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Abundance of *Sclerotinia homoeocarpa* in the thatch and soil on organic and conventional golf courses

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Sclerotinia homoeocarpa causes the most economically damaging disease on cool-season turfgrasses: dollar spot. The life cycle of this pathogen is poorly understood. Past reports have hypothesized that *S. homoeocarpa* overwinters as mycelia or stromata in leaf tissue and plant debris. One recent study cultured *S. homoeocarpa* from 80–100% of toothpicks inserted in the thatch layer of an infection center, but not from toothpicks inserted in the soil. Therefore, we decided to compare the abundance of *S. homoeocarpa* isolated from the thatch and soil from organic and conventional golf courses. We collected samples from three management areas (putting greens, fairways, and roughs) on three golf courses (one organic and two conventional) in Massachusetts in the spring and fall of 2014 and from a fairway and a putting green at the Joseph Troll Turfgrass Research Center in Massachusetts in 2015. We used quantitative PCR to estimate the amount of detectable *S. homoeocarpa* using species-specific primers. There were no significant differences in the amount of fungus detected among management areas or golf courses. However, we found there was highly significantly more *S. homoeocarpa* detected in the thatch layer (0–21.13 pg/μl) than the soil (0–0.805 pg/μl) in all samples. This result may have important implications for future studies aimed at quantifying this pathogen and for developing new management strategies aimed at reducing *S. homoeocarpa* inoculum.

Novel PCR primers for detecting bacterial rot pathogens of onion

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Bacterial rots of onion are a serious problem in New York State. Growers sometimes sustain losses up to 40%. Numerous bacteria have been implicated as bulb-rotting pathogens, with symptoms ranging from mild discoloration of a single internal scale to maceration of the entire bulb. Mixed infections of a single bulb are common, and bulb symptoms are not typically distinct enough to implicate which bacteria are responsible for symptom development. In New York State, three groups of onion-pathogenic bacteria are problematic: bacteria of the *Burkholderia cepacia* complex and *Burkholderia gladioli*, *Pantoea ananatis*, and strains of the *Enterobacter cloacae* complex. To facilitate detection of specific bacterial pathogens of onion, we leveraged available genome sequences to design specific PCR primer pairs to amplify DNA from each of these groups of bacteria. Primers were validated against dozens of target strains (and closely related non-target organisms) collected from onions and other sources in New York and elsewhere. The primers detected bacteria in pure and mixed cultures by visualization of single, discrete bands in agarose gels. The novel primer pairs have proven highly useful in identifying pathogens isolated from symptomatic bulbs submitted to the laboratory.

Tetracycline resistance genes in epiphytic bacteria collected from Pennsylvania stone fruit orchards

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In 2012 and 2013, 648 isolates of epiphytic bacteria were collected from 8 commercial stone fruit orchards in PA. These bacteria were identified and screened for the incidence of tetracycline resistance genes, *tetA*, *tetB*, and *tetC*. The association of management factors, including oxytetracycline use, oxytetracycline application method (e.g., alternate row middle versus complete application), and tree age, with the incidence of tetracycline resistance genes was evaluated. A total of eight bacterial genera were identified and included *Pantoea* (39.8%), *Xanthomonas* (31.9%), *Pseudomonas* (15.7%), *Bacillus* (6.3%), *Curtobacterium* (2.9%), *Staphylococcus* (2.6%), *Fronthabactans* (0.6%), and *Rahnella* (0.3%). Tetracycline resistance genes, *tetA*, *tetB*, and *tetC*, were found in five of the eight sampled orchards. *TetB* was most commonly associated with *Pantoea* spp. while *tetC* was most often found in *Pseudomonas* spp. The incidence of tetracycline resistance genes significantly differed among the sampled orchards. The number of oxytetracycline applications made in the year of and in the year prior to sample collection was not significantly associated with the incidence of resistance genes, *tetA*, *tetB*, and *tetC*; however, tree age and oxytetracycline application method were. A greater percentage of tetracycline resistance genes were recovered from old trees compared to young trees as well as from trees that had been sprayed with the alternate row middle method.

