RUTGERS COOPERATIVE EXTENSION AT THE NEW JERSEY AGRICULTURAL EXPERIMENT STATION

PLANT & PEST ADVISORY

FRUIT EDITION $1.50 AUGUST 24, 1999

INSIDE

Building Soil Quality to Reduce Drought Stress

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

The amount of drought stress exhibited by crops is not entirely due to lack of rainfall. The degree of wilting or leaf rolling expressed over a field during a drought is often a reflection of differences in soil type and soil quality. Symptoms of drought stress are partly related to soil properties that influence the ability of soils to absorb rainfall, store water, and deliver it to the growing crop. Soils that are sandy or shallow are inherently drought prone whereas deep loamy soils are better able to sustain crops through a drought. Soil physical properties such as texture cannot be easily changed, but soil quality can nearly always be improved with good soil management. Soil quality (sometimes referred to as soil health) is the capacity of a soil to function as medium for plant growth.

Attention to the soil management practices listed below can lead to enhanced soil quality and enable crops to better withstand drought.

1. Adopting cultural practices that build and maintain soil organic matter content are key to building soil quality. Things you can do to increase soil organic matter content:

- Grow sod crops in rotation with grain crops
- Grow cover crops. Refer to Rutgers Cooperative Extension Fact Sheet FS 849 "Cover Crops and Green Manure Crops, Benefits, Selection and Use."
- Add organic matter to soil in the form of livestock manures, municipal shade tree leaves, and compost.
- Control erosion. Soil erosion must be controlled to keep top soil rich in organic matter in place. Leave crop residues on the soil surface to control erosion.

2. Soil fertility impacts plant water relations. Things you can do:

- Maintain soil pH in the desired range for the crops being grown. Allowing soil acidity to develop to the point where root growth is inhibited limits the volume of soil that can be explored for moisture. A regular soil testing and liming program helps to ensure that roots will be able to explore the entire soil profile for available water.
- Potassium nutrition is closely linked to plant water relations.

SEE SOIL ON PAGE 2

Varroa-Tolerant Bees Keep Hives Buzzing

The following article is reprinted from Agricultural Research, Blueberry Bulletin, August 20, 1999, Vol. XV, No. 18

An eight-legged, blood-sucking parasite known as the varroa mite ranks as one of the worst enemies of honeybees worldwide. About one-sixteenth inch in size, *Varroa jocobsoni* mites have attacked in nearly every state, killing bees needed for making honey and for pollinating an estimated $8 to $10 billion worth of crops.

Varroa mites feed on the blood of adult bees and developing young bees that are still soft, white pupae. Parasitized bees may have deformed wings and abdomens and a shorter life span than their unparasitized hivemates. What's more, varroa mites are thought to transmit at least a half-dozen bee viruses.

But honey bees that can tolerate attack by the mite may hold an important key to stopping today's devastating losses to this parasite.

ARS entomologist, Eric H. Erickson and colleagues monitored mite infestations in research apiaries. The scientists populated the apiaries with survivors from hives that had not been treated with mite-controlling chemicals, or miticides.

"We rated a hive as varroa-tolerant if it had no more than 15 mites for every 100 adult bees," says Erickson, who heads the ARS Carl Hayden Bee Research Center in Tucson, Arizona. "Our experimental apiaries, which we kept miticide-free, usually scored better than this, often having fewer than 7 mites per 100 bees."

Erickson says the 4-year experiment provides additional evidence that beekeepers can produce and maintain varroa-tolerant strains from established stocks of our domesticated honeybee, *Apis mellifera.*

"Some beekeepers and breeders already do this successfully," he notes.

Russians to the Rescue

Hardy honeybees from the mite-infested Primorski region of Russia's Far East may also offer natural genetic resistance that could be bred into U.S. honey bees.

"The Russian bees are the same species as our domesticated honey bees." Says ARS geneticist Thomas E. Rinderer. "But we suspect that, over time, the constant mite challenge in that region led nature to favor survival of only the most mite-resistant bees." Rinderer heads the ARS Honeybee Breeding, Genetics, and Physiology Research Unit in Baton Rouge, Louisiana.

In 1997, Rinderer brought some of the rugged Russian bees to an ARS quarantine facility on small, sun-baked Grand Terre Island off the coast of Louisiana. His studies there indicated that mite populations in some hives deliberately infested with the parasite decreased as much as one third, while mites in some research hives of domestic bees increased fivefold.

"If this resistance proves constant," says Rinderer, "beekeepers may in some cases be able to reduce, if not eliminate, miticide treatments by relying on the Russian bees."

Rinderer has sent Russian bees to commercial bee colony suppliers in Iowa, Mississippi, and Louisiana to evaluate the insects for temperament, honey production, and pollination skills – traits beekeepers value. "*If their reports to us are good and mite resistance continues to be high*," says Rinderer, "*the Russian bees could make their national debut next year*."

