, and it might be used as an alternative to captan or mancozeb should the need arise. Several biocontrol products (a formulation of the bacterium *Bacillus subtillis* and an extract from giant knotweed) proved less effective than standard fungicides.

To evaluate the status of SI resistance in the Hudson Valley, samples of scabby leaves were collected from unsprayed apple trees in the corners or borders of six Hudson Valley orchards where SI fungicides had been used consistently for at least 10 years. Mike Fargione assisted in identifying appropriate orchards and in collecting samples. The leaves were shipped to Dr. Wolfram Koeller's lab at the Geneva Experiment Station where the pain-staking evaluations were completed by testing 50 isolates from each orchard on an array of agars amended with SI fungicides at various concentrations. The results showed that the tested orchards have not yet moved very far away from the baseline susceptibility levels for SI fungicides. Thus, resistance to SI fungicides is not yet a serious threat in Hudson Valley orchards where SI fungicides have been used for more than 10 years in a conservative manner (i.e., in seasonal programs, not as "bail out" sprays).

In another study, Sovran was tested for phytotoxicity on four varieties of sweet cherries to determine if spray drift from apple trees might cause problems in adjacent cherry plantings. Sovran caused severe phytotoxicity on Sweet Heart and Viva but not on Ulster and Heidelfingen sweet cherries.

Source of project funding: Agrichemical companies

Effects of SI Fungicides on Fruit Size, Fruit Set, and Total Yield of Apples

Investigator: Dave Rosenberger

Cooperators: Uniroyal Chemical Company; Dennis Chaisson.

Project started: 1998

Objective: Determine if SI fungicides can affect fruit size, fruit set, return bloom, or total yield of apple trees.

Project summary:

In 1998 and again in 1999, fungicides were applied to Empire apple trees to determine if fungicide treatments would affect fruit size, fruit set, or total yield per tree. The trial was conducted in a commercial orchard planted in 1991 with trees on M.9/MM.111 stocks. The orchard had not received any DMI fungicides during either the 1996 or 1997 seasons. The same treatments were applied to the same trees in both years. Treatments were replicated four times using three-tree plots. The SI fungicides were applied at the per-acre rate commonly used by commercial growers, whereas the standard for comparisons, Dithane 75DF, was applied at one pound per acre. The one-pound-per-acre rate for Dithane 75DF was based on a dilute rate of one pound per 100 gallons and tree-row volume calculations that indicated the full dilute rate for this orchard was 107 gallons per acre. Treatments were applied using a handgun operating at 150 psi, but handgun applications were timed with a stop-watch and adjusted so that the equivalent of 50 gallons of spray solution per acre was applied at a 2X concentration. Applications in 1998 were made on 7 Apr (early tight cluster bud stage), 14 Apr (pink), 23 Apr (early bloom), 6 May (petal fall), and 14 May. Treatments in 1999 were applied on 19 Apr (tight cluster), 28 Apr (pink), 14 May (petal fall), and 28 May.

In this trial, Empire fruit from trees treated with Procure in 1998 were slightly larger (by 7.8 to 11.6 g) than fruit from trees treated with Nova or Rubigan, but those differences did not re-occur in 1999. Also, fruit set efficiency rated on 27 Jul 1998 showed that more fruit were retained on trees treated with Rubigan or Nova than on trees in other treatments. Because treatment with Rubigan or Nova resulted in slightly more fruit per tree in 1998, it is possible that differences in fruit size detected in 1998 merely reflect the inverse relationship between total numbers of fruit per tree and mean fruit size. The differences detected in 1998 suggest that Rubigan and Nova have stronger plant growth regulator (PGR) effects than Procure, although those differences were not economically important in this experiment.

Failure to detect similar differences in fruit set and fruit size in 1999 may have been related to differences in the timing of fungicide and NAA fruit thinning applications during the two years of the experiment. In 1998, NAA was applied two days after a fungicide application whereas in 1999 the NAA thinning treatment was applied six days after a fungicide application. The relatively weak PGR effects noted with Nova and Rubigan in 1998 may be transient and may have disappeared before the thinning spray was applied in 1999. Thus, the PGR effects of Nova and Rubigan may only be apparent when they contribute to interactions with fruit thinners. More research is needed to verify the hypothesis that Nova and Rubigan may interact with NAA fruit thinning treatments and also to determine if similar interactions occur when carbaryl is used as a fruit thinner.

Fungicide treatments did not produce any significant differences in the estimated dollar-value of the crop in either year of the experiment, nor were differences significant in the combined analysis of two years of data. The mean fruit size across all treatments was 171 g in 1998 and 133 g in 1999. The smaller fruit size in 1999 was mostly attributable to a heavier fruit set in 1999. The mean number of fruit per square cm of trunk cross-sectional area was 7.2 in 1998 and 11.2 in 1999.

Source of project funding:

Uniroyal Chemical Company
Hatch funds (federal formula funds)

Improving Strategies for Controlling Summer Diseases of Apples

Investigator: Dave Rosenberger

Cooperators: Agrichemical companies, various Hudson Valley growers who hosted field trials.

