RUTGERS COOPERATIVE EXTENSION AT THE NEW JERSEY AGRICULTURAL EXPERIMENT STATION

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Pumpkins: What You Don't Know Can Hurt You!

Terry Nennich, Extension Educator, University of Minnesota

(Reprinted from: Lake Plains Vegetable News July 2003, Letter 7, Vol. XII)

Unknown to most growers, the root system of pumpkins are as large and extensive as the foliage. With many trees, what you see in growth above the soil is matched by root growth below ground. The same situation exists with pumpkins. In a "one-of-a-kind" research project in 1927, John Weaver and William Brunder, botanists at the University of Nebraska, grew many different vegetable crops and excavated and mapped the course of the root systems. They published their work in a book titled "Root Development of Vegetable Crops", published by McGraw-Hill Company, New York. To my knowledge, no one since has attempted such a difficult task.

Vines of the 'Small Sugar' pumpkin were about 16 feet long at maturity and the top 12 inches of soil were filled with roots. The taproot of mature pumpkins grew 6 feet deep and had 10 or more lateral branches that extended outward 5 to 17 feet or more. Many of these lateral roots were 2 to 4 feet long, intricately and minutely branched, forming a wonderfully efficient root complex. The second and third feet of soil were also thoroughly filled with roots, with the fourth foot of soil continuing many vertically descending roots. Plant size of pie pumpkins may not be as large and vigorous as the jack-o-lantern types. It is probable that root systems of larger pumpkins may be more extensive than those reported in this book.

So what does this mean to the pumpkin grower? Both cultivation and fertility practices must consider the developing root system hidden beneath the surface. Generally, pumpkin roots grow faster than foliage and root extension usually is equal to or greater than the vine spread. If cultivation is necessary, it should be done before the vines run over the ground. Cultivation must only graze the soil surface to avoid root damage. Later cultivation should be avoided entirely and a good herbicide program used for weed control. Pumpkin vines root in the areas between the planted rows and provide "shortcuts" for water and nutrients to enter the plant. Therefore, pumpkin vines should not be moved around unnecessarily. Broadcasting fertilizer with the space between planted rows may provide nutrition to support the rampant growth of pumpkins and help pumpkins fruits developing on satellite vines quite distant from the main plant.

(Submitted by Win Cowgill, Agricultural Agent, RCE of Hunterdon County)

Tomato Late Blight Update

Wesley Kline, Agricultural Agent, Cumberland County

A Section 18 emergency exemption for Previcur Flex fungicide has been received from the New Jersey Department of Environmental Protection for the protection of tomatoes from late blight. The Section 18 is good until December 31, 2003. The Previcur label is available at http://www.rce.rutgers.edu/labels. There now are four alternatives to combat late blight

Acrobat 50WP (6.4 oz/A)
Gavel (1.5 to 2 lb/A)
Previcur Flex (1.5 pt/A) *Must have a label at the time of application
Curzate (5 oz/A) *Must have a label at the time of application

Add one of the following protectants on an alternating basis to one of the chemicals above - chlorothalonil (Bravo, Echo, Equus) 3 pt 6F/A and OLF or mancozeb (Dithane, Manex II, Manzate, Penncozeb) 3 lb 80WP or OLF.

Make sure to check the individual labels for pre harvest intervals and if there is any plant back restrictions. For example, Previcur Flex has a pre-harvest interval of 5 days and a plant back restriction for root and leafy vegetables – 30 days and for all other crops including winter wheat 120 days. This means a grower cannot plant winter wheat for 120 days after the last application of Previcur.

Under favorable conditions for late blight, make applications on a five-day schedule alternating among the four late blight materials listed above. Late blight develops and spreads, when humidity is above 90% and the average temperature is in the range of 60 to 78 F. Infection occurs in about 10 hours and spread very rapidly within and between fields under these conditions. Return to the normal spray program when weather conditions no longer favor late blight.

