

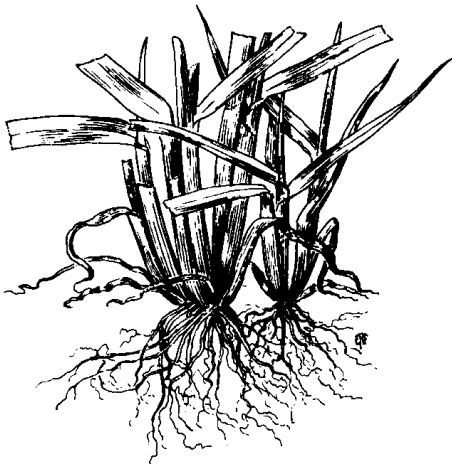
# PLANT & PEST ADVISORY

ORGANIC EDITION \$1.50

AUGUST 11, 2000

## Cultural Steps for a Healthy “Organic” Lawn

*Barbara J. Bromley, Mercer County Horticulturist*



Residential lawns have a reputation for being high maintenance, chemical-requiring, water-guzzling, environmentally irresponsible luxuries requiring great expenditures of time and money. This is a misconception. Lawns are a beautifying link between the home and landscape, provide a play surface, reduce soil erosion, supply oxygen, have a cooling effect on nearby areas, and add to property value. Actually there is a happy medium. There are ways to maintain a healthy, low maintenance turf on any New Jersey soil with a minimum of chemical and labor input.

**1. Accept a slightly lower standard for the lawn.** “Perfect” is a nearly impossible standard for a lawn, especially if pesticides are not regularly used. Accepting a few weeds or a lawn with different shades of green or the presence of a few insects is far more practical. Commercial lawn care customers requesting “natural” care should be informed of this balance.

**2. Select the right grasses for the site and maintenance program.** By choosing the right grasses, many long-term problems can be avoided. There is a tremendous amount of diversity in today’s available cool season grasses. Many Kentucky bluegrass varieties and all perennial ryegrasses are relatively high maintenance. The fine and tall fescues tolerate moderate shade and drought. *Poa trivialis*, roughstalk bluegrass, grows well in damp sun or shade. Established hard fescue does not require fertilization or as much mowing as perennial rye, bluegrass, or some tall fescues. Many perennial ryegrasses and fescues are endophyte-enhanced to reduce damage by surface feeding insects. The advantages and disadvantages go on and on. Blends of grass species and mixes of varieties lend more diversity to a lawn and reduce the impact of insect and disease infestation. Even buffalo grass and zoysia may be useful on some sites.

**3. Improve the soil.** Having a deep rich sandy loam with 5% organic matter and 50% air- and water-containing pore space is great, but not everyone is so lucky. Soil improvement prior to planting, including the addition of organic matter, and occasional core aerifying of established lawns helps make the soil environment conducive to good rooting.

*SEE HEALTHY LAWN ON PAGE 3*

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# SLAN or BCSR? The Alphabet Soup of Fertility Data Interpretation

Daniel Kluchinski, Mercer County Agricultural Agent and Joseph R. Heckman, Specialist in Soil Fertility

The past four issues of this newsletter have discussed various aspects of soil fertility, including soil testing, soil texture and pH, liming and calcium and magnesium fertility. One subject of ongoing debate is the theories and methods used to interpret soil testing data for fertilizer recommendation and fertility management.

