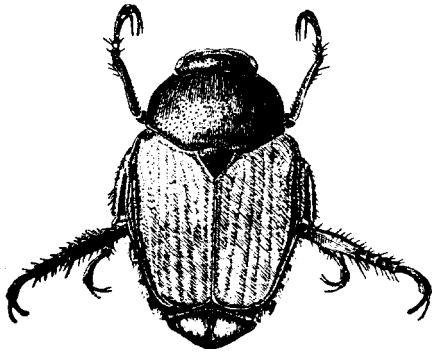
RUTGERS COOPERATIVE EXTENSION AT THE NEW JERSEY AGRICULTURAL EXPERIMENT STATION

# PLANT & PEST ADVISORY

FRUIT EDITION $1.50 JULY 23, 1996



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## The Japanese Beetle

*Peter W. Shearer, Ph.D., Tree Fruit Entomology*

The Japanese beetle was introduced into New Jersey on nursery stock from Japan in 1913. Since its introduction, it has spread to most states east of the Mississippi River. It is now a seasonal pest and can cause extensive damage to many crops. The larvae feed on roots of plants and are especially damaging to turf and pasture. The adults feed on over 275 species of plants such as fruit trees, flowers, and vegetables.

Adults are about 3/8-1/2 inch long and metallic green to greenish bronze in color. They have white tufts of hair along the abdomen. Larvae are C-shaped white-to-cream-colored grubs with brown heads and are about 3/4-1 inch when full grown.

The Japanese beetle overwinters as a grub in the soil. In the spring, they move up towards the soil surface and feed on roots. Adults begin to emerge in late June and are active until late September. Females can lay about 50 eggs each 2-6 inches deep in the soil. It takes about 2 weeks for the eggs to hatch and newly emerging larvae feed on decaying matter, then plant roots.

Adult feeding damages both leaves and fruit. Leaf damage usually takes the form of skeletonizing. Fruit feeding results in large holes in the fruit. Ripening fruit is often attacked making controls necessary yet difficult because of pre-harvest interval (PHI) limitations of effective materials. Early peach and apple varieties are most susceptible to adult attack because their time of ripening occurs during Japanese beetle emergence.

Occasional scouting is required to determine if this pest is causing damage. Carbaryl (Sevin) can be used on peaches and nectarines when adult populations are high and damage can be seen. This product has a 1- and 3-day PHI for peaches and nectarines, respectively. On apple, Imidan is effective and not considered disruptive to IPM programs. Imidan has a 7-day PHI for apple. The fact that these materials do not provide quick knockdown and that new beetles invade from outside the orchard often gives the appearance that control measures are ineffective. Under high pressure, control measures should be applied more frequently. ❑

# Wet Weather Causes Loss of Soil Nitrogen

*Joseph R. Heckman, Ph.D., Soil Fertility*

Some parts of New Jersey have had significantly above normal rainfall this spring. The excessively wet conditions increase the likelihood of soil nitrogen deficiency. Results of soil sampling this year for the presidedress soil nitrate test show that many fields have lower levels of available soil N than might be expected. Even some heavily manured fields are testing low in soil nitrate because they are too wet. It is especially important in a wet growing season to check fields with the PSNT to determine if sidedressing is needed. Manured fields that are expected to have adequate soil nitrogen, may in fact have low levels of available nitrogen due to the losses of soil nitrate.

Wet weather decreases nitrogen availability in several ways:

1. Soils saturated with water lack oxygen. Microorganisms need oxygen to make nitrogen available from the decomposition of organic matter.
2. Cooler soil temperatures associated with wet weather also slow nitrogen release from soil organic matter.
3. Nitrogen in the nitrate form is easily leached from the soil. When soils stay wet for an extended period, considerable amounts of nitrate are also lost by a process called denitrification. This process converts nitrate to a gaseous form of nitrogen which then moves into the atmosphere.

As a consequence of this season's wet weather, more field corn and sweet corn fields will need sidedress nitrogen. The presidedress soil nitrate test is useful to determine which fields are most likely to need sidedressing.