Late Blight Development

Late blight first appears as water-soaked areas usually on leaves that rapidly enlarge to form an oily appearing blotch. On the under side of the leaf, rings of grayish white fuzz (mycelium) form on the edge of the blotchy area. The entire leaf will die and the disease spreads quickly to other parts of the plant and field. Infected fruit turn brown, but remain firm unless some other organism infects the fruit.

Change in Fungicide Recommendations for Powdery Mildew in Cucurbits.

Margaret Tuttle McGrath, Department of Plant Pathology, Cornell University

Symptoms were more severe than expected on the underside of leaves in the commercial pumpkin fields examined this week on Long Island. Conditions have been very favorable for this disease. However, the top side of leaves had very little if any symptoms. Thus it appears that timing of sprays has been good and the protectant fungicides (sulfur, chlorothalonil, copper, etc.) being used are working. Fields should be examined elsewhere to determine if the situation is similar. Poor control on the leaf underside suggests the pathogen is resistant to a systemic fungicide. I suspect resistance to strobilurin fungicides (Quadris, Flint, and Cabrio). Isolates have been collected, but it will be at least 4 weeks before the assay is completed and we will know if resistance is a likely explanation.

Resistance to this group of fungicides was detected in 2002 in several areas of the U.S. It is a qualitative resistance, thus resistant isolates are completely resistant and cannot be controlled by increasing the fungicide rate or decreasing the spray interval. A low frequency of resistance was detected in one commercial spring squash field on Long Island early in the season.

Since resistance may be affecting control, I recommend that strobilurins not be used exclusively for powdery mildew (they are effective for several other diseases, thus it may be desirable to use them for these). Apply Nova or Procure weekly at the highest label rate tank mixed with a protectant fungicide. Sulfur and oil are the best choices (use either one, not both together) because they have provided better control on the underside of leaves than other protectants, but others (chlorothalonil, copper) control a broader spectrum of diseases. Microthiol Disperss, a micronized sulfur, has consistently performed very well at the low rate of 4 lb/A in fungicide efficacy experiments conducted with pumpkin on Long Island. Use oil on melons as they are sensitive to sulfur. Resistance is also a major concern with Nova and Procure. The related fungicide Bayleton is no longer effective due to resistance. Resistance to this group of fungicides is quantitative. Therefore it is critical to use Nova and Procure at the highest rate, use them with other fungicides, and do not apply them more weeks than necessary. Procure has been a little more effective in some fungicide efficacy experiments. Some feel alternating between Nova and Procure might be useful for resistance management. Switch to just protectants towards the end of the season when control is less critical.

Pest Notes

Gerald M. Ghidiu, Ph.D., Specialist in Vegetable Entomology

✔ **Cabbage: Diamondback** moth larvae and **cabbage looper** are starting to cause damage in cabbage fields. If heads are not formed yet, treat when 20% of the plants show damage from *any* species of 'worm' pest; and treat when 5% of the plants show damage in the heading stage. Underleaf coverage is essential, and usually a spreader-sticker is of benefit on waxy-leaf crops such as cabbage. Most effective materials for cabbage loopers are any of the listed pyrethroids (essentially, no differences between them for cabbage looper control), or Larvin, Lannate, or Intrepid. Most effective materials for diamondback moth are Avaunt, any of the biological insecticides (Bt's) with diamondback moth larvae on the label, Proclaim, or SpinTor. Scout for diamondback moth larvae, and manage this pest **before** a high population occurs to prevent control failures.

✔ **Cucurbit**: **Squash bug** populations are increasing on various cucurbit crops, especially pumpkins and squash. For effective management, target the nymphs (the young) of stinkbugs, and treat before the population becomes large. Nymphs look similar to adults, but do not have the wings developed yet, and may be reddish to grayish to powdery blue in color. Direct spray to leaf undersides and base of stems where many stinkbugs often hide. Use Ambush, Asana, Capture, Neem (such as Azadirachtin), Pounce, or Sevin.