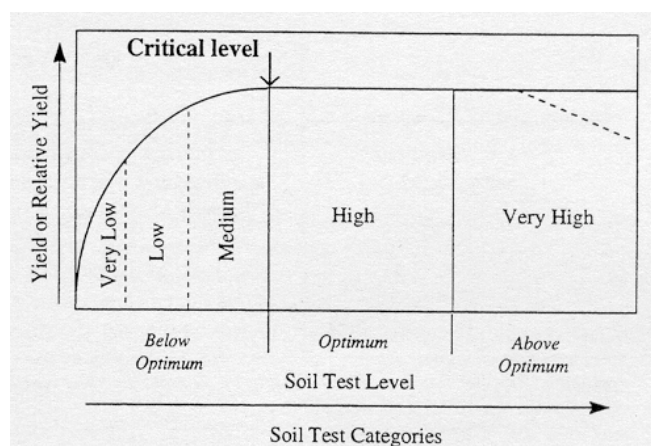
Soil test labs evaluate the nutrient supplying ability of the soil through soil testing, and then based on the levels, provide recommendations for fertilization. For most university soil testing labs, the extraction methods used provide a relative nutrient level value for that nutrient. These soil fertility levels are then classified into three main categories: below optimum, optimum and above optimum. Figure 1 depicts the relationship between soil test categories or levels, and the associated yield response to the application of fertilizer. This relationship predicts if or how much fertilizer is required for optimum plant growth and is based on historical field trials that studied the relationship between soil nutrient level and plant response. This method is called the *sufficiency level of available nutrients* (SLAN). These soil test categories along with crop nutrient requirements are the basis for nutrient recommendations. Therefore if a soil tests below optimum in potassium (K), the recommendation guide will indicate how much K to apply based on the soil type, crop being grown, and for some crops, anticipated yield or yield goal. Note that there are different extraction methods used, and that the fertility recommendations are specific to the extraction method.

Other laboratories and practitioners use the concept of *base cation saturation ratio* (BCSR) for soil fertility and pH management. What does this mean? First, it is necessary to understand cation exchange capacity and base saturation. Cation exchange capacity is a soil parameter that can be measured through a soil testing lab. Cations are positively charged ions and include potassium (K<sup>+</sup>), sodium (Na<sup>+</sup>), hydrogen (H<sup>+</sup>), calcium (Ca<sup>++</sup>) and magnesium (Mg<sup>++</sup>). In soil, cations can be replaced by other cations, or are exchangeable. For example, two K<sup>+</sup> cations, each with one positive charge, can replace Mg<sup>++</sup> with two positive charges. The total number of exchangeable cations a soil can hold is call its *cation exchange capacity* or CEC.

CEC is measured in milliequivalents per 100 grams (meq/100 g) of soil. The higher the number, the greater the amount of cations a soil can retain. Soils differ in this ability due to the amount of clay and organic matter, both of which are called colloids when they are broken down into very small particles. Each colloid has a net negative (-) charge and means it can attract and retain positively (+) charged cations. Therefore soils higher in clay content or organic matter are generally higher in CEC than other soils. It should be noted that just like with SLAN, the laboratory analysis method to determine and measure CEC can vary, therefore results will as well. Understanding this is important to appreciating the variation that can occur from lab to lab if different methods are used.

Percent base saturation is the percent of the CEC that each cation occupies on the colloid. This information has been used to develop the base cation saturation ratio concept and fertilization recommendations. The concept is that specific ratios between cations or nutrients are needed to insure proper uptake by plants for optimum production. Work in New Jersey by Bear et al. in the 1940's suggested that the ideal ratio balance was 65% calcium, 10% magnesium, 5% potassium and 20% hydrogen. These percentages calculate to a desired ratio of 13 parts Ca to 2 of Mg to 1 of K (13:2:1 for Ca:Mg:K). Based on this research the concept of BCSR began. Research in the 1980's by Baker and Amacher defined the normal range for base saturation to be 60-80% for Ca, 10-20% for Mg and 2-5% for K. Using BCSR, soil fertility management is based on maintaining the percent base saturation or the ratio between the bases, as described above. A series of calculations are used to base ratios and percentages to fertilizer recommendations.

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**Figure 1.** This conceptual soil test response curve is divided into categories that correspond with *below optimum*, *optimum* and *above optimum* soil test values. The critical level is the soil test level, below which a crop response to a nutrient application may be expected, and above which no crop response is expected. At very high soil test levels crop yield may decrease.