Project started: 1986

Objectives:

1. Study the epidemiology of flyspeck to determine when apple fruit become infected and where inoculum originates for infecting fruit.
2. Determine what fungicides are most effective for controlling flyspeck and how these fungicides can be integrated into summer spray programs for apples.

Project summary:

Registrations for captan, mancozeb, and benzimidazole fungicides could be revised as a result of EPA actions under the 1996 Food Quality Protection Act. Alternatives to these fungicides were evaluated to determine their effectiveness for controlling flyspeck and sooty blotch. Trees used for this experiment received no fungicides until the first treatments were applied on 21 May, about 6 days after petal fall. Treatments were applied 21 May, 11 June, 13 July, and 10 August. All treatments were replicated four times in 6-tree plots of 13-yr-old Liberty trees on M.9 rootstock. Inoculum was introduced on 25 May by tying 12-inch sections of heavily-colonized blackberry canes into the center two trees in each plot. Additional inoculum was present in the wood lots located on both ends of the 350-ft long rows. The fungicide programs were evaluated by harvesting 50 apples per plot at irregular intervals from 12 July to 5 October except that 100 fruit were harvested at normal maturity on 14 September. For all harvests, fruit were evaluated immediately after harvest and again after two weeks of incubation in plastic bags at 70°F and 100% relative humidity. The incubation period allowed development of infections that were not visible at harvest. The summer was extremely dry with only 1.0, 2.7, 0.8, 1.1, and 2.6 inches of rain monthly from April through August. Accumulated hours of wetting was monitored using a DeWit Leaf Wetness Meter.

Flyspeck was more severe than anticipated for such a dry season. The unusually wet conditions in 1998 may have contributed to an exceptionally large inoculum reservoir in wild hosts in the adjacent wood lots. As of 12 July, approximately 30% of fruit across all treatments showed flyspeck after incubation and none of the treatments were different from the control ($P=0.73$). The infections present on fruit on 12 July probably occurred between petal fall (15 May) and the first fungicide application on 21 May. Therefore, fungicide effectiveness as measured later in the season represented a combination of residual plus post-infection activity. The amount of flyspeck on incubated fruit from the 6 August harvest was a good predictor of flyspeck incidence on fruit on 5 October (about 2 weeks after optimum harvest). Incidence of flyspeck on incubated fruit increased between the 6 August and 14 September harvest dates, presumably as a result of secondary infections caused by conidia blown into the orchard from the bordering wood lots after 6 August. The incidence of visible symptoms on fruit from unsprayed trees increased dramatically between 1 and 14 Sep.

Sovran was more effective than the other fungicides and apparently has good post-infection activity against flyspeck. Thirty percent of incubated fruit from Sovran plots had flyspeck at the 12 July harvest, but that dropped to 6% on 6 August as a result of the spray that was applied on 13 July. Thiram at 2 lb was as effective as the Benlate-plus-Captan standard. Adding Microthiol Special to either Ziram or Thiram did not significantly improve their activity against flyspeck. Both Thiram and Sovran might be useful as substitutes for mancozeb, captan, and benzimidazoles in summer spray programs, but Sovran has the advantage of post-infection activity against flyspeck.

Source of project funding:

Agrichemical companies
NY State IPM Program
New York State Apple Research and Development Program

Factors Contributing to Postharvest Decays of Empire Fruit during CA Storage

Investigator: Dave Rosenberger

Cooperators: Bill Gerling, Lake Ridge Fruit; various fruit growers and consultants in Western NY

Project started: July 1997

Objectives:

1. Determine how non-wounded Empire fruit become infected with decay fungi.
2. Determine if susceptibility to postharvest decays varies with orchard source.

Project summary:

The majority of postharvest decays in stored apples are caused by *Penicillium expansum*. This fungus usually invades fruit through wounds, but during the mid-1990's *P. expansum* began causing decay in non-wounded Empire fruit that were held for more than six months in controlled atmosphere (CA) storages. Research was initiated in fall of 1997 to determine how non-wounded fruit become infected and whether some blocks are consistently more prone to decay problems than are other blocks.

Empire apples harvested from six orchards in western NY were used to determine if orchard source, inoculation method, and storage regimen would affect the incidence of decay in uniformly inoculated fruit. Results from stem inoculation trials were similar for the 1997-98 and the 1998-99 storage seasons. When stems of freshly harvested apple fruit were inoculated with *P. expansum* prior to CA storage, 70% of Empire fruit from some orchards developed decay. Stem invasion does not occur very often when fruit are in air storage even when the storage period is extended to more than five months. Therefore it appears that CA storage conditions either favor development of the pathogen or limit natural defense mechanisms that might limit pathogen growth through stems during air storage. Initiation of postharvest decays by invasion through stems had not been previously report for apples although it was known to occur with pears.

The six orchards in western NY that supplied fruit for stem-inoculation experiments varied significantly in the level of fruit susceptibility to stem-end decay. Factors contributing to this variability have not been fully evaluated. However, initial analyses showed a significant correlation between high foliar boron levels (>40 ppm) and high susceptibility to stem-end decay during CA storage. Further research is needed to verify this relationship and to determine if the correlation reflects a causal relationship.