Also, monitor closely for **two-spotted spider mite** populations on cucurbits (and eggplants, etc.) at this time because of the streak of hot, dry weather during the past several weeks. Look for off-color plants, curling of foliage, and webbing under the leaves for indications of potential or present spider mite problems. Many materials are labeled for spider mite control, but all are not labeled on the same crops, so thoroughly read label before use for all crops, rates and restrictions. Effective miticides specific for mites include Kelthane, AgriMek, and Vendex. Other materials that have mite control on the label include Capture, Danitol, Metasystox-R, and Vydate. Treat for mites while the population is still low, as control is much more difficult after the leaves curl and webbing occurs. **Note:** sprays must reach leaf undersides for effective management of spider mites.

✔ **Pepper:** Egg masses of **European corn borer** moths are still being found on pepper leaves, and corn borer moths are still active in the pheromone and black light traps. Activity will likely run later than 'usual', and moths may remain active for another week or so. Most insect populations were behind schedule due to the weather patterns this summer. For European corn borer, many materials are labeled and all of them are effective. It would be best to select a material that also controls both the **fall armyworm** and the **beet armyworm** because these pests are also active at this time, and growers report numerous armyworm problems in most vegetable crops, including peppers.

For beet armyworm and fall armyworm larvae, most effective materials include Avaunt, Confirm, Intrepid, and SpinTor. Pyrethroids (such as Asana, Ambush, Pounce, etc.) and the Bt's *do not* work well against the beet armyworm, and will not control the armyworm complex.

✔ **Tomato: Corn earworms** are starting to cause some damage to tomato fruit. If larvae are observed, and damage is increasing, treat with any of the following: a pyrethroid listed in the recommendations book, Avaunt, Intrepid, Proclaim, or SpinTor. Thorough coverage of the foliage and fruit is critical for corn earworm control.

Southern states (Virginia, Maryland) report an increase in **stinkbug** activity and damage in tomatoes. If more than 3 fruit per 400 fruit show damage, or stinkbug adults or nymphs are increasing in numbers, or damage to tomatoes is increasing, treat with Actara, Baythroid, Monitor (**note:** a Special Local Needs Label for New Jersey is in effect for the use of Monitor on tomatoes – a copy of label *must* be in possession of user at time of application), Thiodan or Warrior are labeled and effective against stinkbugs in tomatoes. Thorough coverage of the foliage is important! Use high pressure, high gallonage if possible to penetrate the crop canopy at this time.

IPM Update

Kristian Holmstrom, Program Associate in Vegetable IPM

Sweet Corn

European corn borer (**ECB**) adult activity is still moderate to high in many areas of New Jersey, with highest activity shifting to the northern counties. The end of the second flight is not typically as abrupt as with the first flight. Often there is a partial third flight in the southern counties as well, so ECB will remain a threat to crops for some time. Trap catches in parts of Cumberland and western Hunterdon counties are the highest now (see ECB map). These adults will lay eggs on whorl through silking stage corn. Check fields weekly and consider treating if greater than 12% of plants are infested with ECB alone or in combination with **fall armyworm (FAW)**. After the full tassel treatment, follow up with regular insecticide applications on silks as dictated by the local **corn earworm (CEW)** catches. The highest average nightly ECB blacklight trap catches are:

Little York	10	Belvidere	5	Fishing Creek	4
Shirley	10	Blairstown	5	Georgetown	4
Cranbury	7	Chester	4	Jamesburg	4
Allamuchy	6	Elmer	4	Long Valley	4

Corn earworm (CEW) adult activity continues to decrease in the northern counties, but is showing moderate increases in southern areas over the past week. At this time, the highest CEW activity is in the southern half of the state (see CEW map). Future increases could occur following periods of strong southerly winds. We will continue to monitor populations and weather conditions throughout the region to try to provide advance warning of CEW populations. Silk spray schedules are critical to prevent significant losses to CEW. Cross-hatched areas on the map (green on the web) represent a population requiring a 3-4 day silk spray schedule, and dotted areas on the map (blue on the web version) represent a 5-6 day spray schedule. The highest average nightly CEW blacklight trap catches are:

Egg Harbor	6	Crosswicks	4	Elm	3
Indian Mills	5	Fishing Creek	4	Hammonton	3
Tabernacle	5	Downer	3	Mannington	3
Cranbury	4	Eldora	3	Lawrenceville	3

General Sweet Corn Spray Schedule

Silking Corn:	North	5 days
	Central	3-4 days
	South	3-4 days

Fall armyworm (FAW) infestations continue in whorl pre-tassel stage sweet corn plantings throughout New Jersey, with re-infestations common following successful treatments. Look for feeding that initially looks like ECB damage, but rapidly progresses to ragged holes in the leaves with large amounts of droppings in the whorl. FAW can be tough to control because penetration by the insecticide through the layer of droppings is sometimes difficult. Scout fields weekly and consider treating when 12% or more plants are infested with FAW alone or in combination with ECB. Increased spray volume and pressure often assist in control of FAW.

Corn leaf aphids are now still common in pre-tassel stage sweet corn. These blue-gray aphids can become a nuisance to consumers as they move down the plant and get between husk layers on the ears. Their populations may be enhanced by repeated use of pyrethroid insecticides in the silk spray program. It is wise to make at least one application of methomyl or other non-pyrethroid insecticide in the silk spray program to minimize ear infestations of corn leaf aphid.

Corn leaf rust continues to be seen at low levels in northern counties. Cooler evening temperatures and heavier dew events favor the development of this disease. While scouting, look for pustules on the oldest leaves of plants. Pustules rupture, emitting reddish, powdery spores. There is a wide range of host resistance to this disease, but some varieties can be adversely affected. Check the seed source for resistance in your varieties. If the variety is susceptible to leaf rust, pustules will increase on the plant until moisture stress causes a reduction in ear size. The potential for loss is greatest if the infection begins when susceptible plants are in the whorl or seedling stages. Later infections may not reduce yield, but can cause pustules on the husks, which may make ears less marketable. Consider using chlorothalonil or mancozeb (7 day schedule), or Tilt (7-14 day schedule) if rust is found in the seedling or whorl stages.

Pumpkins

As vines run, check plantings for the presence of **powdery mildew (PM)**. Look for powdery lesions on either surface of older leaves. A fungicide schedule may be initiated after 1 or more lesion is found per 50 older leaves. The recommended fungicide program is for chlorothalonil +Nova to be alternated with a strobilurin type fungicide at 7-10 day intervals. It is important to remember that Quadris (a strobilurin type) is effective on PM, but is highly phytotoxic to some apple types. For this reason, Flint is a good substitute if

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apples are to be sprayed with the same apparatus used for spraying pumpkins and winter squash.

Downy mildew (DM) is widespread in the northern counties, and most likely is present throughout the state. This disease is favored by moist conditions infects all cucurbit crops. Heavy sporulation when leaves are wet leads to rapidly spreading infections. Protectant fungicides are necessary to stop spore penetration on uninfected foliage. Fungicides with eradicant properties like Ridomil or Acrobat can help combat existing infections. Check fields weekly for the presence of diffuse yellow blotches on the upper surface of leaves with dark, felt-like sporulation on the lower surface. The sporulation frequently occurs along the leaf veins. If this disease is found in any field, immediately treat all cucurbit crops with fungicides on a 7-day protectant schedule. Consult the *2003 Commercial Vegetable Production Recommendations* for spray materials.

Tomatoes

Maintain regular fungicide applications for **foliar diseases** on tomatoes. Wet weather has prevented some fungicide applications, and plantings are now showing greater levels of **alternaria**. Good disease management to preserve foliar cover for fruit is critical for good fruit quality.

