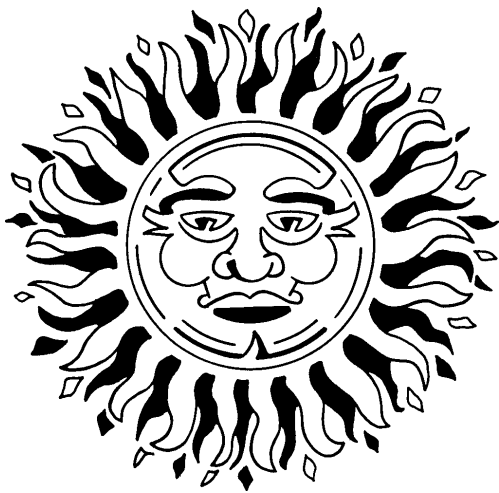


# PLANT & PEST ADVISORY

FIELD CROPS/LIVESTOCK EDITION \$1.50

JULY 22, 1999



## SPECIAL DROUGHT ISSUE

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### Drought Effect on Crop Growth and Yield

*Jeremy W. Singer, Ph.D., Field and Forage Crops*

Seldom do we experience the "ideal" growing season. This year, below average precipitation for most of New Jersey in May, June, and so far July, has resulted in a state of emergency regarding field and forage crop production. Corn emergence and early growth were excellent, but beginning in early June, central and northern New Jersey started missing rains that fell in southern New Jersey. Since then sporadic, if any, rain has fallen across the state. The corn crop in northern New Jersey is beginning to tassel, the most critical growth stage of corn that affects yield. Soybeans planted in May are beginning to bloom. How will drought impact growth and yield of corn, soybeans, and hay?

#### Corn

Dry conditions have slowed growth and caused irreversible yield losses in corn. When corn is subjected to dry soil conditions, it rolls its leaves in an attempt to minimize exposed surface area to reduce light interception. Additionally, the stomates, the small pores on both sides of the leaves close to minimize water loss. Consequently, carbon dioxide cannot enter the plant and photosynthesis rates decline. What does this mean? If growth rates slow down, ultimately yield will decline. Water stress during late vegetative growth, from approximately rapid stem elongation to tasseling, usually 3 to 4 weeks prior to silking, will result in 2% to 3% per day yield reduction.

Stress, both moisture and temperature, during tasseling, silking, and pollination are the most critical stages in corn development. Moisture stress during this period delays silking and increases the time for pollination. As a result, sometimes all of the pollen may be shed prior to silk emergence. At this growth stage, low soil moisture availability can result in yield losses of 5% per day. Severe moisture and temperature stress during this period can result in losses up to 10% per day. During the early grain-filling period, approximately 20 to 30 days after silking, moisture stress can reduce final yield 3% to 4% per day.

Corn in areas that have missed most of the rains in the past 30 days is severely stressed. Much of this corn is severely stunted, is losing its lower leaves, and beginning to exhibit leaf-tip necrosis.

*SEE EFFECT ON PAGE 2*

# South Jersey Field Crops Progress Report

*Phillip Tocco, Salem  
County Program Associate*

## Alfalfa

We are beginning to see the first visibly wilted fields from the lack of rain. The ongoing drought has also magnified the effects of any potato leafhoppers found in the fields. Even populations of hoppers as low as 35% below threshold have caused symptoms to show up in fields. In addition, some fields over threshold have been tough to bring under control. In some cases, only after mowing and treatment twice with insecticide have fields been brought under threshold.

## Corn

Lack of water is really hindering most dryland acreage. Early corn is at tassel, making the stress on the plants that much greater. A number of early season cornfields are showing dieback and leaf scorch. Most middle and late plantings are showing at least some leafrolling in every field.

## Soybeans

Again, the lack of rain has impacted some fields. A number of fields were seen to be in flower over the last two weeks. As only a few fields have been observed, little in the way of insect damage has been seen. □

Even if we receive timely rains today, this corn will probably not recover enough to produce a viable ear. Livestock producers may decide to harvest this corn as silage. Nitrate toxicity is the major concern associated with drought-stressed corn. Nitrate accumulates in the lower 12 to 18 inches of the stalk. If you decide to chop corn for silage, raise the cutter bar to at least 15 inches to minimize the potential for nitrate toxicity. There is a test that can be administered in the field to identify corn that has greater than 1% nitrate. This involves using the diphenylamine quick test. Contact your County Agent for more information. To determine known concentrations of nitrate, samples must be sent out to a lab for analysis. Additionally, drought-stressed corn is usually too dry to undergo proper fermentation. Dry matter levels for ideal silage fermentation range from 28% to 36%. If corn is dryer than this, the recommended rule of thumb is to add 4 gallons of water per ton of silage for each 1% desired increase in moisture content.