These studies and others were conducted in greenhouses and in the field, under a wide range of soil types and crops. Some studies indicate that this method provides for excellent soil fertility, pH management (maintenance of pH in 6.2 to 6.8 range), and improves soil structure. Other research shows this method only is useful in hydroponics or soil-less conditions. In these situations, there appears to be greater likelihood of competition between K, Mg and Ca for plant uptake. In the field, these interactions are less important or non-existent. This demonstrates that base ratios may be more significant for certain crops (such as tree fruit and vegetables) rather than field crops (grains), or for specific growing conditions (hydroponics versus field). The BCSR method is useful in soils with low CEC values to determine if K and Mg competition is occurring. This can lead to problems of grass tetany in livestock consuming forage grown on these soils. To determine the applicability of this method for turf, a research trial on turfgrass will be contacted at Rutgers in 2000 to study the "ideal" BCSR and "non-ideal" BCSR ratios.

The BCSR concept is used by some as the key method for soil fertility management in the field. Others utilize the traditional method based on sufficiency level – that is, providing nutrients for maximum crop yield while avoiding excessive levels of each cation. In actuality, most soil specialists use both methods to interpret and develop fertility recommendations. Whether one method is better than the other or should be used exclusively to interpret the data is a subject of ongoing debate.

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**4. Apply fertilizers and lime properly.** Everyone should have a soil test to establish the base for pH and nutrient levels. Liming (or not) or applying just any old lawn fertilizer without a soil test can result in undesirable nutrient deficiencies or excesses. There is also the concept that applying nothing at all to a lawn is more environmentally responsible. For most grasses some nutrient application will improve the stand of grass and prevent weed encroachment or grass thinning and subsequent soil erosion.

Organic nitrogen sources such as well-rotted (not fresh) manures or feather meal are slow-release, do not burn the grass, and stimulate slow, even growth. There is research evidence that slow-release nitrogen use generates fewer grass clippings and therefore less mowing. If minimum fertilization is desired, Labor Day (or thereabouts) is the best time to make a single application to stimulate deep rooting and enhance winter hardiness. A second application may be made (if needed) on Thanksgiving or Mother's Day (or thereabouts).

If the grass clippings are left on the lawn (a *must* with organic growers), this reduces the amount of additional fertilizer needed by 30% to 50%. The nutrients in the grass are returned to the soil. If grass is mowed often enough, the mulching blades will finely chop up the clippings so they are practically invisible. And leaving clippings does *not* contribute to thatch buildup.

**5. Mow properly.** Mowing too short, a.k.a. "golf course syndrome", or maintaining a regular mowing height below 2 inches is a stress for residential turf. Mowing is one of the most time consuming elements of yard work. Some assume that if the lawn is mowed shorter, it won't have to be mowed as often. The opposite is true. The shorter the mowing, the more frequently it must be done. Ideally, most residential mowing should be no shorter than 2 1/2" in spring and fall and 3" or higher in summer. Also, mow often enough so no more than 1/3 of the grass blade is removed each time. This may mean mowing more often than once a week.

**6. Water correctly.** Most years no supplementary irrigation is needed on low maintenance turf. If a drought period exceeds five or six weeks, then lawns can be watered only to rehydrate the dormant grass crowns, not to bring the grass out of dormancy. When water is needed, irrigate in early morning (5-7 am) when grass blades are already wet from dew to help reduce disease problems. Also, shallow, infrequent watering stimulates shallow rooting. Watering 1 to 1 1/2" per week on moderate to high maintenance turf helps promote deeper roots.

**7. Identify problems and correct them promptly.** When a problem arises, identify the cause.

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If it can't be corrected with biological, cultural, mechanical, or physical means, or with non- or low-toxicity controls, simply repair the damage by reseeding or sodding as soon as possible.

**8. Time maintenance activities for the most appropriate season.** It's called "Labor Day" because that is when you work on your lawn. Seriously, time lawn work to correspond with good growing conditions for cool season grasses. Seeding can be done any time, but the last week in August or first week in September is ideal. Overseeding on frozen or "honey-comb" ground in February or early March is also okay.

**9. Consider alternatives to turf grasses in very shady sites.** There are mosses, ground covers, and mulches that are better adapted to very shady locations than grasses (when was the last time you saw grass growing in the woods?). In light to partially shaded conditions, fine and tall fescues are a good choice.

