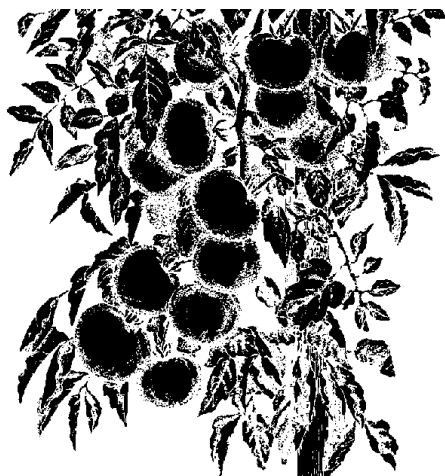


# PLANT & PEST ADVISORY

FRUIT EDITION \$1.50

JUNE 6, 2000



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## Foliar Calcium Use and Benefits in Apples

*Jeremy Compton, North Jersey Tree Fruit Technician and Win Cowgill, Area Fruit Agent*

It is time to consider adding foliar calcium to your apple cover sprays. Calcium-related disorders such as cork; bitter pit and senescent (internal) breakdown are common in New Jersey. These disorders cut into grower returns by making the affected fruit unsaleable. Some cultivars, such as Jonagold, Cortland, Enterprise and most early season varieties can be highly sensitive to calcium deficiencies in the fruit.

Correction of calcium deficiencies begins with maintaining adequate soil calcium levels through regular liming with high calcium lime only. However, soil-applied calcium does not easily translocate within the tree, and many factors, such as nutrient imbalance, soil moisture, pH, crop load and pruning may all effect how well the tree utilizes the calcium that is available in the soil. The quickest and most effective short-term corrective treatment for the control of these calcium-related disorders is the implementation of a foliar calcium spray program.

Calcium sprays have been a hot research topic over the past three decades. And, although major advancements have been made in the reduction of calcium related disorders, no universal "cure" has been found. The most important aspect of a foliar calcium program is the total amount of calcium that ends up in the orchard. Pennsylvania recommends 4 to 14 pounds of total calcium per acre per season, while Massachusetts recommends their growers apply between 21 and 22.5 pounds of actual calcium per season, with up to 10 lb/spray of calcium chloride (CaCl<sub>2</sub>) later in the season.

The cooler climate of the New England states allows them to apply such an intensive spray schedule without any significant leaf burn. In work conducted at the Snyder Research Farm over the past 7 years on Enterprise, we have sprayed over 11 pounds of actual calcium per acre per season without any significant leaf burn. Standard recommendations in New Jersey are to apply 2-3 lb/100 of CaCl<sub>2</sub> per spray before August 1<sup>st</sup> and 3-5 lb/100 of CaCl<sub>2</sub> per spray after August 1<sup>st</sup>.

This will allow for sufficient absorption of calcium by the fruit with minimal leaf burn on most cultivars. Research has shown that late season foliar applications of calcium are more effective in reducing calcium related disorders than early season sprays, but

*SEE FOLIAR CALCIUM ON PAGE 2*

# Hand Thinning Apples

Steve Hoying, Fruit Specialist, Cornell Cooperative Extension

Reprinted from *Fruit Notes, Western New York Fruit Extension Program, Vol. 00, Issue 12, June 1, 2000.*

After the results of chemical thinning are in, there is often the question whether it is beneficial to come back and further reduce the crop by hand thinning. This will be a significant question for many of you this season given the apparent large initial crop and somewhat iffy results of some chemical thinning. Mostly growers know intuitively based on the variety, numbers of fruit in a cluster, and the requirements of that variety in terms of size and color for optimum return. The ability of a variety to return the following year with enough bloom to set a full crop is also very important and based on crop load the previous season. Often the advisability of hand thinning is a mystery since many of the above factors are essentially unknown at thinning time. Here are several factors to remember about thinning that can help you make your decision.

An excessive set of fruit will *always* reduce fruit size and quality. Removing part of the crop is the most effective way to improve fruit size. Separating fruit (singling or doubling) can also improve pesticide coverage, reducing insect and disease damage (OBLR in particular).