Widespread use of a miticide called fluvalinate, or Apistan, has "inadvertently contributed to the rise of mites resistant to this chemical." Says ARS environmental toxicologist, Patti J. Elzen.

Recently, Elzen and colleagues in the ARS Beneficial Insects Research Unit at Weslaco, Texas, found fluvalinate resistance in varroa mites collected from California, Wisconsin, Arkansas, and Florida. Based in part on the Weslaco research, Florida state officials this year were the first to seek and obtain a 1-year emergency exemption from the Federal Environmental Protection Agency to allow use of an alternative chemical, coumaphos.

Submitted by Jerome L. Frecon, Agricultural Agent ❑

SOIL FROM PAGE 1

Optimum levels of potassium supplied in the soil improve crop tolerance to drought stress.

3. Soil compaction destroys good soil structure and restricts root growth. Things you can do to avoid or correct problems related to soil compaction:

- Avoid driving farm equipment over wet soils. On dairy farms, running a manure spreader over wet soil often is a cause of soil compaction. Keep manure in storage until soil conditions are favorable.
- Avoid tillage operations when soils are too wet.
- Examine soil profiles for hard layers that are restricting root growth. Perform deep tillage with a subsoiler to break up a hard pan. The soil must be sufficiently dry for the subsoiling operation to cause shattering of the compacted layer.
- Leave crop residues on the soil surface to encourage earthworm activity. Earthworm channels improve rainwater infiltration and root development.

Droughts occur for varied durations during most growing seasons. Through good soil management practices, growers can help sustain crop growth during periods of low rainfall. ❑

The Annual

Cream Ridge Fruit Variety Showcase and Tour

Date:	Thursday, September 9, 1999
Time:	Registration and Fruit Displays begin at 3:30 p.m. Tours start promptly at 4:00 p.m.
Place:	Rutgers Fruit Research and Extension Center; 283 Route 539, Cream Ridge, NJ 08514
Directions:	Take Exit 7A off the New Jersey Turnpike to I-195 East. Take the 2nd Allentown exit off I-195 (Route 539 South). Follow 539 South 6-7 miles. You will pass the Cream Ridge Golf Course - we are about 2 miles past that on the right - look for the Rutgers Fruit Research & Extension sign.
Audience:	Commercial Tree and Small Fruit Growers, but all are invited as Rutgers Cooperative Extension provides information and educational programs without regard to sex, race, color, national origin, disability, or age.
Includes:	Small and Tree Fruit Research Plot Tours Fruit Variety Showcase and Discussion Disease and Insect Diagnostics Pesticide Recertification Credits Commercial Trade Exhibits and Demonstrations Dinner Provided

Please RSVP by September 3, 1999 (necessary for dinner arrangements). If you have any questions, comments, or suggestions, and to RSVP, please contact:

Dr. Joseph C. Goffreda, Program Coordinator
Rutgers Fruit Research and Extension Center
283 Rt. 539, Cream Ridge, NJ 08514
609-758-7311, X10 (FAX: 609-758-7085)

Drought Briefs

Hot Line

As of August 16, 1999, the New Jersey Department of Agriculture initiated a special drought related "Farmer Information Hotline". The hotline will operate Mon-Fri., 7 am- 8pm for the duration of the drought. The toll free number is 1-877-788-7785.

RCE Drought Web Site

The Rutgers Cooperative Extension web site has a special drought section with Extension publications covering agricultural issues. There are also links to other key drought web sites, including NOAA's meteorological information. The site address is: www.rce.rutgers.edu/programs/drought99/. ❑

Festivals Seek Farmers to Sell Fresh Produce

There are two upcoming festivals with opportunities for farmers to attend and sell fresh produce. Both the festivals are well attended and farmers may make significant revenue.

1. St. Elizabeth's College, Morristown
Peddlers Square Festival, 14th annual
Alumni event - hundreds of people attend
Sat. Sept. 11, 9 to 4:30
Fee for 20"X10' space
Call Corrine Martinell (973) 235-4206

2. Upper Delaware Watershed Festival
Hampton Borough Park, Hampton
10 to 4
Call Fran Varacalli (609) 633-0533 for more information on space, cost, etc.

Calendar of Events

August 31, 1999 - Horticultural Research Twilight Meeting, 6-8:30 p.m. rain or shine, Rutgers Snyder Research and Extension Farm, Pittstown, NJ. Contact: Peter Nitzsche (973) 285-8300, Win Cowgill (908) 788-1339, or William Tietjen (908) 475-6505

September 9, 1999 - Fruit Variety Showcase and Tour, Rutgers Fruit Research and Extension Center, 283 Route 539, Cream Ridge, NJ. For information or to RSVP call Rutgers Fruit Research & Extension Center **(609) 758-7311, ext. 10.**

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