Cultivation can also help. Once soils have dried sufficiently, cultivation of the soil can help bring oxygen back into the soil and stimulate a release of soil nitrogen. ❑

# Post Hail Disease Management on Apples

*Submitted by Win Cowgill, Hunterdon County Agricultural Agent*

*The following comments regarding how to treat hail damaged apple blocks in the Hudson Valley, New York by Dr. Dave Rosenberger, Extension Plant Pathologist, Cornell University, are reprinted from the electronic mail discussion group, Apple-Crop found at <apple-crop@orchard.uvm.edu>*

*Dr. Rosenberger worked closely with us in North Jersey for the past two years until our new plant pathologist, Dr. Norm Lalancette came on board this spring with Rutgers Cooperative Extension.*

This growing season we have also had hail damage in parts of the Hudson Valley on apples. However, many growers are overly pessimistic immediately after a hail storm. At harvest some of these growers decide that they can salvage some fresh market fruit after all. Sometimes this involves picking only the side of the trees that was down-wind and somewhat protected from hail. If growers think that there is any potential for salvaging part of the crop, then scheduled fungicide treatments for summer diseases should be applied for the remainder of the summer.

Bitter rot can be a problem, but it usually occurs only in "hot spots" and I suspect is not worth spraying for in most locations in the Northeast. The 5-6 inches of rain we had over the week-end (2 weeks ago), however, could encourage bitter rot development. However, in our area the rain from Hurricane Bertha came straight down and we therefore did not get the potential for dispersal of bitter rot inoculum that occurs when we get very windy storm events.

It is worth noting that trees that do not receive summer fungicides *may* set less fruit and/or thin more easily the following spring. We first noted this phenomenon in a 4-year study with Liberty that was recently published in Plant Disease 80:798 (1996). Since that time, I have some additional data from other plantings (all on M.9 rootstocks) that shows the same thing. The mechanisms by which summer fungicides might affect fruit set the following year have not been determined, but some possibilities are discussed in the Plant Disease publication.

The potential reduction in fruit set where fungicides are not used is relatively small, so I would *not* suggest that fungicides be applied to hail-damaged blocks just to improve next years fruit set. However, I *would* consider this effect, along with all of the other variables that affect thinning, when determining the rates of chemical thinners to use the spring following a summer when no fungicides were applied. I would be very cautious when thinning hailed blocks that were left unsprayed during the previous summer, especially if other factors also suggested fruit set might be light or only average.

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# Brown Rot Part IV: Environment

*Norman Lalancette, Ph.D., Tree Fruit Pathology*

In parts one through three of our study of brown rot fruit infection, we've focused on the biotic factors: the plant-pathogenic fungus and the susceptible plant. Specifically, we've examined the influence of inoculum level and fruit susceptibility, as it changes with ripening, on disease development.

The final factor to explore concerns influence of the abiotic environment, otherwise known as "the weather", on fruit disease development. An orchard could have all the inoculum in the world, plus highly susceptible fruit, and yet no disease will occur if the weather is not favorable for infection!

Of course, in New Jersey, the weather is usually conducive to disease development, and so we must apply sprays to maintain adequate disease control. But what environmental conditions are favorable for fruit infection? What abiotic factors are important for spores of the brown rot pathogen, *Monilinia fructicola,* to germinate and infect a peach?

### ◆ Temperature

The first abiotic factor to consider is air temperature. The optimum temperature for infection of fully ripened fruit is between 72°F and 82°F (22.5°C and 27.5°C). So, over this 10°F temperature range, brown rot fungus spores can germinate and penetrate the fruit's cuticle in the shortest amount of time. In terms of disease development, the rate of the epidemic will be quickest at these temperatures.

The upper temperature for the optimum range, 82°F, is actually the start of a plateau or leveling off. From 82°F to 86°F (30°C), infection will occur just as fast as in the optimum range. So, in terms of application to commercial situations in the orchard, infection can be considered most severe between 72°F and 86°F.

There are no data available for temperatures above 86°F. However, as with many organisms, *Monilinia fructicola* most likely slows down its growth as the temperature increases. It actually gets too hot for the fungus to operate its metabolism. Of course, without actual data we don't know at what point this slow-down begins.