Search for molecular markers in potato germplasm for PTNRD expression

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Potato tuber necrotic ringspot disease (PTNRD) is a tuber deformity associated with infections by the tuber necrotic strain of potato virus Y (PVY^{NTN}). It negatively impacts tuber quality, reduces trade opportunities, and poses a serious threat to potato seed and commercial production worldwide. Recent surveys indicate that PVY^{NTN} now predominates in Europe and is on the rise in the U.S.A. Our research goal is aimed at developing reliable molecular markers that will allow breeders to rapidly and economically screen early selections to eliminate PTNRD-susceptible clones. The cultivars 'Waneta' and 'Pike' express severe and mild PTNRD symptoms, respectively, when infected with PVY^{NTN} isolate NY090029. An F1 Waneta x Pike population is being used to map the genes controlling PTNRD expression. Over 200 F1 progeny were grown in the greenhouse and inoculated with PVY^{NTN} isolate NY090029 at the 8-10 leaf stage. Foliar symptom type and severity were monitored for 10 weeks; at maturity, tubers were harvested and evaluated for PTNRD expression. The progeny segregated for type of foliar symptoms and PTNRD expression with 99%, 39%, and 14% of the clones expressing foliar mosaic, veinlet-necrosis, and foliar-necrosis symptoms, respectively. Tubers harvested from 40% of the clones expressed PTNRD. DNA was extracted from each clone and genotyped at 8303 SNP loci. After filtering, 1553 high quality polymorphic SNP markers are being used for linkage mapping using TetraploidMap for Windows.

Potential use of GRAS compounds for the control of lettuce bacterial leaf spot and varnish spot

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Over the past decades, numerous studies have reported that several GRAS (Generally Recognized as Safe) compounds with antimicrobial activity show potential to control plant diseases. Bacterial leaf spot (*Xanthomonas campestris* pv. *vitiensis*) and varnish spot (*Pseudomonas cichorii*) are economically important diseases of commercial lettuce (*Lactuca sativa*) production in Canada and no chemicals are registered to control bacterial diseases in this crop. Consequently, control of bacterial leaf spot and varnish spot relies on cultural practices including good soil drainage and air movement through crop canopy. However, cultural practices are not always sufficient to effectively control the diseases. The objectives of the study were (1) to test different GRAS compounds (potassium sorbate, sodium benzoate, sodium bicarbonate, sodium carbonate, and sodium metabisulfite) for their antibacterial activity against *X. campestris* pv. *vitiensis* and *P. cichorii* and (2) to test their efficacy to control varnish spot. Determination of antibacterial activity of the salts was carried out using standard procedures in liquid medium. Efficacy of salts to control varnish spot was determined on lettuce plants grown in greenhouse. The results obtained showed that sodium bicarbonate, sodium carbonate, and sodium metabisulfite were particularly toxic to both bacteria while potassium sorbate and sodium benzoate were toxic to a lesser extent. Applied on lettuce plants inoculated with *P. cichorii*, only potassium sorbate and sodium benzoate reduced significantly varnish spot development but did not allow complete control of the disease.

Effect of nanoparticles of CuO on Fusarium wilt of watermelon

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Nanoparticles (NP) of Cu, Mn, Si, Ti, and Zn oxides were applied foliarly and as a root drench (100 or 1000 mg/l) to watermelons to determine their effect on growth and Fusarium wilt. Half of transplants were inoculated with 50 ml of 50,000 spores/ml of *Fusarium oxysporum* f. sp. *nivuem* (FON). Disease progress curve was computed and plants tops were weighed. Roots and leaves were acid-digested for elemental composition. Nanoparticles of CuO and TiO applied as a root drench at 100 ppm reduced the AUDPC, but only plants treated with NP of CuO had more biomass. Only Cu was increased in the leaves of non-inoculated plants treated foliarly with both rates of NP CuO. Another similar experiment was conducted where NP of Cu, Mn, Si, Ti, and Zn oxides were compared to the bulked oxide equivalents. When applied foliarly, only NP of CuO reduced the AUDPC. In these studies, no treatment affected fresh weights. NP of CuO were compared to the bulked CuO equivalent, Kocide 2000, a Cu-octanoate, or no treatment in field plots. Seedlings were exposed to the treatments twice in the greenhouse before field transplanting. Seedlings were inoculated with spore suspension. Field plots exhibited very low levels of disease and there was no difference among treatments. However, yield did differ among treatments. Plots receiving NP of CuO had more fruit yield than the controls. Digests of the fruit flesh did not show any differences among the treatments for Ca, Cu, Fe, Mn, P, S, Si or Zn. NP of CuO may have value in disease management.