Stem-end decay of Empire fruit surfaced in the mid-1990's because the strains of *P. expansum* that predominate in storages have developed resistance to the fungicides used in postharvest treatments. Sanitation measures (sanitizing storages and field bins) may be the only effective way to reduce decay problems in Empire fruit unless new fungicides are registered for postharvest treatment of apples.

Source of project funding:

New York State Apple Research and Development Program
New York Apple Research Association

Improving Controls for Postharvest Decays of Apples

Investigator: Dave Rosenberger

Cooperators: Debbie Breth, Lake Ontario Fruit Team; various fruit growers who provide either fruit for evaluations or CA storage space for the postharvest experiments.

Project started: 1997

Objectives:

1. Evaluate new fungicides or biocontrol treatments for effectiveness in reducing postharvest decays.
2. Determine inoculum sources and feasibility of reducing inoculum for postharvest decays via sanitiation measures.

Project summary:

The majority of postharvest decays in stored apples are caused by *Penicillium expansum*, but fruit not treated after harvest can also develop gray mold caused by *Botrytis cinerea*. Most strains of *P. expansum* in apple storages are resistant to the thiabendazole/diphenylamine treatment that is often applied after harvest, but *B. cinerea* has not yet developed resistance to the two products applied in combination.

An experimental fungicide from Novartis was evaluated for effectiveness in controlling *P. expansum*. Empire fruit were wounded with nails to simulate stem punctures, were inoculated with spores of *P. expansum*, and were then dipped into solutions of various fungicides. Effectiveness of the treatments was evaluated by counting decayed fruit after 2-3 months of cold storage. Fludioxonil, the experimental fungicide, provided excellent control of postharvest decay. However, feasibility of getting an apple registration for fludioxonil is still questionable.

In another trial, Vangard and Flint were sprayed on replicated blocks of Empire trees on two farms in western NY to determine if field application of these new fungicides would affect development of postharvest decays. Vangard was applied at petal fall because we suspect that *B. cinerea* may become established on flower sepals at petal fall where it then remains quiescent until after apples have been moved into storage. If field sprays could be used to prevent or decrease infection by *B. cinerea*, then postharvest treatment of Empire fruit would no longer be necessary. Flint was applied in preharvest sprays to determine if August sprays could reduce inoculum on fruit or make fruit more resistant to decay. Results of this experiment will not be known until fruit are removed from CA storage in spring of 2000.

A volumetric spore trap was used quantify airborne spore loads in storages and packinghouses. Results showed that packinghouses sometimes contains >1,000 spores of *P. expansum* per liter of air. Levels of inoculum on wooden storage bins were evaluated by washing bins in a portable drencher and making dilution plates of the wash water. We found that a single empty bin that held decay-prone Empire fruit the previous season carried more than 835 million spores of *P. expansum* through summer. Cleaning bins by removing all decayed fruit and washing with a quaternary ammonium sanitizer reduced inoculum levels on bins by 99.1% to 99.8%, but the economic benefit of sanitizing bins has not yet been determined. Sanitation measures (sanitizing storages and field bins) may be the only effective way to reduce decay problems in Empire fruit unless new fungicides are registered for postharvest treatment of apples.

Source of project funding:

New York State Apple Research and Development Program
New York Apple Research Association
Various agrichemical manufacturers

Regional Research Project NE-183: Multidisciplinary Evaluations of New Apple Cultivars

Investigators: Dave Rosenberger, Dick Straub, Jim Schupp, Susan Brown, Ian Merwin

Cooperators: Pomologists, plant pathologists, entomologists, and economists in 18 states

Project started: October 1, 1994

Objectives:

1. Evaluate horticultural qualities and pest susceptibility of new apple cultivars, strains, and advanced selections at numerous locations throughout the United States to determine both the limitations and positive attributes of these cultivars.
2. Develop horticultural and pest management strategies for new cultivars or cultivar strains that are emerging as commercially-acceptable cultivars.

Project summary:

Cooperators in this national project have established uniform plantings of promising new cultivars at various locations where they are being evaluated for horticultural qualities and for susceptibility to various insect, mite, and disease problems. Trees for each uniform planting were all propagated at a single nursery and then distributed to the various cooperators. The first planting of 22 cultivars was established in 1995 at 28 sites across 18 states and two Canadian provinces. A second planting of 22 additional cultivars was established at 29 sites in 1999. Adam's County Nursery propagated trees for the 1995 planting and Waffler's Nursery propagated the trees for 1999.

Each planting is designated for either horticultural evaluations or pest susceptibility studies. Plantings at the Hudson Valley Lab include a 1995 horticultural planting and pest susceptibility plantings from both 1995 and 1999. In each planting, trees are planted in a randomized block design with five single-tree replicates for each cultivar except for those cultivars where tree shortages did not allow for the full 5-tree replications.

Both the 1995 and 1999 plantings use Golden Delicious (Gibson strain) as a "standard". Other cultivars included in the plantings are listed below. Cultivars followed by asterisks are scab-resistant.

