RUTGERS COOPERATIVE RESEARCH & EXTENSION AT THE NEW JERSEY AGRICULTURAL EXPERIMENT STATION

PLANT & PEST ADVISORY

VEGETABLE CROPS EDITION $1.50 APRIL 27, 2005

INSIDE

Perennial Weed Control Using Cultural/Mechanical Techniques

Bradley A. Majek, Ph.D., Specialist in Weed Science

Weeds cause serious crop losses every year by reducing yield, quality and earliness of grain, forage, vegetable and fruit crops. Perennial weeds include any weed that lives for more than two years. **Common perennial grass weeds** in the mid-Atlantic region include **quackgrass**, **Johnsongrass**, **Bermudagrass**, and **wirestem muhly**. **Common herbaceous perennial broadleaf weeds** in the mid-Atlantic region include **Canada thistle**, **milkweed**, **hemp dogbane**, **hedge and field bindweed**, **Canada goldenrod**, **white heath aster**, and **horsenettle**. **Common woody broadleaf perennials** include **Virginia creeper**, **poison ivy**, **creeping dewberry and other brambles**, **multiflora rose**, **greenbriar**, and **mulberry tree seedlings**. **Yellow nutsedge** and **purple nutsedge** are two perennial sedges commonly found in the region.

Most annual and perennial weeds reproduce from seed, but many perennials also reproduce vegetatively. Examples of vegetative reproductive parts of weeds include stolens, rhizomes, roots, tubers, bulbs, and nutlets. Bermudagrass has stolens, which are above ground horizontal stems. Quackgrass spreads by rhizomes, which are underground horizontal stems. Canada thistle, milkweed, hemp dogbane, horsenettle, and bindweed species have a deep complex root system with distinct vertical and horizontal roots. Wild bean has tubers. Nutsedge has nutlets that can live dormant in the soil for several years.

Primary and secondary tillage are effective control methods for annual weeds, but annual plowing and disking or field cultivating prior to planting often only spreads perennials by breaking roots, rhizomes, and stolens, and dragging pieces to uninfested parts of the field, or to other fields. Perennial weed control requires a significantly higher degree of commitment. The grower must make perennial weed control a high priority task. They must recognize that success will require more time, cost more money, and may affect a field's crop rotation sequence to be effective.

Perennial weeds can be controlled by carbohydrate starvation. Perennials emerge in the spring by relying on carbohydrates stored in roots, rhizomes, stolens, tubers, bulbs or nutlets. Control measures should start when the carbohydrate reserves in the weed are at their lowest. This is often after the weed has used stored reserves to overwin-

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PERENNIAL WEEDS FROM PAGE 1

ter and emerge in the spring. Beginning when the weed shoot(s) break the soil surface, carbohydrate flow continues from the root toward the shoots for an additional 7 to 10 days to establish a leaf canopy. Between 10 and 14 days is a transition period. Within 14 days of emergence, the weed moves carbohydrates from the leaves back down into the root.

STARVATION OF PERENNIAL WEEDS IS ACCOMPLISHED BY NEVER ALLOWING THE WEED TO MOVE CARBOHYDRATES DOWN INTO THE ROOTS. This can be accomplished by tilling (or close mowing of tall upright weeds) every 7 to 10 days until they cease to attempt to emerge. It is critical that NO timing be missed or be late! One single missed tillage can negate all the effort expended up to that point. **EXPECT TO CONTINUE THE EFFORT FOR 4 TO 6 MONTHS!** Success may require more time if the effort was not started when carbohydrate reserves in the weed were low at the start of the process.

Typically, a field is fallowed and shallowly tilled on a weekly schedule for one growing season to eliminate a perennial weed problem. Begin with the first sign of the emergence of the weed in the spring. Maintain a seven (7) day tillage schedule. This time schedule provides about a three to seven day cushion in the event of a wet period when the field can not be tilled. The schedule MUST be maintained and must be a high priority for the grower. One, single missed tillage can negate all the effort expended up to that point. Advance the schedule when wet weather is anticipated rather than suffer a delay. The reason for missing the timing is not important. Preventing ANY carbohydrate from moving from the leaves back into the root is critical for success until the weed is dead.