**10. Ask questions.** Use reliable reference sources. Consult your Rutgers Cooperative Extension office and libraries for grass varieties, culture and other information about responsible lawn care. □

## RCE Factsheets of Interest

Rutgers Cooperative Extension (RCE) Publications Distribution has factsheets available (see sample titles on page 7). Many of the publications appear in their entirety on our web site:

<http://www.rce.rutgers.edu> with downloading capabilities. For a hard copy contact your County Extension office listed on the back of this newsletter (or in your local phone directory) or call the Publications Distribution office at (732) 932-9762; fax order to: (732) 932-5023; or mail your order to: RCE Publications Distribution, 57 Dudley Road, Cook College, New Brunswick, NJ 08901-8520.

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## Know Your Production Price Competition from the Western Region

*Jack Rabin, Assistant Director, New Jersey Agricultural Experiment Station*

One key factor for success as a grower in the fresh produce business is knowing and serving the needs of your customers. What quantities, level of quality, and cooling/shipping services does it take to satisfy your customers, and their consumers?

You also need to be keenly aware of your competition, particularly the yields, quality, cost efficiency, and break-even price per package of competing growers in other regions compared to your operation. As the US Government and USDA decrease their support of growers' production risks (and possibly replacing it with subsidized crop insurance), understanding costs helps you plan for managing risks of loss from adverse weather or periods of low prices.

Santa Barbara Bank & Trust, a bank providing agribusiness loans in the Central Coast of California, released a survey of local costs and yields for some crops that are also important to New Jersey growers. This information was reported in the March 18, 2000 Western Farm Press by Staff Editor Dan Bryant. A few crops are highlighted here. Compare them with your own production. The information was gleaned from interviews with growers, farm managers, and their accountants.

Crop	Unit Size	Yield per Acre	Pre-harvest Costs	Over-head Costs	Total Growing Costs	Harvest Costs per Unit	Break-even Price
Cabbage	50 lb. box	700 boxes	\$1,610	\$150	\$1,760	\$2.00	\$4.51 box
Head Lettuce	50 lb. 24 head carton	690 cartons	\$1,670.	\$420	\$2,090	\$2.90	\$5.93 carton
Leaf and Romaine Lettuce	24 head carton	1,160 cartons	\$1,810	\$250	\$2,060	\$1.70	\$3.48 carton
Pepper	1 lb.	26,350 lbs.	\$1,930	\$510	\$2,440	\$0.10	\$0.19 lb.
Spinach	20 lb. carton	520 cartons	\$860	\$420	\$1,280	\$2.00	\$4.46 carton

**Pre-harvest costs** include such items and practices as non-harvest labor, irrigation, chemicals, seeds, planting costs, cultivation, fuel, land cost, and property taxes.

**Overhead costs** include owner/operator salaries for management, office expenses, medical insurance, and other costs not associated with growing crops.

**Harvest costs** include labor, packaging, grading, or hauling from field to cooler.

Pre-cooling, palletizing, storage, shipping, and **sales costs** were not included in the data. □

## Sweet Corn Marketing

Raymond J. Samulis, Burlington County Agricultural Agent

Not too many years ago, consumers would enter a farm market and purchase a dozen ears of sweet corn for their dinner. Today, many consumers buy 2, 3 or 4 ears. Obviously, family size is down, but there are many other factors that contribute to this trend. The general affluence of society has made home cooking by many families a dying art! Recent research shows for the first time in history more than 50% of meals are eaten out of the home. The problem for the most part is restaurants do not use fresh sweet corn. Last week, we learned of a commercial establishment that told a local grower that they don't serve New Jersey sweet corn because they don't have time to husk it. If the corn were pre-husked they would consider it. Personally, I have never felt that husking a few ears of sweet corn was a big deal, but apparently some people do, and find it easier to open a bag of frozen corn.