Development of species-specific PCR tests for detection and quantification of *Meloidogyne hapla*

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The Northern root-knot nematode, *Meloidogyne hapla*, is a significant soilborne pathogen of potatoes and other vegetables grown in the United States and is common within New York State. Effective management of plant-parasitic nematodes relies on the accurate identification and timely quantification of pathogen populations prior to planting. Prediction of damage from soilborne diseases may be substantially improved by the provision and adoption of pre-plant soil tests which utilize quantitative PCR (qPCR) techniques to target DNA sequences specific to the pathogen of interest. Here, PCR primers designed to target unique regions of an effector gene 16D10 in *M. hapla* were developed and assayed for specificity against thirteen plant-parasitic nematodes using qualitative PCR. The primers developed in this study were shown to be highly specific to *M. hapla*. These primers will be utilized in future qPCR tests for quantification of nematode population densities in soil and to assess the risk of crop damage or loss due to *M. hapla*.

Detection and characterization of *Dickeya* species in the outbreak of blackleg disease of potato in Maine

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An outbreak of blackleg of potato (*Solanum tuberosum*) occurred in Maine, 2015, which also affected some other states due to seed shipment. In order to detect and identify the pathogen, potato plants with typical blackleg symptom were collected, including 458 samples from Maine, and 55 from other states. Basal stems of infected potato plants were cut into two-millimeter segments and surface disinfested, which was further chopped into small pieces in a sterile water (700 µl per segment) to release bacterial cells from the tissue. The bacterial suspension was collected for tuber inoculation, bacterial isolation, and detection. The suspension was plated on crystal violet polypectate agar for the selection of *Pectobacterium* and *Dickeya* spp. Bacterial DNA was extracted from the pure culture of selected isolates. Polymerase chain reaction was performed using primers ADE-f/ADE-r that are specific to *Dickeya* spp. and PECf/PECr that are specific to *Pectobacterium* spp. To confirm the pathogenicity, bacterial isolates were cultured in polypectate enrichment broth and incubated for 48 h at 28°C, and inoculated on a potato tuber block, and incubated 28°C. Necrotic lesions were observed 48 hours after inoculation. Among the plant samples, 40.9% were *Dickeya* positive with the rest as *Pectobacterium* spp. Among Maine's samples, 37.2% were *Dickeya* positive. Based on molecular analysis, *Dickeya dianthicola* was identified, although there might be more species involved.

Management of Stemphylium leaf blight of onion with fungicides in New York

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Stemphylium leaf blight (SLB) caused by *Stemphylium vesicarium* has emerged as an aggressive leaf disease of onion in New York. Previous results indicated that chlorothalonil (FRAC M5), mancozeb (M3) and iprodione (2) had no activity against SLB, and efficacy of pyrimethanil (Scala, 9) was variable. In 2015, a small-plot replicated field trial was conducted in a commercial field of muck-grown yellow direct seeded onions to evaluate efficacy of selected fungicides for SLB control. Highest label rates of fungicides with Induce 0.125% v/v were applied weekly from Jul-18 to Aug-13. A final SLB score was determined from six disease and plant health assessments; higher score indicated more severe disease. Luna Tranquility (9+11) had the lowest disease score (152), which was not significantly different than Merivon (7+11). With exception of Pristine (7+11), products with FRAC 7 active ingredients (Luna Tranquility, Merivon, Fontelis, Endura) had five out of the lowest six disease scores. The four products with FRAC 3 active ingredients (Inspire Super, Inspire, Tilt, Quadris Top) were among the seven lowest disease scores. Treatments receiving FRAC 11 active ingredients (Quadris, Cabrio) were not significantly different than the untreated (score 303), which is concerning and subject of further study. Scala (9), Omega (20), Switch (9+12) and Gavel (22+M3) had significantly lower scores than the untreated, but not as low as the best performing fungicides.