A field need not be fallowed for the year, provided the grower maintains a seven day cultivation and hoeing schedule. The weekly tillage cannot be stopped when the crop becomes established. The weekly tillage and hand hoeing must be continued until the weed is dead. ❑

Weed Control in Crops Grown on Plastic Mulch

Bradley A. Majek, Ph.D., Specialist in Weed Science

Plastic mulch, usually used with trickle irrigation, has many horticultural benefits for summer vegetable crops, and black plastic controls most annual weeds. Mulch does not solve all the weed problems in the field, and creates new challenges for the grower. Clear plastic is used to obtain the greatest advantage in earliness, but weed control under clear plastic can be difficult and challenging. Although black plastic controls many weeds, **yellow nutsedge** can pierce black plastic and thrives in the mulched and trickle irrigated environment. Weed control at the planting holes is always an issue, even when using black plastic.

Growers new to the use of plastic often try to adapt weed control practices used in conventionally tilled fields to plastic mulch with less than satisfactory results. **Preplant incorporation of a residual herbicide prior to bedding and laying the plastic is NOT RECOMMENDED!** Forming the beds afterward pulls treated soil from between the rows and piles it on top of treated soil in the row. This creates a bed with an unknown higher rate of herbicide than intended incorporated more deeply than intended, and increases the chance of causing injury to the crop.

Weed control under plastic mulch and between the mulch must be considered separately. Apply herbicide to the soil surface under the mulch after bedding and before laying the plastic. Rely on condensation under the mulch to "activate" the herbicide. Fumigation injected through the trickle irrigation early preplant can provide excellent weed control unless the "wet edge" does not reach the sides of the mulch. Omitting the herbicide in fields scheduled for fumigation is NOT recommended.

The soil strips between the rows of plastic mulch should be treated with herbicides applied in bands on each side of the plastic. **The broadcast application of herbicides on the field after laying the plastic mulch is NOT RECOMMENDED!** Some products, usually considered non-residual postemergence herbicides, including glyphosate products, become residual herbicides on plastic and do not wash off easily in the rain. Residual herbicides can wash into planting holes at rates far above recommended and intended application rates. The average planting hole two inches in diameter has an area of about 3 square inches. If herbicide residue from one square foot of plastic (144 square inches) washes into the hole the rate is 144 divided by 3, or about 48 times higher than the intended rate! Crop injury can be severe and replanting cannot fix the problem.

Build a sprayer shielded on all four sides to apply labeled residual herbicides plus Gramoxone Max and nonionic surfactant. The sprayer should treat both sides of one strip of plastic mulch at the same time. Do NOT try to treat the soil strip from one piece of plastic to the next in one pass unless they were laid together with a multiple row mulch layer. No one can drive that straight. Treat from the vertical shoulders of the mulch to about two-thirds of the way across the soil strips. The rest of the soil will be treated when the next strip of mulch is sprayed. The small overlap in the middle of the soil strip is not important. Be sure the shields have "soft" bottom edges so they can touch the plastic without

SEE PLASTIC MULCH ON PAGE 3

Pest Notes

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

Wet Springs and Maggot Problems

✔ **Seed maggots (seed corn maggots):** Seeds attacked by these maggots may fail to sprout, or will appear very weak after they do sprout. Injury or damage is most likely to occur during cold, wet springs similar to weather that is currently affecting most of New Jersey. Also, fields that are near woods and fields that are rich in organic matter are more likely to have maggot problems than open fields (greater than ½ mile from woods) and fields of mineral soils. In the past few years, many fields with large-seed crops (pumpkins, corn, etc.) have had seed corn maggot losses of up to 40-50% and had to be replanted.

Seed treatments are available that are very effective against seed corn maggots. Special seed treatments containing chlorpyrifos (Lorsban), diazinon, permethrin, or imidacloprid have been especially effective against seed maggots in many vegetable research trials. Also, several seed treatments are available as planter-box treatments, which allow growers to apply treatments to their own seed. Diazinon and Lorsban may be labeled for at-plant and post-plant sprays in some vegetable crops, with the spray directed at the base of the plant. Always refer to the specific label for each crop for all directions, rates, restrictions and precautionary statements.

✔ **Root maggots (cabbage root maggots):** Closely related to seed corn maggots, the root maggots attack the small roots and rootlets of plants, destroying smaller roots and creating tunnels in larger roots. Plants become off-color, wilted, and look like they suffer from lack of water. Heavily attacked plants often die or appear to rot as disease organisms enter the root.