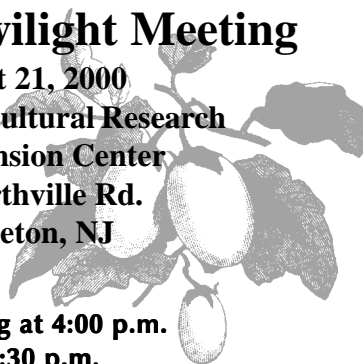
We as an industry have not done a good job on marketing sweet corn and convincing consumers that they should purchase sweet corn over the hundreds of other vegetable/fruit items available in the markets. We must convince consumers that sweet corn is not just a vegetable item used for picnics and special occasions, but rather a staple everyday vegetable. The cranberry industry was able to do just that when they convinced consumers that cranberries were not just something to be served on Thanksgiving, but rather an important, healthy item that should be consumed regularly.

The road to bolstering public opinion about sweet corn will be a long one. If you look at other major vegetables and fruits, many of them have had coordinated national, regional and local advertising campaigns for a long time. Sweet corn, which is a leading vegetable nationally (quite possibly the largest average vegetable crop) has virtually no promotion. During this past winter's meeting season, there was a group of eastern sweet corn growers who met and suggested that some type of promotion council be established to promote the image of sweet corn. The time for such a concept is long over due. I will keep growers posted as to developments regarding this. In the meantime, be sure to properly hydro-cool, harvest at ideal maturity, and by all means work at continually convincing consumers of the quality and economy of fresh sweet corn. □

## Vegetable Twilight Meeting

August 21, 2000

Rutgers Agricultural Research  
and Extension Center  
121 Northville Rd.  
Bridgeton, NJ



**Plots open for viewing at 4:00 p.m.**  
**Meeting to begin at 5:30 p.m.**

See Field Trials

- ❖ Eggplant Variety Trials
- ❖ Pepper Variety Trials
- ❖ Processing Tomato Trials
- ❖ Central Asian Melon, Tomato and Pepper Variety Trials
- ❖ Sweet Corn Variety Trials

Get the Latest Information

- ❖ Disease Updates
- ❖ Insect Updates
- ❖ Weed Control Updates
- ❖ Other Timely Issues

*Bring your plant insect samples to be identified. Bring your questions for agents and specialists. We look forward to seeing you at the meeting!*

For additional information contact Stephen A. Garrison, Specialist in Vegetable Crops at Rutgers Agricultural Research and Extension Center at (856) 455-3100.

Note: Although there will be conventional pest recommendations given at this meeting, the variety trials information will be of interest to organic growers.

# Botanical Insecticides in Tree Fruit Production

Dave Kain and Art Agnello, Dept. of Entomology, N.Y.S. Agricultural Experiment Station, Geneva, NY

Adapted from SCAFFOLDS Fruit Journal Volume 9, No. 20, July 31, 2000, <http://www.nysaes.cornell.edu/ent/scaffolds/>

This annual article used to state that the four most common botanicals available for use in fruit crops today were rotenone, pyrethrin, sabadilla and ryania. Unfortunately, for those who found them useful, sabadilla and ryania are no longer on the list, due to voluntary cancellation of their registrations. To round out the article, we'll substitute information on a few newer, natural materials that, while not technically botanicals, kind of fit the category.

Naturally-occurring pesticides that are derived from plants or plant parts are commonly referred to as "botanicals". Botanicals have been around for quite a while. Along with arsenicals and other inorganic pesticides, they were commonly used before the advent of the synthetic organic pesticides rendered them "obsolete". From time to time they are re-examined for various reasons. Botanicals are of interest to those concerned with pest management for a variety of reasons. They are generally less toxic to the applicator than many synthetic pesticides. They may be acceptable in the organic market where synthetic pesticides are not. Because, in general, they break down quickly, they may also be of use near harvest, when control is needed but other materials may not be applied because of PHI restrictions. Rapid degradation also means they are less likely to become environmental problems. Botanicals, however, are not without concerns. They are usually broad spectrum poisons that can be hard on beneficial insects. And, unlike "biological" pesticides like B.T.'s, insect growth regulators and pheromones, they are somewhat acutely toxic to humans and other mammals. The fact that they break down rapidly in the environment, while an advantage in some respects, also means that sprays need to be:

- timed precisely to coincide with pest events,
- applied at lower thresholds and, possibly,
- applied more often.

They are also very expensive.

