Current Situation…

Jim Willmott, Rutgers Cooperative Research & Extension.

Relatively warm temperatures combined with crowded Easter and spring garden crops have promoted stretch and favored pest troubles. Strive to space crops and remove hanging baskets promptly as sales progress. Also consider switching from ammonium to nitrate based fertilizers such as 15-0-15 when appropriate for media pH and preferences of specific crops.

*Pythium* and *Thielaviopsis* were found rotting roots of vinca. Foliar and root symptoms were so similar that it was impossible to differentiate without microscopic observation of the characteristic spores of each.

Occasionally, but not always, *Thielaviopsis* spores become so abundant that roots blacken and the disease lives up to its name – black root rot. We frequently see this on petunias and calibrachoas. *Pythium* was also found on dahlia and New Guinea impatiens and *Thielaviopsis* was also active on clematis.

New Guinea impatiens were found with stunted, distorted and mottled foliage. The plants tested positive for impatiens necrotic spot virus (INSV) despite the rather uncharacteristic symptoms. Usually symptoms include necrotic spots and vein blackening. Rouge out infected plants and monitor and manage the thrips vector to prevent spread of the virus.

*Pythium* was also found on dahlia and New Guinea impatiens and *Thielaviopsis* was also active on clematis.

Chlorosis or yellowing of young vinca plugs with Pythium root rot. Photo Jim Willmott

Symptoms of distorted foliage, stunting and mottling were caused by INSV. Photo Jim Willmott

Powdery mildews have been observed on verbena and dahlia. In previous seasons we have frequently seen troubles on gerbera daisy and pansy. Many different genera and species of fungi cause these diseases and they are often specific...
Damage to this New Guinea impatiens was caused by cyclamen mites. Photo Jim Willmott

for certain plant species and even cultivars. Periods of high relative humidity favor disease outbreaks. Early detection is critical, but not easy since symptoms and signs are initially subtle. Look for small areas of white powdery fungal growth, which can be found on upper or lower leaf surfaces. On some plants, small discolored (either chlorotic or darkened) patches can be seen before the powdery fungal growth can be easily observed. To manage, rotate a strobilurin fungicide (such as Compass, Cygnus, or Heritage) with a DMI fungicide (such as Strike, Systhane, or Terraguard), a thiophanate-methyl material (such as Cleary’s 3336 or OHP 6672), or a chlorothalonil material (such as Daconil or Echo). (Note that Systhane and Cygnus are not registered for use on Long Island.)

Cyclamen mites were found damaging New Guinea impatiens. Immature stages and adults feed on newly developing tissue often causing distorted and downward cupping leaves. In the photo below, drying increased damage. Not all miticides are labeled or effective for cyclamen mites. Of those labeled, translaminar products are superior since they are able to penetrate through leaf tissue into tightly closed leaf buds and cupped leaves where cyclamen mites feed. Judo, a recently labeled miticide/insecticide (Judo is *not* labeled in NY), is translaminar and highly effective on cyclamen as well as broad and spider mites. The manufacturer, however, cautions about use on impatiens and geraniums; alstroemeria and some varieties of roses are also sensitive.

Avid and Pylon are also translaminar options for cyclamen mite control. Kelthane and Thionex (older labels) are also labeled; be sure coverage is thorough. Newer Thionex labels now omit uses on greenhouse ornamentals.

Be alert for developing populations of aphids and spider mites. Heavy aphid infestations were detected on ipomoea, fuchsia and ivy geranium. Spider mites were found on ivy and zonal geraniums. Symptoms of spider mite damage on zonals are somewhat atypical; look for brown spotting and yellowing, sometimes with distortion. Turn leaves over to check for the mites and associated edema.

Thrips populations and damage have remained low in most areas. Light feeding damage was seen on gerbera daisy, brachycome flowers, vinca flowers, petunia foliage, verbena foliage and flowers, and phlox foliage and flowers. When thrips are present, treat with a labeled insecticide and, while it can be an arduous task, removing flowers where possible will help reduce the population.

Fungus gnats and shorefly populations are moderate to heavy in most greenhouses. Growers have less concern for garden plants since they are will be planted outdoors Young plants however, can be seriously damaged if fungus gnat levels are high. Fungus gnats were recently observed feeding on vinca (Catharanthus) roots, and geraniums are typically prone to fungus gnat damage. However, if either *Pythium* or *Thielaviopsis* are active, intervention may be warranted to bring populations down and limit their spread.