Generally the earlier thinning is done, the more significant the influence on fruit size. The later hand thinning is done in the season, the less it contributes to increased fruit size. Late hand thinning, however, can contribute to improving the quality of the harvested crop by "grading" out culls while they are still on the tree. Another important reason to thin early is to free enough spurs to encourage return bloom next year. Hand thinning for this purpose needs to be done before fruit bud initiation, which occurs at the end of June in normal years. Rarely is hand thinning accomplished this early!

Fruit thinning always reduces the total yield because the increase in fruit size does not make up for the reduction in fruit numbers. Hand thinning (when done properly), removes smaller apples so the reduction in yield is not as great as if done indiscriminately. The optimum crop load suggested by researchers in 6-10 fruit/square centimeter of trunk cross sectional area. These levels apply only to lightly pruned trees. Ideally fruit should be thinned to a single apple per spur and spaced to allow for fruit sizing. Depending on coloring and sizing needs, some varieties can be left as double but never triples. For example, larger triploids such as Jonagold and Mutsu can be left in clusters where fruit size suppression is

needed. Remember that clusters sometimes provide protected feeding sites for leafrollers.

If hand thinning is done early enough, leave plenty of unset buds to provide next year's crop. Spur-type McIntosh or Delicious should be thinned to 1 or 2 fruit for every 4 or 5 spurs, depending on how much spur pruning has been done. Remember that there will be green under-colored areas on the fruit at harvest wherever fruits touch, particularly on the poorer coloring varieties.

Some varieties such as Empire do not always benefit from aggressive hand thinning in increased fruit size. A study done by Stiles in 1984 showed reduction of crop load by 30% resulted in only a 7% gain in fruit size for Empire. Size improvement was even less on *stressed* trees. Another study by Robinson and Dellamano in 1990 at two sites showed an average decrease in yield of 49%, cost of \$225 per acre for thinning, and an improvement in ExtraFancy apples of only 8-30% depending on crop load. Neither study showed a calculated improvement in Net Return per acre when crop was thinned to 4 fruit/sq cm of trunk cross section area (approximately 380 bu/A on these trees.) These certainly would have shown more favorable results in blocks with high yields.

Submitted by Win Cowgill, Agricultural Agent □

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## FOLIAR CALCIUM FROM PAGE 1

total applied calcium by harvest is the most significant factor. Reduced rates of  $\text{CaCl}_2$  should be applied if there was no rain between applications, or if we are experiencing hot and humid conditions.

Care should be taken when applications are occurring in temperatures above 80°F. Since foliar applications of calcium do not translocate through the leaves readily, it is important to get thorough spray coverage to allow for calcium to contact the fruit directly. Increased water volume or the addition of a surfactant may provide better coverage and increased absorption while reducing the chance of any leaf injury.

### Form of Calcium for Foliar Sprays

There are many calcium products promoted by industry as substitutes for Calcium Chloride ( $\text{CaCl}_2$ ). However, extensive research and comparison of these products has yet to show an advantage over Calcium because it is one of the richest forms of calcium at the cheapest price. Calcium nitrate ( $\text{CaNO}_3$ ) can be substituted for  $\text{CaCl}_2$  but only on trees that do not contain low nitrogen levels as measured by leaf analysis. Vigorous trees should not receive Calcium nitrate. Growers opting to use  $\text{CaNO}_3$  as their calcium source should be aware that  $\text{CaNO}_3$  does not contain as much available calcium as  $\text{CaCl}_2$ , so they should adjust their rates accordingly. □

# Fruit IPM

Dean Polk, Fruit IPM Agent

## Peach

✓ **Oriental Fruit Moth:** A few more adults are starting to be seen in the traps. This is the start of the second flight. As additional larvae mature and pupate, we will continue to see increased trap counts of emerging adult moths. These moths will mate and females will deposit eggs on fresh terminal growth and developing fruit. Populations on some farms may be very low. However, from past experience we have seen that when trap counts exceed 6 to 8 males per trap, insecticides are usually needed.