Cultivars in the 1995 Planting		Cultivars in the 1999 Planting	
Arlet	Fortune	Ambrosia	Jubilee Fuji
Creston	NY 75414-1*	BC 8S-25-33	Pinova*
Braeburn	Orin	BC 8S-27-51	MN 1824 (Zesta)
Cameo	Pristine*	BC 8S-26-50	NJ 90
Enterprise*	Sansa	Coop 25*	NJ 109
Fuji (BC Type II)	Senshu	Coop 29*	NY 75907-72*
Gala Supreme	Shizuka	Coop 39*	NY 75907-49*
Ginger Gold	Suncrisp	CRQ10T17*	NY 65707-19*
Golden Supreme	Sunrise	CQR 12-750*	Pink Lady
GoldRush*	Yataka	Delblush	Runkel
Honeycrisp		Hampshire	Autumn Gold

In addition, the 1995 Hudson Valley plantings include Gala (Fulford strain), Mutsu, and McIntosh (Rogers strain) to allow additional comparisons of disease susceptibility. The 1999 planting includes McIntosh and Cortland for disease-susceptibility studies.

Project investigators are collecting detailed data on tree growth, precocity, productivity, fruit size and quality, flowering and harvest dates. Susceptibility to apple scab, apple rust diseases, powdery mildew, fire blight, summer diseases, mites, leafhoppers, and leafminers is being evaluated over multiple years. By combining data from plantings in various states, researchers involved in this project are able to generate a more complete evaluation of new cultivars than has ever been possible before. Results on disease susceptibility of cultivars in the 1995 planting have been published. Horticultural data will be compiled for publication within the next year.

Based on evaluations from the 1995 Hudson Valley plantings, the most promising "new" cultivars are Cameo, Enterprise, GoldRush, Honeycrisp, and Suncrisp. (Braeburn, Fuji, Yataka, and Ginger Gold have already been widely planted and do not qualify as "new".) Orin, Sansa, and Senshu may have special appeal in ethnic markets.

Source of project funding: Hatch Regional Research Funds

Development of Arthropod Management Systems for Tree Fruits in Eastern New York

Investigator: R. W. Straub

Cooperators: Indian Ladder Farms; Montgomery Place Orchards; Jan Nyrop

Project started: 1990

Objectives:

1. Develop integrated management programs for arthropods affecting tree physiology and health, quality of fruit, premature fruit drop and yield of fresh-market apple with emphasis on foliar-feeders.
2. Develop integrated management programs for insects affecting the productivity and fruit quality of pear.

Project summary:

This broad project includes a wide array of studies to solve short- and long-term arthropod problems. During 1999 this project included, but not limited to, studies on:

a). Determination of rescue treatments for two-spotted spider mite on apple. Under extreme mite infestations (mean=15 motiles/leaf), Vendex,), AgriMek, Vydate (two applications), and the experimental TD 2383, reduced TSSM motiles >90% at 21 DAT. Pyramite and Carzol were ineffective. Although the other treatments were variously effective, results suggested that Vendex is the most logical and efficacious rescue treatment for TSSM.

b). Evaluation of translaminar and systemic insecticides against leafminers. This extensive trial in a commercial orchard yielded no data because leafminer populations did not recur.

c). Establishment of *T. pyri* in commercial orchards. 1999 marked the 4th season for this project. Results have generally shown that, in the absence of pyrethroids and EDBC fungicides, this predator has become well established and biological control of European red mite has been good. Spread from the sites of introduction throughout the entire orchard however, has been slow and not yet achieved.

d). Evaluation of optimum treatment schedules for pear psylla. Split-applications of AgriMek and Pyramite provided superior control (allowed <75 cumulative psylla days/leaf) compared to single early-season applications; but split-applications were not advantageous to the performance of Calypso and Provado. Three applications of the reduced-risk materials Neemix and M-Pede (soap), preceded by two dormant oil treatments, provided noteworthy control of pyslla. M-Pede however, caused slight russeting of 'Bartlett' fruit

Source of project funding:

Hatch funds

Agrochemical industry

Competitive grant from NE-IPM program

Management of Selected Major Arthropod Pests of Northeast Apple Without Organophosphate Insecticides

Investigators: R. W. Straub; W. H. Reissig, A. M. Agnello & J. P. Nyrop

Cooperators: **Wright Orchards; Montgomery Place Orchards; various orchards in WNY**

Project started: 1998

Objectives:

1. Determine alternate strategies for the management of PC and AM without organophosphate insecticides.
2. Assess the effects of multiple pyrethroid applications on secondary mite outbreaks
3. Select for pyrethroid-resistant *T. pyri*. and determine the frequency of the resistant genotype.

Project summary (2 years):

Within commercial orchards we evaluated border-row sprays of Asana vs. whole-plot sprays of Guthion to manage PC during early-season. Data from 6 trials showed that border-row sprays were generally as effective as the standard protective method – providing that the infestation pressure was not severe. As a sub-objective, in 5 commercial orchards we evaluated a PC oviposition model (indicated 40% ovipositon completed) vs. the standard protective method. Generally, under infestation levels ranging from low to very high, percent damaged fruit at harvest was not different than the standard protective schedules that received an additional spray. Within another sub-objective, we evaluated non-OP alternatives for management of AM during late-season. Foliar sprays of Spintor or Provado were as effective as Guthion - but twice as many applications were necessary, raising question of cost-effectiveness. Subsequent trials showed that the reduced-risk Calypso was superior to a standard program of Imidan.