## Soybeans

Soybean is vulnerable to water stress throughout its lifecycle, but the magnitude and effect of water stress at different growth stages varies. Seeding soybeans into dry soil is problematic because a soybean seed must absorb approximately 50% of its weight in water to commence germination. Therefore, dry seedbeds are not hospitable environments for soybean seeds. Assuming your soybeans germinated, they are not overly sensitive to dry conditions during vegetative growth. If water stress occurs during vegetative growth, leaf area may be reduced because the plant has to divert more of its resources to the root system to forage for soil moisture. After full-bloom, however, dry soil conditions will impact soybean yield more dramatically.

The most critical stage is after pod-set, when the seed is enlarging. This stage of growth is the most critical because the plant has adjusted the number of pods per plant and seeds per pod based on environmental conditions it encountered earlier in reproductive growth. If water stress continues or occurs at this time, nitrogen fixation, which is largely influenced by soil moisture, is reduced and nitrogen supply to the enlarging seed cannot keep pace with the nitrogen demand of the enlarging seed. Consequently, nitrogen is remobilized from the leaves, which reduces the photosynthetic capacity of the plant and reduces soybean yield. Optimistically, soybean stands can still generate acceptable yields, assuming a reasonable stand emerged and we receive timely rains during the seed enlargement growth stage which occurs about 30 days after first flower.

## Hay

The hay crop consists of alfalfa and grasses. Alfalfa is more drought tolerant than any of the cool-season grasses, but regrowth has been extremely slow. Nevertheless, alfalfa continues to grow but will probably go to flower at a much shorter height than under ideal conditions. It is still recommended to maintain your cutting interval and harvest stunted alfalfa in bloom to allow for regrowth if we receive precipitation.

Our cool season grasses are in worse condition. Timothy started to regrow after an early first cutting but has since lost its leaves and become dormant. Orchardgrass is barely growing, and will soon lose its leaves. Smooth brome grass, the most drought tolerant of the cool-season grasses typically seeded for hay production in New Jersey, is maintaining its leaves, but is essentially not growing. These grasses will go dormant until more favorable conditions arrive. In the worst case scenario, some stands may be lost because of excessively dry soil environments. □

## Scout Pastures for Poisonous Weeds

*William J. Bamka, Burlington County Agricultural Agent*

As a result of the current drought conditions, most pastures have begun to brown out and decline in productivity. Consequently, there is generally a lack of plentiful good quality forage in pastures. When forage is plentiful in the pasture, livestock will often avoid poisonous plants. However, during periods of drought, or when pastures are overgrazed, animals may begin to investigate undesirable plants discovered in pastures. Many individuals believe that instinct protects livestock from poisoning, but this cannot be relied on to prevent pasture poisonings. It is up to the livestock owner to prevent pasture poisonings. The primary way to do this is to walk your pastures and inspect them for poisonous plants. Do not forget to inspect three or four feet beyond the fence line of the pasture. Livestock will often stretch beyond the fence for forage.

Scout pastures and remove poisonous weeds before they cause livestock problems. Given the current drought conditions the most effective option for poisonous plant removal is clipping. Under current conditions herbicides will likely not be effective as best results are obtained when weeds are actively growing. There are many poisonous plant species that can invade a pasture. Some plants to look for include the nightshades (eastern black nightshade, jimsonweed, groundcherry), wild black cherry, brackenfern and poison hemlock. If you suspect the presence of a poisonous weed and require identification assistance, contact your county agricultural agent. Additionally, RCE Fact Sheet 938 Poisonous Weeds in Horse Pastures may offer some assistance. The following World Wide Web Resources can be of assistance in identifying poisonous plants:

[Rutgers Cooperative Extension Weed Images Page](http://www.rce.rutgers.edu)  
<http://www.rce.rutgers.edu>

[Cornell University Poisonous Plants Page](http://www.ansci.cornell.edu/plants/plants.html)  
<http://www.ansci.cornell.edu/plants/plants.html>

[Indiana Plants Poisonous to Livestock and Pets](http://vet.purdue.edu/depts/addl/toxic/cover1.htm)  
<http://vet.purdue.edu/depts/addl/toxic/cover1.htm>

## Nitrate Toxicity from Drought Stressed Forage Crops

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

During a prolonged drought, corn and other forage crops can accumulate high levels of nitrate. When livestock feed on forages with high concentrations of nitrate they may become poisoned. To insure the health and safety of livestock, drought stressed forage crops should be sampled and tested at a reputable forage-testing laboratory. To find a forage-testing lab, refer to Rutgers Cooperative Extension Fact Sheet 935, available from your County Agricultural Agent or write to the RCE Publications Distribution Center, Cook College, 57 Dudley Road, New Brunswick, NJ 08901-8525.