✓ **Catfacing Insects - Tarnished Plant Bugs (TPB) and Stink Bugs (SB):** Sweep sampling in orchard ground cover has shown increased levels of catfacing insect activity, primarily from tarnished plant bugs. Although we have seen very little fruit injury, there have been as many as 20 TPB per 50 sweeps, mostly in weedy blocks, with a 50:50 ratio of adults to nymphs. Occasional TPB and SB adults have been caught in beating tray samples. This means that populations are present in the ground cover, but have been slow to move into the tree canopy, and that the numbers of motile adults will increase over the next week to 10 days. Operations which disturb the ground cover have the potential to disturb the insects and encourage movement into the trees. Insecticides that are directed against weedy ground covers will decrease populations of catfacing insects.

✓ **Phytophthora:** Many trees appear off-color and sick. In some cases, digging around the crowns showed little evidence of phytophthora root rot, but in other cases classic symptoms were evident. The massive amounts of rain (and wind) that occurred during the fall are probably the culprits.

## Apple

✓ **Apple Scab:** The spore tower count done on June 1 showed 154 spores released over 30 minutes. Although primary inoculum levels are on their way out, the precipitation we are getting throughout Tuesday should be a significant infection period. As overwintered leaves decay on the orchard floor, primary infections should cease to be a concern.

✓ **Tufted Apple Budmoth (TABM):** The first flight of TABM is close to its peak. Hatched egg masses have also been seen, indicating that larval emergence is well underway. We have 2 out of the 4 alternate middle applications remaining to be applied in southern counties. These should be timed for about 6/9 and again on 6/13-14 (763 and 898 DD after biofix). Three additional applications should be due in central counties on or about 6/8, 6/14, and 6/20 (625, 763, and 898 DD). All four applications have yet to be applied in

northern counties, and will be due on 6/9, 6/15, and about 6/21-22, and about 6/29-30. This insect should be specifically targeted if orchards have had a previous TABM problem. Specifically targeting TABM as a key pest means using combinations of Lannate and an OP in place of an OP alone, or using Confirm. As mentioned in previous newsletters, the timing for Confirm is different in that it should be applied at 20 to 30% egg hatch or 650 DD after biofix. This was 6/2-3 in southern counties, and should be around 6/9 in central counties, and around 6/16 in northern counties (timings are for every middle application).

✓ **Cedar Apple Rust:** Rust is present in a number of blocks, especially near cedar trees. While the rust lesions that are present on the leaves may look serious, very little fruit infection is present. These infections have come from the galls on nearby cedar (juniper) trees, and will not spread from apple leaves to the fruit. No further infections are expected.

✓ **Apple Aphids (green apple aphids and spirea aphids -GAA and SA):** Aphid populations have increased and are starting to reach treatment levels in some locations. One block in a North Jersey orchard did have about 60% of terminals with established aphid colonies present (50% is needed to justify treatment). As mentioned in the last newsletter, aphids can be suppressed with cover sprays that include Lorsban 50W combinations (1-1.5 lb/A) for other insect control. Use of Lannate combinations will also suppress aphids, and likely negate the need for additional aphicides. If a specific aphicide is needed, Dimethoate @3pt/A is effective and easiest on mite predators. Thiodan may also be used. Provado gives excellent results, but should be saved for controlling more than just aphids at this time of year (use when leafminers and leafhoppers are also a problem).

✓ **Spotted Tentiform Leafminer (STLM):** Adults are starting to emerge for the second generation flight. Very low populations are present in most orchards, and therefore this insect is not a problem and does not deserve treatment.

## Blueberry

✓ **Worms and General Lep. Larvae:** Leafroller and Lep. activity is close to the same levels as seen last week, with larvae present in 20% of samples and over treatment threshold in just 2 samples. About 12% of samples show a small level of fruit injury.

✓ **Aphids:** Aphid populations have shown a steady increase since bloom. Aphids were present in 56% of our samples, with about 50% of infested samples showing over 5% of terminals infested. There are 2 cases where Provado applications seemed less than adequate. Reasons could include insufficient coverage or the weathering of material immediately after application.

SEE IPM ON PAGE 4

✓ **Plum Curculio (PC):** No new PC injury was seen. All egg laying activity should be over for the season, although larvae will be found in early harvested fruit.