With the recent wet weather, be on the lookout for *Botrytis*. Watch for water soaked areas on foliage or stems or blighted flowers that develop the characteristic gray mold. Remove heavily infested plant parts, keep humidity low, and treat with an appropriate fungicide such as Decree, Daconil, or iprodiones such as Chipco 26019, Chipco 26019N/G, or 26GT.
Puny Calibrachoas?
It May be Thielaviopsis

Margery Daughtrey, Senior Extension Associate, Cornell University Department of Plant Pathology LI Horticultural Research & Extension Center

Many growers blame themselves when they notice scattered pockets of sub-standard pansies, or stunted, yellowed calibrachoas here and there across the bench. But not all problems in the crop are the grower’s fault: sometimes there is a pathogen to blame! It is important to remember that cultural problems tend to be fairly uniformly distributed in the greenhouse, affecting all of one cultivar or species, or even multiple species of plants, in a similar way. Contagious disease problems are more capricious, and will affect a plant here, a plant there, or a cluster of plants, usually within a single species, in a more random distribution. The infected individuals will show symptoms of imperfect health that make them stand out from their healthy green neighbors. Poorly distributed lime in the growing mix is one of the exceptions to the pattern rule: this cultural problem can mimic the distribution of a contagious disease.

One contagious disease that is often mistaken for a cultural problem is Thielaviopsis root rot. If the root system is attacked aggressively, the symptoms of black root rot are pretty obvious, and a grower who checks the roots of a stunted, purplish or yellowish plant could make an accurate diagnosis. The roots will be stunted and show a dark brown or black discoloration. (With more moderate levels of disease, it may help to rinse off the root system to better see the blackening of root tips caused by *Thielaviopsis*—these blackened areas will not slough off as easily as they would were *Pythium* the problem). In some cases, diagnosis can be challenging: the *Thielaviopsis* fungus may be present and having an impact on the top growth even though the root system is not dramatically blackened. In these instances, only microscopic examination in a laboratory will provide confirming evidence of *Thielaviopsis* attack on a plant. Because the fungus can produce toxins that affect plant growth, the root system does not have to be conspicuously stunted in order for the plants to look unhealthy.

Top photo shows blackened roots of a pansy infected with *Thielaviopsis basicola* the cause of black root rot. Bottom photo shows the chlamydospores under high power magnification. Photos Margery Daughtrey

The good thing about Thielaviopsis root rot is that it is not a general pestilence in the greenhouse. The fungus *Thielaviopsis basicola* will harm relatively few of your crops, but it makes up for its restricted diet by consuming large quantities of the plants it favors! Pansies, violas, calibrachoas and vincas are its most common hosts. We have occasionally seen Thielaviopsis root rot on diascia, petunia, poinsettia, verbena and fuchsia. Thielaviopsis disease problems tend to continue in a greenhouse operation once they begin, as the fungus is very well equipped to survive as resistant chlamydospores in wood benching or in soil floors. Re-use of flats is a practice that greatly aids and abets the *Thielaviopsis* fungus: the poor quality plants that aren’t sold are often the ones whose flats are saved for use next year. Without a powerful rinsing to remove organic debris and a
disinfestant dip treatment, these flats will spread contagion to next year’s pansy crop. Following an outbreak of Thielaviopsis root rot, it is best not to re-use flats. If necessary, clean them and use them for a crop other than those listed as hosts of *Thielaviopsis*.

Management of the problem includes plant choice: sometimes you can choose to grow cultivars that are not as likely to be harmed by this disease. Just as some species never seem to get Thielaviopsis root rot, many cultivars also possess natural disease resistance. I am not aware of any evidence that pansies vary in susceptibility, but we have observed wide variation in calibrachoas’ susceptibility to Thielaviopsis root rot. In a trial last year, Cabaret Red, Cabaret Cherry Rose, Cabaret Apricot, Cabaret White, Cabaret Scarlet, Cabaret Purple, Superbells White, Superbells Pink Kiss, Superbells Trailing Rose, Superbells Blue, Million Bells Cherry Pink, and Million Bells Crackling Fire were all much less susceptible to Thielaviopsis root rot than Million Bells Terra Cotta, whose beauty is matched by its sensitivity to this disease. By noting problem plants and avoiding growing them in future years, the most serious *Thielaviopsis* problems can be side-stepped. We also have noted that some cultivars will have some growth of the fungus on their roots even though the plants show no symptoms after inoculation. This means that there are some plants that can introduce the fungus to your greenhouse without themselves being particularly harmed by it. If this inoculum is inadvertently moved to susceptible plants, disease symptoms will appear. Fungus gnats are known to be one of the ways that *Thielaviopsis* can be moved around your greenhouse, so their control will be another aspect of a careful Thielaviopsis root rot management program.