Continue to monitor for **aphids**. Often, the first sign of significant aphid populations is cast skins on leaves below the colonies. It this condition exists in the field, and fruit are sizing up, consider treating. Aphid populations that are present prior to fruit enlargement are often controlled adequately by natural predators and parasites.

Be sure to check field edges for the presence of **two-spotted spider mites (TSSM)**. TSSM will enter tomato plantings from field edges as surrounding vegetation dries up or is disrupted. Look for the whitish pin-spots (stipple) on the upper surface of leaves. Mites are often found on the lower surface. Spot treat for TSSM if possible, to prevent a greater infestation in the field.

Yellow striped armyworm has been active in tomato fields around the state. This caterpillar is dark green when small, and darkens to black with prominent yellow stripes on each side as it grows. Small larvae feed on foliage before infesting fruit. Fruit injury is similar to that caused by CEW. Look for signs of foliar feeding and holes in the fruit near the calyx. Often fruit nearest the outer canopy are affected first. If fruit feeding begins to increase, consider treating for this pest. Recommendations for armyworm control may be found in the *2003 Commercial Vegetable Production Recommendations.*

This is the time of the season when **stinkbug** injury generally begins to increase significantly in tomato plantings. Stinkbug pressure in tomatoes tends to be heavier during dry seasons, and with this wet season, stinkbug injury has been minimal in scouted fields. Still, some adults in the *Euschistus* genus (larger, brown stinkbugs) have been captured recently in pheromone traps and found in corn tassels throughout the state. The adults will move into tomato plantings when surrounding host vegetation is too dry or is mowed. Adults, and emerging nymphs will feed on green and ripening fruit, causing the large, yellow "cloudy-spot" injury. If this feeding is found to be increasing in samples, consider protectant sprays for stinkbug. The **marmorated stinkbug** has recently become active in eastern Pennsylvania, where they were observed feeding on beans, tomatoes and peaches as well as non-food crops. This stinkbug is similar in appearance to our brown stinkbugs, but is somewhat larger. Adults were active in northwestern NJ last season from late August into October. Damage and control should be similar to that for the brown stinkbugs. Consult the *2003 Commercial Vegetable Production Recommendations* for spray materials

Bacterial infections have worsened in several northern NJ tomato plantings following numerous heavy rains or hail. These diseases are characterized by marginal necrosis, or small very dark spots on infected leaves. If the disease is bacterial canker, there may be stem lesions and the "birds-eye spot" or white rimmed blister on the surface of affected fruit. Bacterial spot and speck cause dark lesions on the surface of infected fruit. As with all bacterial infections, avoid working in fields when the plants are wet. Surface sterilize pruning and tying tools between rows, and always work in infected plantings last. Copper with mancozeb may help minimize impact, although copper sprays can cause spotting on fruit. Actigard at the lowest recommended rate may also help. Actigard should be used weekly for a total of 6 applications.

Snap beans

ECB is a significant threat to snap beans in parts of New Jersey. Areas shaded in black on the ECB map (red on the web) represent adult populations capable of considerable damage to developing pods. In those areas, beans should be treated in the bloom and pin stages. Weekly protectant sprays should continue on developing pods as long as local ECB adult catches remain above 5 per night. Continue to monitor for **potato leaf hopper (PLH)** in beans. This pest is capable of severely stunting beans, and reducing yield. As populations build up in fields, and PLH reproduces in the crop, chlorosis and deformation of leaves may become apparent. When these symptoms of infestation appear, damage to the crop has already occurred. Insecticide applications directed at ECB often control PLH as well. For this reason, it is important to check regularly for PLH. Consider treating if adults and

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nymphs exceed 100 per 20 sweeps prior to bloom, or 250 per 20 sweeps at bloom, or 250+ during pod development. If a sweep net is not available, consider treating if nymphs are found in random samples covering all areas of the field.