✓ **Cranberry Fruitworm (CBFW):** The adult flight appears to have peaked in Atlantic County and is showing a flight peak in Burlington County. Thus, growers with CBFW populations should treat as soon

as possible. One location was seen where first instar larvae were seen, indicating that eggs are hatching. Catches have been variable with as high as 26 moths per trap on one farm, but with traps on most other farms showing a "0" catch. Out of 26 farms, only 6 locations showed positive catches; 2 out of 16 in Atlantic County and 4 out of 10 in Burlington County. Therefore, most locations do not have significant CBFW populations that are worth treating.

**Insect Trap Counts**

**South Jersey Tree Fruit**

Week Ending	AM	CM	LPTB	OFM	PTB	STLM	TABM-A	TABM-P
5/5		0.80		27.40		423.60	3.10	7.80
5/12		5.68		44.79	1.00	529.17	11.65	26.27
5/19		6.77	78.75	21.98	0.00	256.25	34.04	53.06
5/19		5.9	45.0	6.1	0.2	106.2	37.9	40.5
6/02		2.54	53.92	6.44	1.62	256.05	39.24	59.14

**North Jersey Tree Fruit**

Week Ending	AM	CM	LPTB	OFM	PTB	STLM	TABM-A	TABM-P
5/5		1.09		37.23		873.93	0.50	
5/12		19.18		44.28		634.48	3.63	3.79
5/19		10.25		14.35		107.07	6.84	6.66
5/26	6.00	5.66	6.67	9.00	0.00	67.25	6.99	6.87
6/02		4.65	10.15	12.45	0.00	67.96	8.59	11.17

**Blueberry**

**Atlantic County**

Week Ending	RBLR	OBLR	CBFW	SNLH	BBM	OB
5.5	23.73	0.09	0.00			
5/12	10.08	0.08	0.00			
5/19	0.85	1.81	2.98			
5/26	0.31	1.54	1.02			
6/02	2.54	3.27	0.67			

**Burlington County**

Week Ending	RBLR	OBLR	CBFW	SNLH	BBM	OB
5.5	9.00	0.00	0.00			
5/12	4.63	0.00	0.00			
5/19	0.56	3.00	0.56			
5/26	0.00	1.56	2.60			
6/02	0.00	2.33	4.10			

**PPV National Survey Information for  
Week Ending June 1, 2000 for NJ**

*Robert J. Balaam, Director, Division of Plant Industry, New Jersey Department of Agriculture*

Field Sampling:

Sampling conducted by: NJ Department of Agriculture

0	Acres of propagative orchards surveyed.	0	Samples taken
116	Acres of commercial orchards surveyed.	729	Samples taken
0	Mother trees sampled.	0	Samples taken
0	Nursery properties surveyed	0	Samples taken
0	Other (list):	0	Samples taken

Laboratory Analysis:

Analysis conducted by: NJ Department of Agriculture

1388 Samples Analyzed 1388 Negative Samples 0 Positive Samples

This report covers activities from May 26, 2000 through June 1, 2000.

Submitted by Jerome L. Frecon, Agricultural Agent ☐

**Calendar of  
Events**

**June 19, 2000 - Wildlife**  
Damage Twilight Meeting, Mt. Holly, NJ. Contact Rutgers Cooperative Extension of Burlington County at 609-265-5050.

**June 27-29, 2000 - IDFTA**  
Summer Tour: Quebec Canada, Vermont, New York. Registration Deadline June 9, 2000. Contact: Charles Ax, IDFTA, 14 South Main Street, Middleburg, PA 17842. Phone: 570-837-1551, e-mail: attorney@ptdprolog.net. For complete information on the IDFTA Summer Tour visit the IDFTA website at: <http://www.IDFTA.org>.

SEE CALENDAR OF EVENTS ON PAGE 6

# Apple Disease Developments

Dave Rosenberger, Ph.D., Plant Pathology,  
Highland NY Agricultural Experiment Station,  
Cornell University

Excerpted from *SCAFFOLDS Fruit Journal*, Geneva, NY, June 5, 2000, Volume 9, No. 12, <http://www.nysaes.cornell.edu/ent/scaffolds/>.