In many vegetable crops, diazinon and/or Lorsban are labeled for root maggot control (consult label for specific crops). These materials have proven to be superior to other treatments in various tests. Several research trials in the mid-Atlantic region have shown that imidacloprid (Admire 2F) at planting in the furrow for insects such as **flea beetles** and **aphids** will significantly reduce the maggot population.

✔ **Onion maggots:** Adults are active, and will be ovipositing on onions, scallions and leeks. Lorsban applied at-plant is labeled for control of onion maggots (in bulb onions only), and should still be effective against onion maggots throughout New Jersey; diazinon is labeled in all onions. Trigard ST seed treatment is very effective, but is available only as a commercially treated seed. The only treatment for use after planting is diazinon, directed in a 1-2 inch band around the bases of plants. Although this method of application will *not* improve on a good, well-placed at-planting treatment, it will help reduce damage caused by late-hatching maggots. Foliar sprays for adults (flies) are not very effective, and may actually cause increased resistance to soil insecticides as well as destroy natural enemies. ❑

Vegetable Weed Control

Bradley A. Majek, Ph.D., Specialist in Weed Science

✔ **Parsley:** Use Lorox 50DF to control most weeds in parsley. Apply to the soil surface immediately after seeding. Lorox requires rainfall before weeds emerge to make the herbicide available to the germination seeds. Irrigate if rainfall does not occur within a few days of application. *Consult the Commercial Production Recommendations for rates and additional information.*

✔ **Sweet Corn** - Early sweet corn that has emerged has been observed yellow or light green in color. The chlorosis may be uniform, or appear mottled on the plant. Cold weather is responsible for the injury. Corn cannot make chlorophyll when the temperature fails to climb above 65 to 70°F for an extended period. Herbicides are not responsible for the problem. Varietal differences to cold tolerance exist. The corn will turn green when the weather turns warm. ❑

Plastic Mulch from page 2

ripping it. This is important to prevent the spray from "bouncing off the edge of the plastic. Several layers of plastic (non-absorbing) burlap with the horizontal weave removed from the bottom few inches works well.

Residual and post emergence herbicides can be applied before and/or after planting, but do not use treated soil from between the rows to pack around plants when transplanting! Again, control of rate of residual herbicides is poor and crop injury may result.

Consult the *Commercial Vegetable Production Recommendations* for specific herbicides recommendation under and between plastic mulch for each crop. ❑

Vegetable Disease Update

Andy Wyenandt, Ph.D., Specialist in Vegetable Pathology and Wesley Kline, Ph.D., Cumberland County Agricultural Agent

✔ **Asparagus – Phytophthora crown and spear rot –** Cutting has started in some areas and in fields with low spots (poorly drained soils) or fields with a history of crown and/or spear rot apply Ridomil Gold 4E (mefenoxam, 4) at 1 pt/A over beds just before 1st harvest. For new plantings apply the same after planting seedlings or after crown covering. For more information please see *2005 New Jersey Commercial Vegetable Production Recommendations Guide*.

✔ **Cole crops – Downy Mildew and Alternaria –** Symptoms of Downy Mildew include purple to yellowish-brown spots on upper leaf surfaces. A grayish-white spore mass will develop and cover the underside of leaves under ideal temperatures (night temperatures of 46 to 61°F and day temperatures below 75°F. Downy mildew can kill young plants. Heavily infected leaves may drop providing entry points for bacterial infections (Black rot and Soft rot). Symptoms of Alternaria on infected leaves include small, expanding circular lesions with concentric rings that may have a 'shot-hole' appearance as lesions age. Heavily infected seedlings may result in damping-off. Control of Downy mildew and Alternaria begin with preventative fungicide applications. Use one of the following at the first sign of disease and continue every 7 to 10 days (Please refer to the pesticide table on page F17 of the *NJ Commercial Vegetable Production Recommendations* to determine which fungicide is labeled for each specific crop): Amistar (azoxystrobin, 11) at 2.0 to 5.0 oz 80 WDG/A (Alternaria only; labeled for use on leafy greens only), or Bravo, Echo, Equus (chlorothalonil, M4) at 1.5 pt 6F/A or OLF, or maneb (M2) at 1.5 to 2 lb 80WP/A or OLF, or Ridomil Gold Bravo (mefenoxam + chlorothalonil, 4 + M4) at 1.5 lb 76.5WP/A (14-day schedule), or Switch (cyprodinil, 9) at 11 to 14 oz 62.5WG/A (Alternaria only). For downy mildew only, apply Actigard (acibenzolar-S-methyl, P) at 1 oz 50WG/A (begin applications 7-10 days after thinning and re-apply every 7 days for a total of 4 applications per season.), or Aliette (fosletyl Al, 33) at 3 to 5 lb 80WDG/A (on 14-day schedule). For more information please see *2005 New Jersey Commercial Vegetable Production Recommendations Guide*.