Cole crops

Imported cabbageworm (ICW), diamondback moth larvae (DBM), and **cabbage looper (CL)** are all active now on cole crops. In addition, **flea beetle** continues to be a problem on young plantings. Check plantings at least once a week for the presence of the above pests. Consider treating if greater than 20% of plants are infested prior to head formation or if greater than 5% are infested when heads are present. For collards, kale, mustard and other leafy cole crops, consider treating when 10% or more plants are infested with any larvae. Flea beetle infestations should be treated when the pest is present on more than half the plants in the sample and damage is occurring.

Alternaria is a threat to maturing cole crops now, and will remain so for the rest of the season. Look for necrotic lesions on older tissue. The lesions often have concentric rings of within the borders. At the first sign of disease, begin a 7-10 day fungicide program. Consult the *2003 Commercial Vegetable Production Recommendations* for effective spray materials.

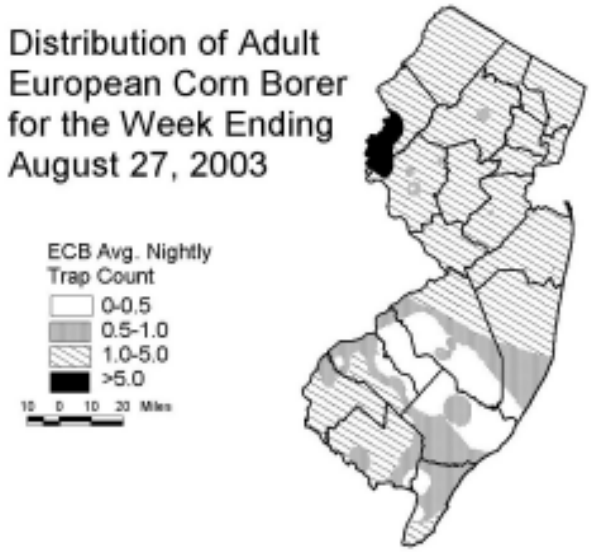
Peppers

In areas where ECB activity is increasing, consider a weekly protectant insecticide schedule to prevent fruit injury. On the ECB map, cross-hatched and dark portions (shaded green and red on the web version) represent areas where ECB activity is a threat to pepper fruit. As eggs hatch, larvae will tunnel into the fruit around the cap. As the larvae feed in the fruit, bacteria enter and can result in a high incidence of soft rot. When scouting, look at two leaves and fruit on five consecutive plants in ten random locations throughout the planting. Consider treating for ECB if more than one eggmass is found in the field. Consider preventive treatments if fruit are present, and local trap catches are greater than one moth per night on average. Consult the *2003 Commercial Vegetable Production Recommendations* for spray materials.

TSSM is a threat to pepper plantings at this time. Consider spot treating if TSSM appears in the planting. Early detection and spot treatments can help prevent a difficult infestation later.

High levels of FAW feeding in sweet corn are an indication the population is high enough to cause problems for peppers as well. When scouting, determine the type of caterpillars present in fruit (if any). FAW is generally brown in color, with an inverted "Y" on its head capsule. ECB is a pale caterpillar with a dark brown, flattened head. It is important to distinguish between the two, because Orthene is not as effective on FAW as it is on ECB. Consult the *2003 Commercial Vegetable Production Recommendations* for spray materials effective against both pests.

Bacterial leaf spot (BLS) has been found on bell peppers recently in the northern counties. This disease is characterized by necrotic spots and margins on leaves. When infected, plants often drop large numbers of leaves. Fixed copper combined with maneb at 7-10 day intervals may be useful in minimizing spread in the field. Consult the *2003 Commercial Vegetable Production Recommendations* for formulations and rates. High fertility levels (to increase foliar fruit cover) may help prevent scalding of fruit. Avoid working in wet fields.