**Fire blight** symptoms appeared last week in several orchards in the northern part of the Hudson Valley. Most of the farms reporting fire blight last week had previous problems with blight sometime within the past three or four years. In several cases, fire blight developed even in apple and pear blocks that had two streptomycin sprays during bloom. Where inoculum was present, two sprays of streptomycin proved insufficient for protecting trees throughout the entire period from May 6 to 11 when conditions were almost continuously ideal for blossom blight infection.

The fact that fire blight has been reported on relatively few farms in the Hudson Valley adds credence to the hypothesis that many orchards in eastern New York are free of fire blight inoculum. If inoculum had been present in most orchards, we presumably would be seeing a more widespread outbreak of fire blight, given the favorable weather conditions during bloom. Only a small proportion of the total Hudson Valley apple acreage was sprayed with streptomycin during bloom. Unfortunately, we still lack effective tools for predicting which orchards will have blight inoculum present during bloom and which ones will not. Therefore, streptomycin sprays are sometimes omitted where they are needed and, conversely, streptomycin may be applied unnecessarily in orchards that lack inoculum.

**Cedar apple rust** lesions are appearing on leaves that were not protected with effective fungicides during the two weeks of rainy weather that occurred after petal fall. Flint or Sovran have only marginal activity against apple rust diseases, so growers who used either Flint or Sovran after petal fall will probably see some rust infections on terminal leaves of susceptible cultivars such as Rome Beauty. Apple fruit are not susceptible to rust infection after petal fall, so there is no risk of fruit infection at this time, even though leaves may have numerous rust lesions. Furthermore, rust spores can infect only young leaves, so rust lesions appear only on those leaves that unfolded during the unprotected infection periods. Rust cannot spread from one apple leaf to another. Therefore, there is no need to fear secondary infections.

The bottom line is that rust infections on terminal leaves may be unsightly, but they are economically unimportant unless infections are severe enough to

cause large numbers of terminal leaves to senesce and drop from the tree. This level of infection is likely only when apple trees are planted immediately adjacent to heavily infected cedar groves.

**Apple leaf spot** diseases have also become prominent within the past week. Apple leaf spots cause only cosmetic damage to apple trees in the northeast. By the time the leaf spots become visible, the events that contributed to their development are long past and it is too late to apply control measures. Fortunately, the fungi causing leaf spotting in the northeast do not have secondary cycles on leaves. Therefore, most of the spotting will be limited to those leaves that become infected during the extended wetting periods between bud break and first cover.

The most common causes of leaf spotting are the black rot fungus (*Botryosphaeria obtusa*), the cedar apple rust fungus (*Gymnosporangium juniperi-virginianae*), other weakly pathogenic fungi (*Alternaria* species, *Phomopsis* species), or spray injury from oil sprays and/or from captan. The exact causes of leaf spotting are often difficult to determine because spots attributable to various causes all look very similar. Most leaf spots are uniformly circular and one to four millimeters in diameter. Individual leaves may have a single spot or as many as 30-50 spots. Severely affected leaves will turn yellow and drop from the tree within the next several weeks. The number of leaves lost is usually insignificant and does not adversely affect fruit growth.

The black rot fungus is the most common cause of leaf spotting. Spotting caused by the black rot fungus is called "**frog-eye leaf spot**" because the lesions are dark brown with an almost black center and a yellow halo around the edge. Other fungi can cause similar symptoms, so the spots themselves are not diagnostic. However, frog-eye leaf spot can often be identified based on its irregular distribution within the tree. Inoculum usually originates with small mummified fruitlets that remained in the tree after the fruitlet was killed by the previous year's thinning treatments. Inoculum can also originate from cankers, from branches killed by fire blight the previous year, or from pruned twigs left in the tree. Frog-eye leaf spot on the new foliage is usually concentrated in a cone pattern beneath one of these inoculum sources.

Captan, Benlate, Topsin M, Flint, and Sovran are all effective for preventing frog-eye leaf spot, but the SI fungicides and the low rate of mancozeb fungicides (3 lb./A) are relatively ineffective.