Within 6 commercial orchards having moderate ERM pressure, the effectiveness of mite control programs using Apollo, AgriMek or Pyramite was not affected by the use of pyrethroids vs. Guthion in season-long cover sprays. We found only marginal evidence that a seasonal program of Asana flares mites, and only at higher population densities. We concluded that in a worst-case scenario, Asana could be substituted for Guthion without catastrophic effects, so long as the program is coupled with the effective miticides we now have. We stress however, the importance of rotation of miticides to forestall resistance.

The mite predator *T. pyri* is very susceptible to pyrethroids. We introduced pyrethroid-resistant *T. pyri* into a New York *T. pyri* population, and bioassays have shown that the gene which confers resistance has become established. To date, results show that the resistant population survived 3 rates of Asana application, while a susceptible population was nearly eliminated by a low rate of Asana.

Source of project funding:

Competitive grants from North East Pesticide Impact Assessment Program

Competitive grants from NYState Apple Research & Development Program

Development of Management Programs for the Obliquebanded Leafroller

Investigators: R. W. Straub, W. H. Reissig, & A. M. Agnello

Cooperators: **Crist Bros. Orchards; various orchards in WNY**

Project started: 1998

Objectives:

1. Compare the effectiveness of different pheromone release systems integrated with selective insecticides in disrupting mating and preventing fruit damage from OBLR.
2. Test the susceptibility of OBLR in Hudson Valley orchards to different insecticides and bioassay for resistance to Guthion and Lorsban.
3. Test methods of increasing the effectiveness of Confirm and Spinosad against OBLR

Project summary (2 years):

Only Objective 2 was performed in the Hudson Valley. During 1998, larvae were collected from Crist orchard (Milton) and the Hudson Valley Lab. Larvae were bioassayed at Geneva and compared to resistant populations from Western NY. Results showed that the Hudson Valley Lab population remained susceptible to both insecticides, while the Milton population was as resistant to Guthion as resistant populations from WNY. Milton population was still susceptible to Lorsban. Field trials by airblast application during 1998 & '99 more or less confirmed these bioassays; Guthion performed poorly, while Lorsban performed on par with the most efficacious treatments. Field results also showed that three applications (starting at estimated first adult flight; 200 DD) of materials such as Dipel, SpinTor & Asana gave good field performance. Grower failures with these insecticides are likely attributable to poor coverage or to improper scheduling.

Source of project funding:

Competitive grants from NYState Apple Research & Development Program

Hatch funds

Agrochemical industry

Determining Causes of Leaf Chlorosis on Honeycrisp Apple Trees

Investigators: R. W. Straub & D. A. Rosenberger

Project started: 1999

Objective: Determine if potato leafhoppers cause the leaf chlorosis commonly seen on Honeycrisp apple trees.

Project summary:

In commercial as well as experimental plantings of 'Honeycrisp', observers have noted leaf chlorosis symptoms that closely mimic those caused by the feeding of potato leafhopper (PLH). The symptoms have generally been attributed to PLH, even though feeding may not have been observed, the incidence of feeding was slight, or symptoms occurred before PLH immigration began. Because mis-diagnosis of casual factors could lead to unnecessary pesticide applications, replicated trials were conducted on M.9/'Honeycrisp' planted at Cornell's Hudson Valley Laboratory in NY.

Whole-tree cages, designed to exclude leafhoppers, were constructed of fine-mesh Saran screening. On 1 May exclusion cages were placed over 4 'Honeycrisp', while 5 uncaged 'Honeycrisp' trees served as checks. Starting 3 Jun, trees were monitored approximately every-other-week until 28 July for the presence of PLH on leaves and for chlorotic symptoms.

Results of caged vs. uncaged companion treatments throughout the summer showed that 75% (3 of 4) of caged trees developed uniform symptoms by 17 Jun – one tree was completely free of symptoms until 28 July. Of check trees, 75% developed uniform symptoms by 17 Jun – one tree was completely free of symptoms the entire monitoring period. We concluded:

- Check trees developed symptoms early in the season, in spite of very low levels of PLH infestation; and
- All caged trees eventually developed symptoms in the absence of PLH infestations.
- Symptoms expressed by caged or uncaged 'Honeycrisp' varied from tree to tree and in chronology.
- <u>Apparently, symptoms are not due to PLH but to some physiological factor or to the source of budwood</u>.

Source of project funding:

Hatch funds

Regional Project NE-183

Genetic Manipulation of Sweet Corn Quality and Stress Resistance

Investigators: R. W. Straub

Cooperators: **Wallkill View Farms**

Project started: 1985

Objectives:

1. Evaluate and compare transgenic sweet corn hybrids with non-transgenic hybrids treated with conventional insecticides.
2. Compare conventional (neurotoxic) insecticides with reduced-risk (primarily biologically derived) insecticides for management of sweet corn pests.

Project summary:

A number of transgenic hybrids containing various endotoxin proteins engineered to impact specific lepidopteran and coleopteran pests were evaluated in field trials during 1999.