Similarly, as the temperature decreases below 72°F, the rate of fruit infection also decreases. For example, at 59°F (15°C) less than one half as many fruit will become infected as at 82°F. As the temperature decreases further to 32°F, spores will still germinate and infect fruit, but fungal growth at this temperature is very slow. So think of refrigeration temperatures of 40°F to 45°F as a way to slow down, rather than prevent infection and colonization of the fruit.

It should be obvious that optimum temperature alone doesn't determine a favorable environment. If this were true, we would be experiencing infection nearly every day during the fruit ripening period. So another factor, moisture, is also necessary for infection to take place.

### ◆ Moisture

Moisture in the form of free water is necessary for spore germination to occur. Thus, whenever a wetting period occurs, whether it is by dew or rain or even overhead irrigation, the potential exists for infection. But what determines how severe an infection will occur or any at all? Clearly, a short morning dew doesn't have the same infection potential as a long drawn-out rain period!

As the last statement above implies, wetness *duration* is the key factor that determines infection severity. The longer the duration of wetness the greater the opportunity for spores to germinate and penetrate the fruit's cuticle. And once inside, the fungus is no longer dependent on external moisture. It's now got all the water and nutri-ents it needs to colonize and rot the fruit.

As you might expect, temperature interacts with the amount of wetness time needed for infection. In controlled experiments on fully ripened fruit, no infection occurred at 59°F and three hours of fruit wetness. However, at an optimum temperature of 77°F, three hours of free moisture resulted in about 27% of the fruit diseased. And as the wetness duration increased up to 15 hours at 77°F, disease incidence increased to greater than 90% of the fruit rotted. ❑

# New Jersey Grain & Forage Journal

*Jerome L. Frecon, Gloucester County Agricultural Agent*

The New Jersey Grain & Forage Journal, Volume 3, 1996 is a 30 page compilation of research and extension projects in corn, soybeans, small grains and forage conducted by Rutgers Cooperative Extension field crop agents and specialists. The journal and the projects it contains are made possible by funding from the New Jersey Soybean Board and the Grain and Forage Producers Association. Copies are available from any Rutgers Cooperative Extension County Office. ❑

# Bird Correction

*Jerome L. Frecon, Gloucester County Agricultural Agent*

In the last issue of the Plant and Pest Advisory Newsletter, Fruit Edition I mentioned an excellent review article by Dr. Paul Curtis in the Spring 1995 issue of New Jersey Horticultural News. This review article was in Fall 1992, Vol. 72, Issue 4, pages 5 through 7. ❑

# Blueberry Pests

*Sridhar Polavarapu, Ph.D., Entomology and IPM*

### ◆ Blueberry maggot (BBM)

Adult counts in the abandoned fields in Burlington County continue to be very high. In commercial fields, however, adult counts have remained very low, averaging less than one fly per trap. If your field is surrounded by abandoned fields or wild blueberries, (such as fields around New Lisbon, Pemberton, Browns Mills, and Indian Mills), insecticide application every 10 days is the only way to completely protect the fruit from flies migrating into your fields from these surrounding infested areas. If BBM infested areas are not in the immediate vicinity of your field (such as several fields around the Hammonton area), and if adult counts continue to remain at less than 1 fly per trap, you may be able stretch insecticide applications to 14 day intervals.

### ◆ Aphids

Aphid populations are very low in most of the monitored fields. Healthy populations of predators have been seen in many growing areas. Further applications of insecticides specifically for aphid control may not be necessary in most fields.

### ◆ Leaf-rollers:

Larval populations are very low in all monitored fields. Treatments solely for leafroller control are not required at this time. ❑

# AgrAbility Project

*Wei Zhao, Ph.D., Project Director, NJ AgrAbility Project*

More than 1,000 people in New Jersey each year are injured because of farm related accidents and/or exposure to occupational hazards in agriculture. Many of these injuries can result in permanent disability, making farming difficult or impossible. Farmers and agricultural workers also acquire disabilities as the result of non-farm accidents or through illnesses or serious health conditions. It is estimated that as many as 6,000 individuals with disabilities work on farms on in farm-related occupations in New Jersey and serve an integral part in the agricultural community work force.