✓ **ROTENONE** Rotenone is derived from the root of various plants of the *Derris* or *Lonchocarpus* species from Southeast Asia, Central and South America. It is available as at least 118 formulated products from a large number of manufacturers. It is synergized by the addition of piperonyl butoxide

(PBO), which is another botanical material. Rotenone is expensive compared with synthetic insecticides, but is moderately priced for a botanical. It is the most commonly mentioned of the botanicals in pre-synthetic literature and is at least somewhat effective against a large number of insect pests. These include: pear psylla, strawberry leafroller, European corn borer, European apple sawfly, cherry fruit fly, apple maggot, cranberry fruitworm, raspberry fruitworm, pea aphid (which is similar to rosy apple aphid), European red mite and two-spotted spider mite, codling moth, plum curculio, Japanese beetle and tarnished plant bug. Unfortunately, it is also toxic to ladybird beetles and predatory mites. But, it is non-toxic to syrphid flies that feed on aphids, and to honeybees. Rotenone is rapidly degraded by sunlight, lasting a week or less.

Of the botanicals mentioned here, rotenone is the most toxic to humans and other mammals. The acute oral LD50 is from 60- 1500 mg/kg. In small doses it may be irritating or numbing to mucous membranes. It is highly toxic to fish, having been commonly used as a fish poison. It is also toxic to birds and pigs.

✓ **PYRETHRIN (Pyrethrum)** This compound is produced in the flowers of *Chrysanthemum cinerariaefolium* and is the forerunner of the synthetic pyrethroid insecticides. There are not nearly as many commercially available formulations of this chemical as there are for rotenone, but it is available as an emulsifiable concentrate, in combination with rotenone, or alone as a wettable powder, from at least a couple of sources. Pyrethrin is the least expensive of these four materials. Depending on the rate used, it may be less expensive than many synthetic insecticides. It is also synergized by PBO. Pyrethrin is labeled against a large number of pests. An addendum to the label for one formulation of pyrethrin showed it to be moderately to highly effective (61-100% control) against the following pests of fruit: grape leafhopper, potato leafhopper, leaf curl plum aphid, blueberry flea beetle, blueberry thrips and blueberry sawfly. It is also effective against cranberry fruitworm. It is quickly broken down in the environment and may be used up to and including the day of harvest.

Pyrethrin is relatively non-toxic to humans and other mammals, although the dust produces allergy attacks in people who are allergic to ragweed pollen. The acute oral LD50 is 1200- 1500 mg/kg. It is toxic to fish, but "relatively" non-toxic to honey bees.

✓ **AZADIRACTIN (Neem)** Azadirachtin is derived from the seeds of the neem tree, *Azadirachta indica*, which is widely distributed throughout Asia and Africa. The observation that the desert locust did not eat the leaves of the neem tree, and another, closely related species, led to the isolation and identification of azadirachtin in 1967. Since then, azadirachtin has been shown to have repellent, antifeedent, and/or growth

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regulating insecticidal activity against a large number of insect species and some mites. It has also been reported to act as a repellent to nematodes. Neem extracts have also been used in medicines, soap, toothpaste and cosmetics.

The most common commercial formulations of neem available for New York tree fruit is Neemix (W. R. Grace & Co.), which lists leafminers, mealybugs, aphids, fruit flies, caterpillars and psylla, and Align (AgriDyne), which includes some minor leafrollers on the label. Azadirachtin has shown good activity against spotted tentiform leafminer in tests in past years, but the formulation that was available at that time was somewhat phytotoxic. In Dick Straub's insecticide trials in 1992 with another azadirachtin product called Margosan-O, the insecticide showed good activity against STLM and leafhopper. Margosan-O is no longer available for fruit crops. In laboratory tests by Jan Nyrop's lab, toxicity to the predatory mite *Amblyseius fallacis* was very low. Field trials against OBLR by Harvey Reissig in 1998 were not encouraging.

Azadirachtin is relatively short-lived and mammalian toxicity is low (rat oral LD50 >10,000). It can be used up to and including the day of harvest and reentry is permitted without protective clothing after the spray has dried. It is toxic to fish and aquatic invertebrates.