The same fungus that causes frog-eye leaf spot also causes **black rot** fruit decay. However, the fungus does not appear to spread from the infected leaves to fruit. Fruit infections that appear as a calyx-end rot

SEE DISEASES ON PAGE 7

# EPA Increases Risk Estimate of Pesticide Dursban

David Brown and Joby Warrick, Washington Post Staff Writers

*Excerpted from The Washington Post, June 1, 2000.*

The Environmental Protection Agency has concluded that one of the most commonly used pesticides, a compound sold as Dursban and found in dozens of home-and-garden products, may be more dangerous to people than previously thought, according to sources familiar with the decision.

The EPA's conclusion, which is expected to be announced June 8, will effectively remove the pesticide, also known as chlorpyrifos, from all over-the-counter products. Although farmers will still be allowed to spray it on crops, the chemical's agricultural use will be reduced to a degree not yet decided. Whether professional exterminators will be allowed to employ it to kill termites, ants and cockroaches is uncertain.

The move culminates the most extensive scientific assessment of a pesticide in EPA history, and one of the more contentious. Last October, the agency proposed making the acceptable exposure level of chlorpyrifos one-third of what it is currently. Now the level will be even more stringent: one-tenth of what's currently allowed.

The decision is part of a systematic review of the safety of pesticides EPA is required to make under the 1996 Food Quality Protection Act. The law is designed to protect children in particular from the toxic effects of pesticides. The newly estimated hazards of chlorpyrifos are based on experiments showing the substance can cause brain damage in fetal rats, not on human studies.

The pesticide is a member of the organophosphate family of compounds, whose most potent cousins include nerve gases used as chemical weapons. Its only American manufacturer is Dow Chemical Co. About 800 consumer products contain the compound. They include Ortho Lawn Insect Spray, Real Kill Wasp & Hornet Killer II, and Spectracide Dursban Indoor & Outdoor Insect Control. The EPA has determined that the compound poses no imminent threat to public health, and consequently won't order a recall of products containing it.

About 11 million pounds of chlorpyrifos are used each year by farmers and fruit growers; about 5 million pounds by industrial, commercial and government buyers; and about 3 million pounds by the home-and-garden market.

Public concern about pesticide exposure - and the expectation of further government regulation - has driven many users of the compound in the last few years to find alternatives. For example, some dog and cat flea collars now contain insecticides called pyrethroids instead of chlorpyrifos. Many exterminators use chemical baits rather than pesticides to rid houses of termites.

"Dursban is still an important product, but not the most important product in every category," said Mancer Cyr, a consultant with Kline & Co., a Little Falls, NJ, company that gathers market data for the chemical industry. In the home-and-garden market, about half the chlorpyrifos used is bought by consumers and half is applied by exterminators and lawn care companies, he said.

Crucial in the EPA's decision was a study by Dow - one of more than 100 the company was required to perform - that showed brain damage in fetal rats whose mothers were given the compound.

Normally, EPA sets a safe exposure level for a pesticide such as chlorpyrifos at one one-hundredth of the maximal concentration at which there are no detectable effects on an adult animal. Under the 1996 law, however, that hundred-fold safety margin is increased ten-fold more if there is any evidence that infants or children are especially vulnerable to a pesticide. The detection of "neurodevelopmental effects" in the rats triggered that part of the regulation.

The level of chlorpyrifos that will now be deemed safe for children will be one one-thousandth of the "no-effect level." Such a stringent level effectively rules out home use of chlorpyrifos because consumers couldn't use the chemical without bumping up against that very low ceiling.

EPA is negotiating with Dow Chemical over what uses of chlorpyrifos will be permitted. If the manufacturer (and its customers) don't voluntarily agree to restrict its use to reach the new exposure level, the agency can force the restriction. □

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#### CALENDAR OF EVENTS FROM PAGE 4

**July 12, 2000, Wednesday** - Twilight Fruit Research Meeting, Rutgers Agricultural Research & Extension Center, Upper Deerfield Township, Northville Road, Bridgeton, N.J. Contact Jerry Frecon at 856-307-6450.