### Environment and Crop Nitrate Concentrations

- ❖ Higher rates of nitrogen applied to soil from fertilizers or manure cause increased concentrations of nitrate in forages.
- ❖ Stressful environmental conditions favor uptake of nitrate over the rate of protein synthesis in the plant.
- ❖ Environmental stress includes drought, high temperatures, failed pollination, and losses of leaf area due to hail damage.
- ❖ Risk of high nitrate concentrations is greatest immediately following a drought-ending rain.

### Recommendations

- ❖ In corn, nitrate accumulates in lower portions of the corn stalk. Harvesting higher, 15 to 18 inches above ground level, helps to avoid high nitrate concentrations.
- ❖ Ensiling helps to reduce nitrate concentrations.
- ❖ If only one forage has a high nitrate concentration, you may be able to reformulate the ration to include low levels of this particular forage.
- ❖ Consult with your veterinarian and/or Extension agent for specific dietary recommendations. □

## Survey to Document Drought Effects

Everett A. Chamberlain,  
Warren County Agricultural  
Agent

The drought situation in northern New Jersey is at a critical level. The lack of rain, and poor commodity prices has created a desperate situation for agriculture.

In an effort to document the drought conditions, a survey will be sent to all grain and forage producers. The information from the survey will be used to enlighten the legislators and government agencies as to the severity of the crop damage and financial burden facing New Jersey farmers.

The survey will be attached to the next issue of the Field Crops/Livestock edition of the Plant & Pest Advisory newsletter. Please take the time to complete the form. The information is crucial in developing a case for disaster relief. □

## Stress Effects on Corn Growth and Yield

Daniel Kluchinski, Mercer County Agricultural Agent

Many types of stress can affect corn growth and yield, including moisture and temperature. The ongoing drought and recurring heat waves have put grain and silage corn crops through serious stress. At this time, obvious response to this stress is being seen in the field, typically consisting of leafrolling. The question is, however, what effects does this type of weather have on yield? This depends on the severity of the stress and the stage of growth of the corn plant.

Early season weather was near normal and encouraged early vegetative growth and deep root growth. This helped early plantings as the season progressed and dry weather started. Later plantings in drier conditions did not see this benefit. In *Weather Stress in the Corn Crop*, Shaw and Newman note "the effect of early-season stress on the final corn yield is difficult to assess. Although moisture stress reduces plant size, it has little effect on final yield if good crop production conditions prevail during pollination and grain-filling periods." However, good conditions have not occurred across the state.

In late vegetative growth stages (stem elongation to tasseling), the effect of weather stress on yield is greater. Both heat and drought combine to reduce vegetative growth, and can result in a 2 to 3 percent reduction in yield for each day of the stress. As the plants reach tasseling, silking and pollination, the greatest damage to yield is done. Shaw and Newman note that "combined moisture-temperature stress during the reproductive period can substantially reduce final grain yield." However, regardless of soil moisture, the greatest stress occurs when the daily average temperature is above 77°F and daily maximum temperature is above 95°F. High temperatures with low moisture can reduce yields 5 to 10 percent per day.

The largest yield reduction occurs with stress during silking. Silk development is delayed and the tassels shed pollen before the silks develop. If poor pollination occurs, yields will be drastically reduced. However, even with pollination, continued stress during grain filling can reduce final yield by 3 to 4 percent per day. About six weeks after pollination, the effects of stress on final yield greatly diminish.

Although little can be done this season, this weather-related stress serves as an example of the need to stagger plantings, using hybrids of varying maturity dates. This will help to spread the silking, tasseling, pollination and maturity of the crop and reduce impact of the stress on overall production.

R. H. Shaw and J. E. Newman. 1984. *Weather Stress in the Corn Crop in National Corn Handbook*, Purdue University, W. Lafayette, IN. □

# Weekly Weather Summary & Long Range Outlook

Keith Arnesen, Ph.D., Agricultural Meteorologist

Temperatures averaged above normal north and central, and below normal south. Extremes were 102 degrees at Canoe Brook on the 18th and 47 degrees at Charlotteburg on the 15th. Weekly rainfall averaged 0.17 inches north, 0.20 inches central, and 0.64 inches south. The heaviest 24 hour total was 0.99 inches at Pomona on the 12th to the 13th. Estimated soil moisture, in percent of field capacity, this past week averaged 56 percent north, 45 percent central and 43 percent south. Four inch soil temperatures averaged 71 degrees north, 73 degrees central and 72 degrees south.