✔ **Lettuce – Bottom Rot/Drop –** Spring lettuce season has started and growers should take precautions to help control Bottom rot (*Rhizoctonia*) and Lettuce drop (*Sclerotinia*) which may cause potential problems. For Bottom Rot, Endura 70W (boscalid, Group 7) at 8 to 11 oz/A, or Rovral 50WP (iprodione, 2) at 1.5 to 2 lb/A or OLF should be applied one week after transplanting or thinning and 10 and 20 days later. For Lettuce drop, the biological Contans 5.3WG at 2 to 4 lbs/A pre-plant can be incorporated at a depth of 1 to 2 inches; or Ronilan 50DF (vinclozolin, 2) at 1 to 2 lbs/A or OLF, or Rovral 50WP at 1.5 to 2 lb/A beginning one week after transplanting or thinning and again at 10 and 20 days later. For more information on control of Bottom rot and Lettuce drop and other important diseases of lettuce please see the *2005 New Jersey Commercial Vegetable Production Recommendations Guide*.

✔ **Spinach (Downy mildew and White rust) -** The use of Ridomil Gold (mefenoxam, 4) at 1 to 2 pt 4E/A or Ultra Flourish (mefenoxam, 4) at 2 to 4 pt 2E/A at planting for damping-off control will provide early season control. Beginning 2 to 3 weeks after emergence (and prior to symptom development), apply the following on a 7 to 10 day schedule (do not use if temperature is high). Actigard (acibenzolar-S-methyl, P) at 0.75 oz 50WG/A, or Amistar (azoxystrobin, Group 11) at 2 to 5 oz 80WDG/A, or OLF. For downy mildew control use a minimum of 4 oz of Amistar 80WDG/A and do not make more than one consecutive application. Rotate to one of the following fungicides: Aliette (fosetyl Al, 33) at 3 lb 80WDG/A, or Kocide (fixed copper, M1) at 2 lb 61DF/A (Copper containing fungicides may cause some phytotoxicity), or Ridomil Gold Copper (mefenoxam + copper, 4 + M1) at 2.5 lb 70WP/A (on 14-day schedule). For more information please see the *2005 New Jersey Commercial Vegetable Production Recommendations Guide*.

✔ **Tomato – Bacterial spot and speck –** Both bacterial diseases can cause serious problems in the field if infections begin in the greenhouse prior to transplanting. Symptoms of spot and speck look very similar on infected leaves. Lesions are small, circular, blackish-brown and with time develop a halo, or yellowing of tissue surrounding the lesion. As lesions develop they can coalesce (join together) and can cause premature death. Since sources for these diseases include weed hosts, volunteer plants and contaminated wood (benches or stakes) make sure production or holding areas are disinfested, weed free and clean prior to introducing transplants, and inspect all seedlings prior to holding and transplanting. Infections can occur on all parts of the tomato plant and can easily be spread during transplant trimming with contaminated equipment and by workers' hands. Tomato plants with suspected symptoms can be treated with streptomycin (Agri-Mycin 17, Agri-Strep, 25) at 1 lb/100 gallons, or 1.25 teaspoon per gallon prior to transplanting every 4 to 5 days. After transplanting apply Actigard (P) at 0.33 oz 50 WG/A, or fixed copper (M1) at 1 lb a.i./A *plus* a mancozeb (Dithane, Manex II, Manzate, Penncozeb, M3) at 1.5 lb 75WP or OLF, or ManKocide (M1 + M3) at 2.5 to 5.0 lb 61WP/A, or Cuprofix MZ (M1 + M3) at 1.75 to 7.25 lb 52.5 DF/A on a 7 day schedule. ❑

Recognizing and Controlling Important Fungal Diseases in Fresh-Market and Processing Tomatoes

Andy Wyenandt, Ph.D., Specialist in Vegetable Pathology

With transplanting beginning in the next week or so it's not too early to think about common fungal diseases in tomatoes such as **Septoria leaf spot**, **Early blight** and **Anthracnose fruit rot**. All three diseases are soil-borne and can lead to pre-mature defoliation and/or fruit rot. Interestingly, all three diseases are easily identified by the symptoms they produce on infected tomato plants.