The AgrAbility Project is designed to help these individuals gain and/or retain access to their chosen professions in agriculture. The New Jersey program is a collaborative effort between Rutgers Cooperative Extension and the United Cerebral Palsy Association of New Jersey, Inc., Rehabilitation Technology Services. The program provides: (1) educational information and materials on issues and concerns in farming with a disability, use of assistive technology and worksite modifications to accommodate the individuals with disabilities working in farm related occupations, including greenhouse production, as well as availability of community resources and services; (2) technical assistance to agricultural growers and farm workers on worksite modifications.

The disabilities served by the AgrAbility Project include, but are not limited to, the following: amputation, multiple sclerosis, arthritis, muscular dystrophy, back pain, respiratory problems, spinal cord injury, cerebral palsy, deafness and hearing impairments, blindness or vision impairments, traumatic brain injury, mental retardation, or cancer, etc.

For more information, please call the New Jersey AgrAbility Project staff at (908) 932-9754, or (609) 392-4004, ext. 533, or send your request to: AgrAbility Project RCE, Department of Bioresource Engineering, Cook College - Rutgers University, P.O. Box 231, New Brunswick, NJ 08903-0231. ❑

Insect Degree Day Accumulations as of 7/15

| Insect | Site & County<br>Biofix Date plus Degree Days Since Biofix | | | | | | |
|---|---|---|---|---|---|---|---|
| | Bridgeton Cumb. | Hammonton. Cam. | Hardingville Glou. | Richwood Glou. | Princeton Mercer | Oldwick Hunt. | Morristown Morris |
| $OFM_{45}$ | 4/20 hit 200 on 5/2 hit 400 on 5/19 | 4/5 hit 200 on 4/27 hit 400 on 5/13 | 4/19 hit 200 on 5/1 hit 400 on 5/18 | 4/17 hit 200 on 5/1 hit 400 on 5/18 | 4/19 hit 200 on 5/3 hit 400 on 5/19-20 | 4/22 hit 200 on 5/9 hit 400 on 5/22 | 4/24 hit 200 on 5/14 hit 400 on 5/24 |
| $TABM_{45}$ 2nd Gen | 5/4 - 1656 Predict 2228 about Aug 1 | 5/3 - 1662 Predict 2228 about Aug 1 | 5/2 - 1682 | 5/2 - 1684 | 5/13 - 1507 | 5/20 - 1382 | 5/23 - 1263 |
| $CM_{50}$ 2nd Gen | 5/8 - 1271 hit 1250 on 7/15 | 5/8 - 1267 hit 1250 on 7/15 | 5/8 - 1274 hit 1250 on 7/15 | 5/8 - 1275 hit 1250 on 7/15 | 5/11 - 1223 predict 1250 on 7/16 | 5/20 - 1098 predict 1250 on 7/21 | 5/20 - 1071 predict 1250 on 7/22 |

All reported accumulations based on Skybit Inc. data with some ground verification. OFM base = 45, max = 90, TABM base = 45, max = 91, CM base = 50, max = 88.

Spray targets based on: OFM: 200 °D after biofix and again 200 °D later (first generation only)
TABM: (A.M. sprays) 490, 625, 763, 898 - 1st gen. and 2228, 2415, 2605, 2795 °D after biofix - 2nd gen.
CM: 250 °D after biofix and again 2 - 3 weeks later; 2nd generation at 1250 - 1300 °D after biofix + another spray 14 to 21 days later.

# Weather Summary for Week Ending 7/22/96

*Keith Arnesen, Agricultural Meteorologist*

Temperatures averaged near normal. Extremes were 94 degrees at Freehold on the 19th and 54 degrees at several locations on the 22nd. Weekly rainfall averaged 0.93 inches North, 1.13 inches Central, and 1.19 inches South. The heaviest 24 hour total was 1.30 inches at Glassboro on the 19th to 20th. Estimated soil moisture, in percent of field capacity, this past week averaged 92 percent North, 85 percent Central and 86 percent South. Four inch soil temperatures averaged 74 degrees North, 76 degrees Central and 77 degrees South.