✓ **PIPERONYL BUTOXIDE (PBO)** PBO is a synergist (in this case, a material that when added to a pesticide increases the activity of its active ingredient) of both rotenone and pyrethrin. It is also a botanical product, being derived from Brazilian sassafras. Acutely, it is very safe, having an acute oral LD50 of greater than 7,500 mg/kg, but it may be chronically toxic in high doses.

✓ **GARLIC (Guardian)** A 10% formulation of garlic is registered on apples and a number of apple pests are on the label. In 1995, Guardian (supplied by THUMBS-UP Sales Co., Chesterland, OH) was applied in six sprays at two-week intervals, starting at petal fall, and compared with a 3-spray Imidan program. Following the manufacturer's recommendations, each application of Guardian included an adjuvant of Sylgard 309 and Tri-Fol, a buffering agent, to maintain an optimum pH below 5.5- 6.0. Results showed that the garlic spray applied at a rate of 11 oz/A did not provide control of any of the labeled apple arthropod pests in New York and did not affect the population density of two predator species commonly found in apples. The foliar pests - aphids, leafminers and mite populations - were unaffected by the garlic sprays. The fruit pests - plum curculio, tarnished plant bug, obliquebanded leafroller and internal lepidopterans - were also not affected by the biweekly sprays. However, the garlic did not have any effect on the population density of the predators *T. pyri* or *Aphidoletes aphidimyza*.

Although not technically botanical insecticides, the following materials are unique, natural products that kind of fit the category:

**ABAMECTIN (Agri-Mek)** is a natural fermentation product containing a macrocyclic glycoside, used on apples and pears as an acaricide/insecticide. When used as currently recommended, it controls European red mite and pear psylla, and aids in the control of spotted tentiform leafminer. Abamectin is toxic to bees and predator mites on contact, but the foliar residue dissipates quickly, making it essentially non-toxic to these species after a few hours (low bee-poisoning hazard).

**INSECTICIDAL SOAPS (M-Pede)** are concentrates made from biodegradable fatty acids and are contact insecticides that can be effective against such soft-bodied arthropods as aphids, mealybugs, and psyllids. They can provide suppression of pear psylla when used in a seasonal spray program, but the residual period is short. Uniform drying conditions are required to prevent droplet residues on the fruit surface. They have a low bee-poisoning hazard.

**SPINOSAD (SpinTor)** is a mixture of spinosyn A and spinosyn D molecules, a naturally derived group of toxicants from a species of *Actinomyces* bacteria that are found inhabiting soil. Spinosad, which acts as both a contact and a stomach poison, is available for use in apples, primarily against obliquebanded leafroller, although activity against spotted tentiform leafminer is also exhibited. SpinTor is essentially non-toxic to birds, fish, aquatic invertebrates, and most beneficials. It has a low bee-poisoning hazard.

Submitted by Win Cowgill, Agricultural Agent □

FACTSHEETS FROM PAGE 4

E197C – New Jersey Wheat Variety Trial Test Results 1999  
 E049J – New Jersey Hybrid Trial Test Results 1999  
 E041M – New Jersey Soybean Variety Trial Test Results 1999  
 FS079 – Sample IPM Landscape Maintenance Agreement  
 FS155 – Laboratories for Soil Testing and Plant Analysis  
 FS174 – Plant Nutrient Recommendations for Field Corn  
 FS683 – Organic Certification of Agricultural Products  
 FS718 – On-Farm Use of Leaves: Regulations  
 FS760 – Presidedress Soil Nitrate Test (PSNT) Recommendations for Sweet Corn  
 FS767 – Soil pH Measurement with a Portable Meter  
 FS800 – Farmer-to-Consumer Direct-Marketing Operations: Issues and Analysis  
 FS802 –Threshold for Common Field Crop Insect and Weed Pests in New Jersey  
 FS804 –Drip Irrigation of Liquid Fish Fertilizer for Vegetable Production  
 FS828 – Biological Control of Insect Pests of the Greenhouse  
 FS873 – Boron – Needs of Soils and Crops in New Jersey

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