Evaluation of specific hybrids for management of corn flea beetle (vector of bacterial wilt) yielded no results because hybrids were obtained and planted too late to be exposed to maximum infestations of flea beetle. Evaluation of transgenic and genetic resistant hybrids for management of corn earworm and fall armyworm revealed very good results from most transgenic entries, but only mediocre results from genetic resistant selections. During the last two decades, efforts to identify genetic resistance to ear infesting pests has been generally unrewarding. In spite of public concerns about genetically-engineered crops, these hybrids have outstanding potential for reducing the environmental impacts of sweet corn production.

Over two seasons of field experimentation, the relative efficacies of present and near-future biorationals (SpinTor® [spinosad]; Proclaim® [emamectin]; M-Pede® [soap]; Confirm® [tebufenozide]; Dipel® [Bacillus thuringiensis]; and Neemix® [azadiractin]) were determined in efforts to give them serious consideration for inclusion into NY management programs. Results revealed that biorational insecticides were generally inferior to the standard pyrethroid (Warrior) insecticide. The exception was SpinTor, which generally performed very well relative to the standard, and probably will become commonly used in sweet corn production. Other biorationals, if applied at twice the recommended application rate under low infestation conditions, appear to have sufficient efficacy for use in commercial sweet corn production – however, the cost would likely be prohibitive. At high infestation conditions, only SpinTor is comparable to the Warrior standard. It was concluded that of the biorational insecticides evaluated, only SpinTor shows promise of being commonly used in fresh market sweet corn production.

Source of project funding:

Competitive grants from NYState IPM Program

Regional Project NE-124

Agrochemical & Seed industries

Occurrence and Management of Onion Arthropods in Eastern New York

Investigators: R. W. Straub; C. J. Eckenrode & A. Taylor

Cooperators: **Zangrillo Farms; Ruszkiewicz Farms**

Project started: 1995

Objectives:

1. Monitor the seasonal patterns of adult thrips immigration into onion fields and investigate the relationship between adult occurrence and optimum spray events.
2. Investigate the relationships between 'cumulative thrips days per leaf', leaf greenness and onion yield.
3. Evaluate seed-treatments for control of onion maggot
4. Evaluate chemical and fumigation treatments for control of onion bulb mite.
5. Investigate the relationships between barley cover-crop, winter temperatures and bulb mite infestation of onion.

Project summary:

• Because of recent findings concerning thrips behavior and occurrence in onion fields, monitoring of immigrating thrips was concluded to be of no practical benefit in management.

• Evaluation of insecticide seed-treatments against onion maggot showed that only Trigard seed-treatment and Lorsban drench treatment allowed damage significantly lower than untreated. Because the probability of losing Lorsban by FQPA regulation is very real, we consider seed-treatments to be the only avenue by which we will obtain new soil insecticide labels for onion.

• Fall fumigation with the maximum rate of metam sodium resulted in no appreciable mortality to soil inhabiting bulb mites.

• Laboratory results utilizing gradual drops in temperature suggest that the bulb mite lethal temperature threshold (LT90) is ≈ 15°F.

• Barley (cover crop) is an important host of bulb mites. Studies utilizing remote temperature sensors showed that as of 16 Jan, minimum temperature at the barley root zone had stabilized at 32°F. Sequential sampling within the same plot revealed that only 39% of mites recovered at the barley root zone had been killed by this drop in temperature.

Source of project funding:

Competitive grants from NYS Onion Marketing and Research Fund

Agrochemical industry

NYS IPM program

Other Professional Activities of Hudson Valley Lab Scientists during 1999

Summary for Dave Rosenberger

Presentations at meetings

Controlling Fungi that Cause Apple Decays during Storage
7 Jan 1999 New England Fruit Meetings, Sturbridge, MA.

Effects of SI fungicides on Apple Fruit Size and Yield
15 Jan 1999 NY State Hort Society Meeting, Rochester, NY.

Rethinking Scab after A Bad Scab Year
9 Feb 1999 Upper Hudson and Champlain Commercial Tree-Fruit School, Lake George, NY.

Procure and Other SI Fungicides: Disease Control and PGR Effects
9 Feb 1999 Upper Hudson and Champlain Commercial Tree-Fruit School, Lake George, NY.

Apple Scab: The 1998 Season and How to Prevent a Recurrence in 1999
10 Feb 1999 Hudson Valley Commercial Fruit Growers School, Kingston, N.Y.

Controlling Diseases Other Than Scab: Reminders and Updates
11 Feb 1999 Hudson Valley Commercial Fruit Growers School, Kingston, NY.

Weather Parameters — How They Affect Activity of Pests, Fungicide Residues, and Potential Phytotoxicity from Prebloom Copper Sprays
9 March 1999Apple IPM In-Depth Fruit School, Geneva, NY.

Disease Management at Bloom: Scab, Mildew, and Rust Diseases
9 March 1999Apple IPM In-Depth Fruit School, Geneva, NY.

Disease Management at Petal Fall: Scab Mildew, Black Rot, Rust, Calyx-end Rot, Effectson Fruit Finish
10 March 1999 Apple IPM In-Depth Fruit School, Geneva, NY.