Mix and fertilizer choices will also have an effect. In our trials last year, symptoms were somewhat reduced by a bark mix as compared to a peat mix, and were further reduced by using an acid-reacting, ammonium-based fertilizer as opposed to a calcium nitrate source. We attributed this disease reduction to a pH effect: lower pH will help the plant and suppress the fungus. Aim to keep pH well below 6.0 for best results; pH 4.8 will prevent disease development in field soil. Many calibrachoas are prone to iron deficiency at high pH, so lowering their growing pH can help reduce iron chlorosis as well as disease symptoms.

Warm growing temperatures also help to curb Thielaviopsis disease (55-61F is the optimum for the fungus). The most challenging time for the grower of Thielaviopsis-prone crops is the early part of the production season, when conditions are colder and calcium nitrate sources are being used to avoid ammonium toxicity. For chemical suppression of *Thielaviopsis*, treatment with thiophanate-methyl materials (such as Cleary’s 3336, OHP 6672 and Banrot) is an important mainstay: a drench with 3336 completely prevented any symptoms or signs of root colonization in inoculated plants in our experiment last spring. PlantShield, Alude and Terraguard treatments were all helpful for reducing stunting from *Thielaviopsis*, but were not as effective as 3336; they would be good rotational partners with a thiophanate-methyl material. Base your Thielaviopsis root rot control on cultivar choice, sanitation, and cultural management, and utilize appropriate fungicides on the highly susceptible crops at times when conditions are favorable for disease.
Tips for Yellow Tips
Karen Kackley, J.R. Peters Laboratory

Many growers are seeing yellow growing tips on members of the “petunia group” (e.g. petunia, calibrachoa, bacopa, scaevola, nemesia, diascia, and pansy). The most usual cause of yellow tips on these plants is iron deficiency due to high pH in the growing medium. Members of the “petunia group” grow best when the pH in the medium is between 5.4-5.8. At higher pH levels, iron and other micronutrients become insoluble and unavailable to plants.

When yellow tips are detected, the first step should be to determine the pH of the growing medium. Do this by sending a sample to a horticultural testing laboratory or by doing in-house testing. The advantage of a laboratory test is it provides information on the levels of all the nutrients in the media in addition to pH and soluble salts. It is important to remember that while iron deficiency due to high media pH is the most common cause of yellow tips, it is not the only cause. High phosphorous, low iron and imbalances with manganese, zinc and copper can also result in iron deficiency. If high pH is detected, efforts should be directed at correcting this situation. One of the most common causes of high pH in the growing medium is the use of high alkalinity water. A complete laboratory water analysis will determine the level of alkalinity in water and supply the information needed to determine the amount of acid required to correct the problem.

In the meantime, growers may wish to use corrective iron drenches. Iron chelates (Sprint 330, iron –DTPA or Sprint 138, iron-EDDHA) or iron sulfate drenches may be applied at rates of 4 to 6 oz. per 100 gallons. It is best to make applications of iron in early morning and to lightly rinse it from the foliage with tap water. Foliar applications may be made at similar rates but there is more risk of injury than with drenches. A test spray should be tried to look for potential injury before doing large scale foliar applications. Most plants should green up within 7-10 days after application. If plants do not respond, the grower may need to increase their acid injection rate or switch to more acidic fertilizer. Iron can be reapplied in 3 or 4 weeks if needed.

The J.R. Peters Company has introduced Jack’s Professional Petunia FeED 20-3-19 with double the iron of a peat-lite formula and three chelate sources. This product prevents yellow tips with regular use. 
(The author can be contacted at: kkackley@jrpeterson.com.)
Coleus Downy Mildew Strikes Again
Nora Catlin, Cornell Cooperative Extension of Suffolk County

Coleus downy mildew, first observed last season, has been seen at a few locations so far this spring. The causal agent of this disease is a species of *Peronospora*, but a different species than the *Peronospora lamii* known to cause downy mildew on some plants in the mint family such as lamium and salvia.

Little is known about this newly discovered coleus disease, but it can be expected to behave similarly to downy mildews that affect other crops. Downy mildew fungi typically develop during cool and wet conditions with high humidity. It is likely that the upcoming hot and dry weather conditions will slow the disease where it is present, but this is not a certainty. Extended periods of leaf wetness also favor the development of the disease since a surface layer of water is necessary for the new spores of the pathogen to germinate and cause a new infection. The disease is spread by air currents and splashing water, and some downy mildews can also be transmitted by seed, but this mode of transmission has not been confirmed for this particular downy mildew.