Dickeya, a new potato pathogen in Maine and elsewhere

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Severe stand losses and blackleg symptoms were present Maine during the 2014 field season. Again, in 2015, severe stand losses and blackleg symptoms were present in a number of states including Maine. Blackleg symptoms have been associated with infection by *Pectobacterium* spp. Field symptoms and losses in 2014 and 2015 were far greater than had been previously encountered with *Pectobacterium* spp. infection. PCR confirmed *Dickeya* spp. as being present in number of these instances. Nonemergence is one symptom of *Dickeya* infection. Data from winter grow-out tests of potato seed lots showed an increase in nonemergence plants over the two years. It is probable *Dickeya* has been in the Maine seed system, albeit at low levels, for over 5 years. The pathogen may have been present and misidentified with symptoms attributed to unfavorable weather conditions. Warm conditions and excessive water favors the spread and development of *Dickeya*. One means of pathogen spread may be physical transfer within and among seed lots during harvest.

Susceptibility of Impatiens species to downy mildew caused by Plasmopara obducens

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Records of downy mildew caused by *Plasmopara obducens* on *Impatiens* in North America go back to 1881, when it was collected on the native jewelweed, *I. fulva* (syn. *I. capensis*), in Massachusetts. The disease became relevant to the U.S. bedding plant industry beginning in 2004, followed by widespread landscape losses of impatiens in 2011-12 that have continued to the present. The threat of the disease has significantly reduced use of *I. walleriana* as a bedding plant. A study in Riverhead, NY in summer 2012 exposed 18 species of Impatiens to downy mildew inoculum from infected *I. walleriana* in June. Potted plants were given overhead irrigation twice daily in a shaded hoop house. Several weeks to months later, sporulation of *P. obducens* was observed on known hosts *I. walleriana*, *I. capensis* and *I. balsamina*, and also on *I. auricoma*, *I. arguta*, *I. flanaganii* and *I. hochstetteri*. A study in summer 2015 used a similar set of conditions to challenge 23 Impatiens species with downy mildew. Observations of symptoms and sporulation were supported by sequencing the rDNA ITS region, which showed 100 percent nucleotide identity with *P. obducens* on *I. walleriana* for a number of new hosts. Infected *I. briartii*, *I. cinnabarina*, *I. grandis*, *I. irvingii*, *I. laurentii*, *I. repens* and *I. sodenii* var. *uguensis* showed scattered leaf lesions, and some species showed stem discoloration, but none of these new hosts were defoliated in the manner of the highly susceptible *I. walleriana*.

Making aecial-telial host connections: New insight into host alternation of the pear trellis and Japanese apple rust fungi in the Northeast

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Pear trellis rust caused by *Gymnosporangium sabinae* was first reported from the northeastern United States in 1912, affecting only the rosaceous (aecial) hosts *Pyrus communis* and several cultivars of *P. calleryana* in central and southeastern New York. To date, the infection of junipers (*Juniperus*, Section Sabina; telial hosts) in the U.S. has been noted only in California. Similarly, the Japanese apple rust fungus (*G. yamadae*) was first noted in 2004 on crabapple (*Malus toringo*) in the eastern U.S., whereas the telial stage has been reported in the U.S. only once, in 2009, on *J. chinensis* in Delaware. Scouting efforts in spring 2015 in Suffolk County, NY detected telia on nursery- and landscape-grown *Juniperus*, including *Juniperus chinensis* 'Pfitzeriana' and *J. chinensis* 'Robusta Green'. Leaves of crabapples (*Malus* spp.) and apples (*Malus x domestica*) with conspicuous aecia were also collected in the region. Molecular (LSU D1-D2 domain) and morphological analyses of the aecial and telial stages revealed two rusts – *G. sabinae* and *G. yamadae* – producing telia on stems of *J. chinensis* 'Robusta Green', while telia on *Juniperus chinensis* 'Pfitzeriana' were determined to be *G. yamadae*. The latter rust fungus was also confirmed on crabapple and edible apple within the scouted area. Thus, these and other junipers in the Section Sabina likely have played a critical role in the introduction and establishment of pear trellis and Japanese apple rust fungi within the region.