Summer Disease Management: Scab, Flyspeck and Sooty Blotch, Summer Rots
10 March 1999 Apple IPM In-Depth Fruit School, Geneva, NY.

Major Apple Diseases and Fungicides Used for their Control
20-21 March 1999: Presented as part of a 2-day in-house seminar for the fungicide Branch of EPA's Office of Pesticides.

Fruit Disease Update at Petal Fall:
13 May 1999 Columbia County Apple Petal Fall Field Meeting, Hudson, NY.
13 May 1999 Ulster County Apple Petal Fall Field Meeting, Clintondale, NY.
14 May 1999 Saratoga Area Apple Petal Fall Field Meeting, Rexford, NY.
25 May 1999 Champlain Valley Apple Petal Fall Field Meeting, Peru, NY.

Postharvest Decays: Research Results and Future Directions.
18 Aug 1999 Apple Harvesting, Handling, and Storage Workshop, Ithaca.

The Fruit Industry in the Northeast: Will It Survive?
26 Oct 1999 New England, NY, Canadian Fruit Grower Meeting, Burlington, VT.

Results of Fungicide Trials in the Hudson Valley.
18 Nov 1999 Cumberland-Shenandoah Fruit Workers Meeting, Winchester, VA.

Advantages and Limitations of New Fruit Fungicides
7 Dec 1999 Connecticut Pomological Society, Glastonbury, CT.

Other Professional or Extension Meetings Attended

6 Aug 1999	Deciduous Tree Fruit Workers Tour, Quebec
7 Aug 1999	WRCC-95 Technical Committee on Postharvest Pathology, Montreal, Quebec
8-11 Aug 1999	National Meetings of Am. Phytopathological Society, Montreal, Quebec
5-6 Nov 1999	NE-183 Technical Committeeon Evaluations of New Apple Cultivars, Biglerville, PA
1-2 Dec 1999	Apple Research and Development Program Annual Research Review, Geneva, NY

Other committee and service assignments

Member of national IPM task force convened by Council Agri. Sci. Tech. to compile an IPM report
Secretary, New Fungicide-Nematicide Data Committee, Am. Phytopathological Society
Editor of Pome Fruit Section, Fungicide and Nematicide Test Results, APS Press.
Fruit Statewide Program Committee (SPC) and Fruit SPC Executive Committee, Cornell University
NY State IPM Fruit Commodity Committee, Cornell University, Geneva, NY
Cornell Search Committees for Hudson Valley Pomologist and Extension Fruit Pathologist, Geneva, NY

Other Professional Activities of Hudson Valley Lab Scientists during 1999

Summary for Dick Straub

Presentations at meetings

The food quality protection act and the implications on management of plum curculio and apple maggot in New York.
6 Jan 1999. Southeast Apple Growers Assn. Annual Meeting, Ashville, NC

Damage and control of dogwood borer in New York.
7 Jan 1999. Southeast Apple Growers Assn. Annual Meeting, Ashville, NC

Traditional and emerging arthropod problems on apple in the Hudson Valley
14 Jan 1999. NY State Hort Society Meeting, Rochester, NY.

The food quality protection act – potential effects on apple production.
10 Feb 1999. Hudson Valley Commercial Fruit Growers School, Kingston, N.Y.

Dogwood borer in apple and stink bug in pear.
10 Feb 1999. Hudson Valley Commercial Fruit Growers School, Kingston, NY.

Results of onion bulb mite research in Orange County.
11 Feb. 1999. NYS Vegetable Conf., Syracuse NY

Results of 1999 onion research in Orange County
2 Feb. 1999. Community Campus, Orange Cty. Coop. Extn., Middletown NY

Occurrence and management of peach X-disease
5 Mar. 1999. Columbia County Stone Fruit Workshop, Kozels Resturant, Claverak, NY

The science and potential of Bt transgenic sweet corns.
9 March 1999. Harris Moran Seed Company Seminar, Holliday Inn, Kingston NY

Effects of carbaryl for thinning on pest management programs.
10 March 1999. Apple IPM In-Depth Fruit School, Geneva, NY.

Biology and control of summer foliar and trunk insect pests.
10 March 1999. Apple IPM In-Depth Fruit School, Geneva, NY.

Fruit Insect Update at Petal Fall:
13 May 1999 Columbia County Apple Petal Fall Field Meeting, Hudson, NY.
13 May 1999 Ulster County Apple Petal Fall Field Meeting, Clintondale, NY.
14 May 1999 Saratoga Area Apple Petal Fall Field Meeting, Rexford, NY.
25 May 1999 Champlain Valley Apple Petal Fall Field Meeting, Peru, NY.