Septoria leaf spot will only infect the foliage and stems of the tomato plant. Symptoms to scout for are small, circular lesions with a dark outer edge and brownish-tan center. Black spore producing bodies will develop in the center of these lesions. When scouting, look for Septoria leaf spot on the lower foliage of the tomato plant early in the season. The disease will work its way up the plant causing pre-mature defoliation. If left untreated Septoria leaf spot can cause 100% defoliation.

Early blight will affect the foliage, stems and fruit. Early blight will produce brown, concentric lesions on the foliage and stems that are much larger than the lesions produced by Septoria leaf spot. Early blight, like Septoria leaf spot can also cause severe defoliation. Early blight can also infect green and red fruit through the stem attachment. Lesions that develop on the fruit also produce brown, concentric rings.

Anthracnose fruit rot, or red fruit rot, can infect green fruit and foliage, although symptoms only appear on ripe fruit during the later stages of the growing season. Anthracnose lesions begin as slightly depressed circular lesions that enlarge. As lesions enlarge they become more flat and develop black, speck-like fruiting bodies in the center of the lesion.

Control of all three diseases should begin with a weekly preventative fungicide program which focuses on alternating fungicide chemistries. In fields in highland areas, not rotated away from tomatoes, and late planted fields, begin sprays shortly after transplanting. In all other areas, begin sprays when crown fruit reach one-third their final size. Begin a preventative fungicide program with chlorothalonil (Bravo, Equus, Echo, M5) at 2 to 3 pt 6F/A or Mancozeb (Dithane, Manzate, Manex II, Penncozeb, M3) at 3 lb 80WP/A and alternate with a strobilurin (Amistar, Flint, Cabrio, (11) or Tanos, 11 + 27) or Endura (boscalid, 7) at 2.5 to 3.5 oz 70W/A. Strobilurin fungicides have a maximum-season usage and should not be mixed together in a single application or used in back-to-back applications singularly or together. The alternation of fungicide chemistry helps to reduce the potential for the build-up of fungicide resistance. Remember that any fungicide maintenance program should begin with regular scouting. Scouting on a regular basis will help you stay on top of potential problems and may reduce fungicide use. For more information on controlling important diseases of tomato please see the *2005 New Jersey Commercial Vegetable Production Recommendations Guide*. ❑

Vegetable Diseases of the Week

Andy Wyenandt, Ph.D., Specialist in Vegetable Pathology

Anthracnose fruit rot of tomato.

Septoria leaf spot of tomato.

Early blight causing rot in ripe tomato fruit

Tomato and Potato Disease Forecasting Reports for 2005

Andy Wyenandt, Ph.D., Specialist in Vegetable Pathology

Tomato and Potato Disease Forecasting Reports will start the 1st week of May (next week!). Like in years' past, the Tomato Report will track DSV accumulation for the timely control of Early blight, Septoria leaf spot and Anthracnose fruit rot. The Potato report will track DSV accumulation and conditions favorable for Late blight and Early blight development. **If you received 2004 reports, you are already on our list to receive reports in 2005!** Anyone interested in receiving these weekly reports either by FAX or email should contact Andy Wyenandt at (856) 455-3100 ext. 4144 or by email at wyenandt@ aesop.rutgers.edu. ❑

Strawberry Update

Peter Probasco, Salem County Agricultural Agent

Chandler fields are in full bloom now and should be sprayed with a fungicide for **gray mold**. **Aphids** are present in most fields and may need a spray with either Lannate, Thionex, Danitol, Provado included with your fungicides. Try to spray late in the day when bees are returning to their hives. Most fields came through the winter in good shape. **Vetch weeds** are a problem in some fields but they can be sprayed back with Stinger 3A.

Our strawberry variety trial shows a number of very good selections that may be released this year. We have demonstrated that New Jersey is capable of growing strawberry tips in the greenhouse for growers, so we should be able to readily provide new varieties now to growers. Our present season is only 3 weeks long, but with the addition of new varieties and Ovation, we should be able to stretch it to 5 weeks. ❑

Weekly Weather Summary

Keith Arnesen, Ph.D., Agricultural Meteorologist

Temperatures averaged above normal central and south and much above normal north, averaging 57 degrees north, 56 degrees central and 57 degrees south. Extremes were 89 degrees at Toms River on the 21st, and 33 degrees at Long Branch and Pomona on the 23rd and 25th. Weekly rainfall averaged 0.57 inches north, 0.25 inches central, and 0.19 inches south. The heaviest 24 hour total reported was 0.76 inches at Belvidere on the 23rd to 24th. Estimated soil moisture, in percent of field capacity, this past week averaged 74 percent north, 69 percent central and 48 percent south. Four inch soil temperatures averaged 56 degrees north, 54 degrees central and 55 degrees south.