Watch for small discolored or dead areas, round or angular in shape, on the leaf surfaces, and a gray-brown fuzz of mildew growth on the undersides of the leaves. (See: http://www.hort.cornell.edu/greenhouse/pestsdis/gallery/index.html.) The necrotic areas or flecks will appear after the plant tissue has been killed by the mildew and have been observed most often when the plant has been in a higher humidity environment (a favorite environment for downy mildew) for a period of time. In severe cases, the necrotic areas will be more extensive and can result in the twisting of leaves, or leaf drop. Often the mildew fuzz can be observed on the undersides of leaves when no apparent symptoms are found on the upper leaf surface.

All coleus varieties are assumed to be susceptible, though the light green varieties seem to be more affected by the disease than the darker reds. Some of the cultivars now known to be susceptible to downy mildew are Aurora Mocha, Aurora Peach, Black Dragon, Copper, Dapple Apple, Daffy, Juliet Quartermain, Kiwi Fern, Kong, Midnight, Needlepoint, Pineapple, Sun Coleus, Red Velvet, The Line, Wizard Jade and Wizard Rose. Downy mildews are usually quite particular in their choice of hosts, and tend to infect plants that are at least within the same family—so it can be assumed that any plants in the same family as coleus are potentially at risk until more information is gathered. Coleus belongs to the mint family, Lamiaceae, which also includes bee balm, bells of Ireland, basil, lavender, mint, oregano, marjoram, rosemary, salvia, plectranthus, thyme, and others. Research conducted by Margery Daughtrey at the Long Island Horticulture Research and Extension Center has indicated that this coleus downy mildew infected inoculated basil plants but did not infect ‘Mystic Spires blue’ salvia (*Salvia farinacea x longispicata*) or *Salvia greggi* ‘Navajo Pink’. However, until more research has been conducted, you should be cautious and consider that there is a chance that this downy mildew will be able to infect all plants in the mint family.

Carefully inspect your incoming plants and have any suspicious plants sent to a lab for diagnosis, or place a few leaves in a sealed bag with a moistened paper towel and watch for the telltale gray-brown sporulation on the undersides of the leaves (a well lighted area and a hand lens might be necessary). For control, remove and dispose
of all parts of any severely affected plants – plants with large dead patches, twisted leaves, or leaf drop – since these will be sources of inoculum for other plants. Since downy mildew is fairly host specific, you can safely replant into the pot of a discarded plant, so long as you don’t replant with a plant in the mint family. Avoid giving the downy mildew a good environment for growth by managing the humidity in the greenhouse. Treat with appropriate fungicides on a weekly rotation. Apply an appropriate systemic such as Aliette, Stature DM (newly registered in NY), or a strobilurin fungicide (Compass or Heritage), and rotate the systemic with a mancozeb material such as Protect or Dithane, or a copper material.

Sporulating downy mildew on lower leaf surfaces are easy to overlook. Carefully inspect lower leaf surfaces of plants that show characteristic brown spots on upper surfaces. Photo Margery Daughtrey

New England Greenhouse Conference Program

Mark your calendar for the New England Greenhouse Conference, which will be held this year from November 1 to November 3rd at the DCU Centre (formerly the Centrum Center) in Worcester, MA. The first day, November 1st, features six pre-conference workshops and short courses on such topics as plant growth regulators, disease diagnostics, greenhouse pest management, perennial production, plant nutrition and retail garden center marketing. The trade show will kick off on the second day with over 170 exhibitors of exciting new plants and hard goods. “I look forward to the trade show at every New England Greenhouse Conference.” (from 2004 conference evaluation)

The second and third days feature several consecutive tracks of educational programs and trade show, all to help your business grow and prosper. Educational sessions focusing on greenhouse production, pest management, retail garden centers and business management, and energy will be featured on Tuesday, November 2nd. You won’t want to miss the popular “Garden Center Idea Exchange” in the evening that will be moderated by Bill Calkins, Managing Editor of “Green Profit” magazine. Greenhouse management, pest management, alternative crops (including cut flower production and organic greenhouse production), marketing, and perennials will be featured on Friday, November 3rd. There will be over 40 educational workshops from which to choose, featuring respected industry speakers over this 3-day educational conference.

Visit: http://www.negreenhouse.org or contact Cindy Delaney, 1 Main Street, No. 36, Winooski, VT 05404 Phone: 802-655-7769 Fax: 802-655-6098 Email: info@delaneymeetingevent.com

Don’t confuse these spots on coleus with downy mildew! These were caused by INSV. To differentiate between downy mildew, check lower leaf surfaces for sporulation. Photo Jim Willmott
Fungus gnat damage to vinca often causes curling of leaves.

Aphid cast skins often give away infestations of immature stages that usually blend in with foliage.

Rutgers IPM Program Associate Steve Rettke holds a healthy lobelia on right and an INSV infected plant on the left. The diseased plants were about ¼ of the size of healthy plants and with little to no flowers.

Photos Jim Willmott

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