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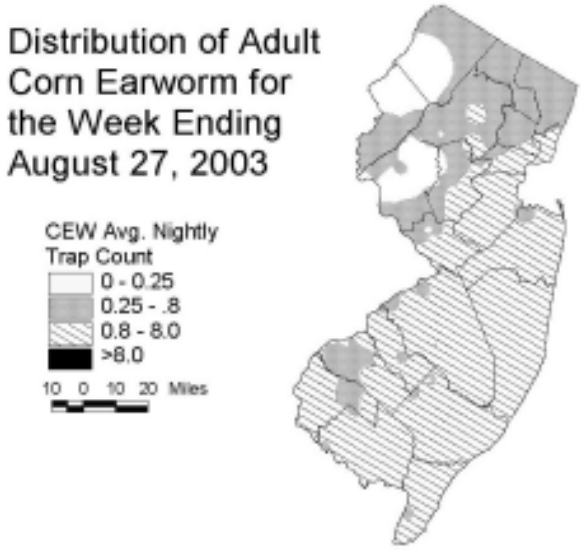

Data collected and processed by: Kris Holmstrom, Marilyn Hughes
Rutgers Cooperative Extension & Center for Remote Sensing

Weekly Weather Summary

Keith Arnesen, Ph.D., Agricultural Meteorologist

Temperatures averaged much above normal. Extremes were 93 degrees at several locations on the 23rd, and 48 degrees at Charlotteburg on the 24th. Weekly rainfall averaged 0.07 inches north, 0.06 inches central, and 0.13 inches south. The heaviest 24 hour total reported was 0.58 inches at South Harrison on the 22nd to 23rd. Estimated soil moisture, in percent of field capacity, this past week averaged 68 percent north, 55 percent central and 44 percent south. Four inch soil temperatures averaged 72 degrees north, 74 degrees central and 75 degrees south.

Weather Summary for the Week Ending 8 am Monday 8/25/03

	RAINFALL			TEMPERATURE				GDD BASE50		MON
WEATHER STATIONS	WEEK	TOTAL	DEP	MX	MN	AVG	DEP	TOT	DEP	%FC
BELVIDERE BRIDGE	.00	35.03	11.56	90	51	73.	4	2255	172	66
CANOE BROOK	.08	32.29	7.68	93	52	74.	5	2336	241	60
CHARLOTTEBURG	.25	34.12	9.27	89	48	69.	3	1833	174	64
FLEMINGTON	.09	31.29	7.57	89	50	72.	2	2200	51	58
LONG VALLEY	.00	29.36	3.73	86	55	70.	3	1738	-119	57
NEWTON	.01	30.95	8.01	89	49	71.	4	2043	141	62
FREEHOLD	.15	25.99	2.87	93	51	74.	3	2375	87	67
LONG BRANCH	.00	28.14	4.76	92	55	75.	4	2194	-16	27
NEW BRUNSWICK	.02	29.54	6.23	92	53	74.	2	2338	-43	64
PEMBERTON	missing									
TOMS RIVER	.14	27.25	3.33	93	51	73.	2	2349	157	51
TRENTON	.00	23.98	1.83	92	60	75.	3	2311	-175	30
CAPE MAY COURT HOUSE	.12	22.48	1.83	90	54	73.	0	2248	80	22
DOWNSTOWN	.15	24.68	2.83	91	54	74.	2	2400	-61	53
GLASSBORO	.00	25.63	2.82	92	61	76.	4	2542	73	32
HAMMONTON	.00	21.89	-.93	93	54	75.	3	2509	36	38
POMONA	.06	21.95	.91	93	51	75.	4	2363	57	31
SEABROOK	.44	27.53	6.61	92	56	74.	2	2590	85	47
ATLANTIC CITY MARINA	missing									
SOUTH HARRISON	.58	23.32	.74	92	57	75	NA	2520	NA	NA

WES KLINE — GDD BASE 40 PINEY HOLLOW
Last Week 264 (Ending 8/18/03)
This Week 237 (Ending 8/25/03)

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