**September 6, 2000, Wednesday, 6:00 P.M.** Fruit Variety Meeting and Showcase, Gloucester County Office of Government Services Auditorium, 1200 North Delsea Drive, Clayton, NJ. Contact Jerry Frecon at 856-307-6450.

# Wildlife Management Twilight Meeting

Raymond J. Samulis, Burlington County Agricultural Agent

It comes as no surprise to farmers that wildlife damage to New Jersey farms is on the rise. Natural pest populations are increasing and urbanization has greatly reduced normal animal habitats. Deer, geese, swans, ground hogs, and grackles all raise havoc and cause severe economic losses. Rutgers Cooperative Extension of Burlington County has developed a Wildlife Management Twilight Meeting to share the latest techniques and devices to better deal with wildlife problems. The Rutgers Wildlife Damage Specialist, as well as state and local Fish and Game personnel will give demonstrations. This Twilight Program will be held the evening of June 19, 2000, at 7:00 p.m. on a farm just outside Mt. Holly. While this program was designed for Burlington County farmers, growers from other counties with severe wildlife problems or just interested in wildlife damage are welcome to attend. Out of county growers can call our office at (609) 265-5050 for directions.

Growers attending the meeting can anticipate learning the most comprehensive wildlife damage information available, enjoy refreshments, and direct discussions with knowledgeable experts and growers experiencing the same problems as you are. Why not come out and experience the latest in an ongoing struggle? □

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## Farmers Needed for Wildlife Damage Study

David Drake, Ph.D., Wildlife Management

Rutgers Cooperative Extension is currently conducting a study to assess damage to a variety of agricultural crops. We have put up roughly 70 exclosures so far and expect to put up another 30 - 50. However, we need to locate farmers who are experiencing wildlife damage (ranging from some to a lot) to their crops. We are looking for farmers who are currently growing strawberries, apples, leafy vegetables, and nursery stock. We will be looking for other fruit and vegetable crops, forage crops, and grains as they are nearing harvest. The USDA assessment techniques can only be used when the crop is mature and nearing harvest or actually being harvested. You cannot be using fencing or any other type of crop protection, as this will bias our results. We will not interfere with any farming practices. We need to assess damage from all types of wildlife (i.e. groundhogs) and not just deer and geese. Please contact your county agricultural agent about participating in the study. □

### DISEASES FROM PAGE 5

when the apples begin to ripen are probably initiated at the same time and from the same inoculum sources as the leaf infections that are appearing now. Fruit infections can remain quiescent during summer because the green fruit have natural inhibitors that limit growth of the fungus. These natural inhibitors disappear as the fruit begins ripening. We do not know whether or not fungicides can eradicate quiescent black rot infections if the fungicides are applied to fruit several days or weeks after infections were initiated. However, it seems likely that Benlate, Topsin M, Flint, and Sovran might provide some eradicant activity against black rot infections on fruit.

In areas where cedar apple rust is prevalent, rust-induced leaf spotting can be confused with frog-eye leaf spot. Cultivars such as Empire, Cortland, and Liberty that are considered resistant to cedar apple rust can develop rust-induced leaf spotting. Rust spores can germinate on the foliage of rust-resistant cultivars. The rust fungus then invades a few cells and may even appear macroscopically as a pin-point yellow or orange spot on the upper leaf surface. However, the infected leaf cells soon die because of incompatible host-pathogen interactions within rust-resistant cultivars. The host cells that are killed or damaged by the rust infections are subsequently invaded by *Botryosphaeria*, *Alternaria*, or *Phomopsis*. These fungi use the dead or dying cells as a food base to get energy for invading adjacent healthy tissue.

Rust-induced leaf spots are indistinguishable from frog-eye leaf spot except that rust-induced leaf spots are usually more uniformly distributed throughout the tree canopy. Sometimes the original orange-yellow rust lesion is visible in the center of the brown leaf spots initiated by rust infections. There is no reason to spray trees after these leaf spots appear because infected leaves do not produce inoculum for secondary infections.

Submitted by Win Cowgill, Agricultural Agent □

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