Weather Summary for the Week Ending 8 am Monday 4/25/05

	RAINFALL			TEMPERATURE				GDD BASE50		MON
WEATHER STATIONS	WEEK	TOTAL	DEP	MX	MN	AVG	DEP	TOT	DEP	%FC
BELVIDERE BRIDGE	1.26	8.40	1.27	84	36	56.	3	108	93	99
CANOE BROOK	.27	8.29	.40	87	36	60.	8	133	124	73
CHARLOTTEBURG	.53	10.19	2.47	81	35	55.	5	84	84	74
FLEMINGTON	.52	9.75	2.20	86	36	57.	4	98	86	76
NEWTON	.29	8.60	1.75	82	36	56.	5	95	93	73
FREEHOLD	.63	8.68	1.16	88	37	58.	4	119	93	84
LONG BRANCH	.04	6.99	-.79	79	33	48.	-5	34	16	60
NEW BRUNSWICK	.09	7.91	.73	87	37	58.	3	109	70	77
TOMS RIVER	.31	7.32	-.25	89	37	56.	2	84	64	67
TRENTON	.16	7.38	.56	85	40	58.	2	113	62	61
CAPE MAY COURT HOUSE	.15	5.88	-.74	83	40	56.	1	67	26	36
DOWNSTOWN	.18	7.29	.47	86	37	57.	1	102	47	52
GLASSBORO	.33	8.53	1.35	86	41	58.	2	126	75	65
HAMMONTON	.08	7.23	.26	87	36	57.	2	112	65	37
POMONA	.17	7.05	.35	86	33	56.	2	78	48	51
SEABROOK	.22	7.96	1.90	87	41	59.	3	158	101	55
SOUTH HARRISON	.21	8.12	1.37	85	40	59	NA	137	NA	NA

WES KLINE — GDD BASE 40 PINEY HOLLOW Last Week* 45 (Ending 4/18/05) This Week 117 (Ending 4/25/05)

*February total base 40 equals 32 units

NJ AGRICULTURAL EXPERIMENT STATION
RUTGERS
COOPERATIVE RESEARCH & EXTENSION
Plant & Pest Advisory
Rutgers' Cook College
18 College Farm Road
New Brunswick, N.J. 08901-8551

FIRST CLASS
POSTAGE PAID
PERMIT #576
MILLTOWN, NJ 08850

PLANT & PEST ADVISORY
VEGETABLE CROPS EDITION CONTRIBUTORS

Rutgers Cooperative Research & Extension (RCRE) Specialists
Gerald M. Ghidiu, Ph.D., Vegetable Entomology
George Hamilton, Ph.D., Pest Management
Joseph R. Heckman, Ph.D., Soil Fertility
Bradley A. Majek, Ph.D., Weed Science
Andy Wyenandt, Ph.D., Vegetable Pathology

RCRE County Agricultural Agents
Atlantic, Richard W. VanVranken (609-625-0056)
Burlington, Raymond J. Samulis (609-265-5050)
Cape May, Russell Blair (609-465-5115)
Cumberland, Wesley Kline, Ph.D. (856-451-2800)
Gloucester, Michelle Infante-Casella (856-307-6450)
Hunterdon, Winfred P. Cowgill, Jr. (908-788-1338)
Middlesex, William T. Hlubik (732-745-3443)
Monmouth, Bill Sciarappa, Ph.D. (732-431-7260)
Morris, Peter J. Nitzsche (973-285-8300)
Passaic, Elaine F. Barbour, Agric. Assistant (973-305-5742)
Salem, Peter R. Probasco (856-769-0090)
Warren, William H. Tietjen (908-475-6505)

Vegetable IPM Program (732-932-9802)
Joseph Ingerson-Mahar, Vegetable IPM Coordinator
Kristian E. Holmstrom, IPM Program Associate

Newsletter Production
Jack Rabin, Associate Director for Farm Services, NJAES
Cindy Rovins, Agricultural Communications Editor

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