The following table contains meteorological information since the start of the growing season March first. The table is updated each Monday and the following is an explanation for each column.

Week=total rainfall for the previous 7 days ending Monday morning
Total=total rainfall since March 1st
Dep=departure from normal of rainfall since March 1st. A negative sign indicates below normal and no sign indicates above normal.
Mx=highest temperature for that 7 day period
Mn=lowest temperature for that 7 day period
Avg=average temperature for that 7 day period
Dep=departure from normal of the average temperature for that 7 day period
Total=total number of growing degree units since March 1st
Dep=departure from normal of growing degree units
%FC=percent of field capacity (soil moisture)

**Weather Summary for the Week Ending 8 am Monday 7/22/96**

| | | RAINFALL | | TEMPERATURE | | | | GDD BASE50 | | MON |
|---|---|---|---|---|---|---|---|---|---|---|
| WEATHER STATIONS | WEEK | TOTAL | DEP | MX | MN | AVG | DEP | TOT | DEP | %FC |
| BELVIDERE BRIDGE | .76 | 22.88 | 4.56 | 87 | 56 | 72. | -1 | 1295 | -34 | 84 |
| CANOE BROOK | .86 | 24.88 | 5.47 | 90 | 58 | 75. | 1 | 1555 | 221 | 87 |
| CHARLOTTEBURG | 1.15 | 26.86 | 7.28 | 88 | 54 | 72. | 0 | 1327 | 241 | 80 |
| FLEMINGTON | .75 | 26.38 | 7.64 | 87 | 57 | 73. | -1 | 1449 | 73 | 90 |
| LONG VALLEY | 1.29 | 23.92 | 3.86 | 85 | 54 | 71. | -1 | 1308 | 144 | 90 |
| NEWTON | .74 | 24.41 | 6.52 | 87 | 54 | 72. | -1 | 1301 | 110 | 84 |
| FREEHOLD | .73 | 19.16 | .94 | 94 | 58 | 77. | 2 | 1556 | 74 | 80 |
| LONG BRANCH | 1.67 | 17.02 | -1.11 | 90 | 62 | 76. | 1 | 1476 | 71 | 70 |
| NEW BRUNSWICK | 1.30 | 23.19 | 5.10 | 90 | 57 | 75. | -1 | 1523 | -42 | 88 |
| PEMBERTON | 1.82 | 26.18 | 8.08 | 90 | 60 | 76. | 1 | 1762 | 242 | 74 |
| TOMS RIVER | .30 | 21.14 | 2.59 | 92 | 57 | 76. | 2 | 1451 | 39 | 57 |
| TRENTON | .98 | 30.18 | 12.96 | 89 | 55 | 74. | -2 | 1544 | -83 | 79 |
| CAPE MAY CRT HOUSE | 1.00 | 22.19 | 6.10 | 88 | 61 | 76. | 0 | 1577 | 70 | 78 |
| DOWNSTOWN | .96 | 20.22 | 3.36 | 88 | 59 | 76. | 0 | 1670 | 30 | 78 |
| GLASSBORO | 2.41 | 24.14 | 6.25 | 89 | 61 | 76. | 0 | 1754 | 135 | 87 |
| HAMMONTON | .88 | 18.84 | 1.02 | 90 | 60 | 77. | 1 | 1701 | 87 | 74 |
| POMONA | .96 | 20.06 | 4.00 | 90 | 55 | 75. | 0 | 1592 | 92 | 74 |
| SEABROOK | 1.05 | 22.55 | 6.26 | 88 | 58 | 75. | -1 | 1714 | 67 | 80 |
| ATLANTIC CTY MRINA | 1.07 | 17.96 | 2.58 | 87 | 59 | 75. | 0 | 1487 | 70 | 81 |
| WOODSTOWN | 1.95 | 21.78 | 3.72 | 89 | 54 | 76 | NA | 1818 | NA | NA |

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