## Long Range Weather Outlook

While it may already be too late for some crops and individual fields, there is some hope for August and beyond for better precipitation totals. The Climate Prediction Center, (the federal agency in charge of long-range forecasts) is forecasting the following: For the period July 27th through July 31st, temperatures in New Jersey are expected to average much above normal and precipitation to total below normal. The 30-day and 90-day forecasts however, are calling for precipitation totals to be above normal both for the month of August and for the period of August through October. Temperatures for both those periods are expected to average above normal.

Weather Summary for the Week Ending 8 am Monday 7/19/99										
WEATHER STATIONS	RAINFALL			TEMPERATURE				GDD BASE50		MON
	WEEK	TOTAL	DEP	MX	MN	AVG	DEP	TOT	DEP	%FC
BELVIDERE BRIDGE	.00	10.66	-7.24	97	53	75.	2	1470	210	43
CANOE BROOK	.66	11.74	-7.25	102	54	78.	4	1683	419	61
CHARLOTTEBURG	.21	13.05	-6.12	100	47	72.	1	1216	194	48
FLEMINGTON	.00	8.96	-9.36	100	51	76.	2	1540	236	52
LONG VALLEY	.00	10.46	-9.15	96	51	72.	1	1289	191	46
FREEHOLD	.18	11.66	-6.17	101	55	78.	3	1721	314	48
LONG BRANCH	.33	12.46	-5.30	91	56	73.	-1	1510	180	30
NEW BRUNSWICK	.06	12.01	-5.65	99	53	77.	2	1620	133	57
PEMBERTON	.17	12.88	-4.77	101	50	76.	1	1695	250	22
TOMS RIVER	.25	6.60	-11.50	95	53	73.	-1	1485	145	27
CAPE MAY COURT HOUSE	.90	9.79	-5.95	90	57	72.	-4	1605	176	36
DOWNSTOWN	.54	14.57	-1.87	94	54	73.	-3	1636	74	35
HAMMONTON	.33	13.01	-4.37	95	53	73.	-3	1632	96	23
POMONA	1.01	13.00	-2.67	93	55	74.	-1	1594	169	44
SEABROOK	.30	15.56	-.32	92	56	74.	-2	1760	191	30
ATLANTIC CITY MARINA	.77	10.30	-4.70	83	62	72.	-2	1631	289	34
WOODSTOWN	.09	14.72	-2.92	97	50	74	NA	1755	NA	NA
WES KLINE — GDD BASE 40 PINEY HOLLOW										
Last Week 281 (Ending 7/12/99)										
This Week 235 (Ending 7/19/99)										

# **Field and Forage Crop Twilight Meeting**

**August 3, 1999**

**Rutgers University Snyder Research and Extension Farm  
Pittstown (Hunterdon County), NJ**

5:00 to 6:00 PM    Registration and Dinner Buffet  
6:00 to 8:00 PM    Twilight Meeting and Farm Tour

The program will provide updates on on-going research, demonstration and Extension programs, including:

- ❖ Corn Phosphorus Fertilization
- ❖ Nitrogen Management in Wheat
- ❖ Long-term Impact of Manure on Soil Quality
- ❖ Water Quality and Farm Management
- ❖ Update on Soil Nitrogen Testing (PSNT) for Corn
- ❖ Grass Hay Production Techniques
- ❖ Variety Trials
- ❖ Pesticide Safety Update
- ❖ Current Pest Update and Control Recommendations

Pesticide license recertification credits will be available (1 core, 1-Category 1A, and 1-Category PP2). Rutgers Cooperative Extension and North Jersey Resource Conservation and Development are sponsoring the program. A free dinner buffet will be provided. Participants must register by July 27 by calling the Mercer County Extension Office at 609-989-6830.

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# **Equine Pasture Management Twilight Meeting**

**August 5, 1999**

**Rutgers University Snyder Research and Extension Farm  
Pittstown (Hunterdon County), NJ**

6:00 to 6:30 PM    Registration and Light Refreshments  
6:30 to 8:00 PM    Twilight Meeting

The program will provide information on:

- ❖ pastures for equine nutrition and health
- ❖ pasture variety selection and management
- ❖ pasture management techniques and methods, including a pasture walk

Pesticide license recertification credits will be available (1 core, 1-Category 1A, and 1-Category PP2). Rutgers Cooperative Extension is sponsoring the program. Light refreshments will be provided. Participants must register by July 27 by calling the Mercer County Extension Office at 609-989-6830.

# PLANT & PEST ADVISORY

Field Crops/Livestock Edition (biweekly during growing season)

- ✓ Stay informed of insect and disease advisories
- ✓ Get the latest information on your crop and region
- ✓ Learn effective cultural practices and the latest results of New Jersey crop research
- ✓ Reduce costs through IPM and more effective use of pesticides
- ✓ Improve storage/handling procedures. Learn new marketing techniques and opportunities
- ✓ Be informed of upcoming meetings, seminars and trainings

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