Review and Tour of 1999 Insecticide/Acaracide Research Plots
8 Sep 1999 Tour of Field Plots for Extension & Agrichemical Professionals, Highland, NY

Other Professional and Extension Meetings Attended

20 Jan 1999. Onion Industry Council Meeting. Cortland, NY

5-6 Nov 1999. NE-183 Technical Committee, Multidisciplinary Evaluations of New Apple Cultivars, Biglerville, PA

1-2 Dec 1999. Apple Research and Development Program Annual Rsh. Review, Geneva, NY

12-16 Dec. 1999. National Meetings of Entomological Soc. of America, Atlanta, GA

Other committee and service assignments

Fruit Statewide Program Committee (SPC), Cornell University

Search Committee for Hudson Valley pomologist, Dept. Hort. Science, Geneva, NY

NY State IPM Vegetable Commodity Committee, Cornell University, Geneva, NY

Other Professional Activities of Hudson Valley Lab Scientists during 1999

Summary for Jim Schupp

Presentations at meetings

Training Systems Don't Matter.
6 Jan 1999 New England Fruit Mtg., Sturbridge, MA

Pruning Demonstration.
24 Feb 1999 Skowhegan, ME

Results of Thinning and ReTain Trials
2 Mar 1999 Northeast Plant Growth Regulation Meeting, Wilkes-Barre, PA

Optimizing Macoun Management.
17 Mar 1999 Annual Meeting, ME State Pomological Soc.

What's New in Apple Plant Growth Regulators and Chemical Thinning.
28 Apr 1999 North Jersey Twilight Fruit Meeting.

Thinning Workshops,
13 May 1999 Hudson, NY.
13 May 1999 Clintondale, NY.
14 May 1999 Rexford, NY.
25 May 1999 Peru, NY.

Blossom Thinning for Crop Management.
15 Jul 1999 Northeast NY Orchard Tour, Peru, NY.

Regulating Fruit Set and Maturity of 'Macoun' Apples.
30 Jul 1999 American Soc. of Horticultural Sci., Minneapolis, MN.

Thinning Honeycrisp.
17 Nov 1999 Great Lakes Fruit Workers Mtg. Port Huron, MI.

Storm Damage Recovery.
17 Nov 1999 Great Lakes Fruit Workers Mtg. Port Huron, MI.

Apple Reserch Update.
1 Dec 1999 Apple Research and Development Program Annual Review, Geneva, NY

Programs for Thinning Macoun and Honeycrisp.
13 Jan 2000 NY State Hort. Soc. Mtg., Rochester, NY.

Storm Damage Recovery
10 Feb 2000 VT Tree Fruit Growers Assoc. Rutland, VT

Thinning Honeycrisp and Macoun
10 Feb 2000 VT Tree Fruit Growers Assoc. Rutland, VT

Other Committees and service assignments

Secretary, American Pomological Society

Secretary, Plant Growth Regulator Working Group, American Soc. for Horticultural Sci.

Fruit Statewide Program Committee

Chair, Northeast Plant Growth Regulation Meetings

1999 Grants and Contracts that Supported Research Programs at the Hudson Valley Lab

Total 1999 support from grants and contracts: $160,000

Competitive grants funded in 1999:

Daniels, C., and D. A. Rosenberger. "Biological and Economic Assessment of Apple Pest Management". Funded by USDA's National Agricultural Pesticide Impact Assessment Program.

Eckenrode, C. J., R. W. Straub and A. G. Taylor. "Onion Maggot and Thrips Control and Pesticide Resistance Assessment." Funded by NY State Onion Research and Development Program.

Reissig, H. R., R. W. Straub and A. M. Agnello. "Development of an Improved Management Program for the Obliquebanded Leafroller." Funded by NY State Apple Research & Development Program.

Rosenberger, D. A. "Developing Improved Controls for Postharvest Decays of Apples." Funded by NY State Apple Research & Development Program and the New York Apple Research Association.

Schupp, J. R. "Pear Thinning." Funded by NY Pear Growers Association.

Straub, R. W. "Biorationals for Management of Lepidopteran Pests of Fresh Market Sweet Corn." Funded by NY State Integrated Pest Management Program.

Straub, R. W., C. J. Eckenrode and A. G. Taylor. "Occurrence and Management of Onion Thrips and Onion Bulb Mite in Eastern NY." Funded by NY State Onion Research and Development Program.

Straub, R. W., H. R. Reissig, A. M. Agnello and J. Nyrop. "Management of Selected Arthropod Pests of Apple Without Organophosphate Insecticides." Funded by USDA's National Agricultural Pesticide Impact Assessment Program.

Straub, R. W., H. R. Reissig, A. M. Agnello and J. Nyrop. "Management of Selected Arthropod Pests of Apple Without Organophosphate Insecticides." Funded by NY State Apple Research & Development Program.

Contracts received in 1999:

Rosenberger, D. A. Contracts with 11 agrichemical companies for fungicide evaluations.

Schupp, J. R. Contracts with 4 agrichemical companies for plant growth regulator evaluations.

Straub, R. W. Contracts with 10 agrichemical companies for insecticide-acaracide evaluations.

Grant Proposals Submitted for Funding in the Year 2000

Cheng, L. and J. R. Schupp. "Fall Foliar Nitrogen to Improve Apple Yield and Fruit Quality." Submitted to NY State Apple Research & Development Program.

Landers, A., H. W. Reissig, and J. R. Schupp. "Evaluation of Novel Pesticide Sprayers to Manage Disease and Insects in New York." Submitted to NY State Apple Research & Development Program.

Musser, F., A. M. Shelton & R. W. Straub. "Integrated tactics for sweet corn pest management." Submitted to NY State Integrated Pest Management Program.

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