Curative fungicidal activity against Calonectria pseudonaviculata, causal agent of boxwood blight

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Boxwood blight, caused by *Calonectria pseudonaviculata* (*Cps*), is a recently emerged disease of *Buxus* and *Pachysandra*. Selected efficacious fungicides were evaluated for post-infection activity. *In vitro*, *Cps* exposed to > 5 ppm DMI fungicides in agar did not resume growth when transferred to non-amended media, suggesting the potential for curative activity. A detached leaf assay was used to evaluate 0, 3, 30 or 300 ppm propiconazole, tebuconazole or kresoxim-methyl on disease when applied 24 h before or 24, 48 or 72 h after inoculation (curatively) with 100 conidia per leaf. All fungicides were effective from 3 to 300 ppm when applied preventatively. Propiconazole reduced disease incidence at 30 or 300 ppm at 24 h applied curatively and prevented sporulation at 30 or 300 ppm up to 96 h. Tebuconazole and kresoxim-methyl did not reduce disease when applied curatively; tebuconazole but not kresoxim-methyl prevented sporulation at 30 or 300 ppm up to 96 h. Propiconazole applied curatively at 30 or 300 ppm reduced diseased leaf area; 300 ppm resulted in 2, 18 or 51% of leaf area diseased at 24, 48 or 96 h compared to 90% for untreated leaves. Green Velvet boxwood plants were treated with propiconazole, thiophanate-methyl, pyraclostrobin, kresoxim-methyl or water alone 48 h after inoculation with *Cps*. Disease development was reduced after curative application of propiconazole only. The number of *Cps* re-isolations from symptomatic tissue was also reduced for propiconazole.

Assessing internal decay in trees nondestructively with tomography

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Through carbon (C) sequestration, forests play a critical role in mitigating against global warming caused by rising concentrations of atmospheric C. Internal decay of wood in living trees, which can extend over most of a tree's lifespan, is a countervailing metabolic process, resulting in release of sequestered C in the form of greenhouse gases. Despite its importance and near ubiquity, internal decay remains unaccounted for in models of forest C dynamics, an understandable omission given the absence of methods for nondestructively quantifying its rate and extent. Our goal was to develop, test, and validate a methodology for this purpose. We used sonic and electrical resistance tomography (SoT and ERT, respectively) to generate three SoT and ERT cross-sectional images on the lower boles of each of 72 trees (23 *Acer saccharum*; 21 *Betula alleghaniensis*; 28 *Fagus grandifolia*) in Great Mountain Forest, Norfolk, CT. 105 cross-sections corresponding to the tomographs were cut from approximately half the trees, after felling, and then processed for photography, gas chromatography, and dendrochronology. Tomographic variation correlated positively with C density, and accurately predicted presence and size of cavities in 68% of the cookies. Tree ages, which varied from 68 to 192 years old, permitted estimation of lifetime rates of decay. We conclude from this work that SoT and ERT constitute a powerful tool in identifying and quantifying internal decay in living trees.

Fungicide sensitivity in the boxwood blight pathogen *Calonectria pseudonaviculata*

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Boxwood blight caused by *Calonectria pseudonaviculata* is a devastating disease of boxwood resulting in defoliation, dieback, and high economic losses. Fungicide efficacy against the pathogen was proven in previous studies. Three isolates: 11-9-4a - a sensitive wild type; FC1 - an isolate of 11-9-4a selected for ability to grow on up to 250 µg a.i./ml pyraclostrobin; and a recent isolate CTWH1 from a Connecticut landscape were evaluated *in vitro* to analyze fungicide sensitivity for four strobilurins (pyraclostrobin, azoxystrobin, trifloxystrobin, kresoxim-methyl) and five demethylation inhibitor (DMI) fungicides (propiconazole, tebuconazole, triflumizole, myclobutanil, tetraconazole). Radial growth was used to assay for fungicide sensitivity at concentrations of 0, 3.16, 10, 31.6, 100, 316, and 1000 µg a.i./ml. DMIs strongly inhibited mycelial growth for all isolates, complete inhibition was achieved with propiconazole, tebuconazole, and triflumizole at concentrations of at least 1 µg a.i./ml and with myclobutanil and tetraconazole at 10 µg a.i./ml. The 85% effective dose (EC₈₅) values show that pyraclostrobin and kresoxim-methyl had the highest effect on the pathogen. FC1 and CTWH1 exhibited reduced sensitivity to strobilurin, but not DMI fungicides compared to 11-9-4a. This study shows that reduced strobilurin fungicide sensitivity in *C. pseudonaviculata* can be selected for *in vitro* and can also occur naturally in pathogenic isolates in the landscape.

Efficacy of fungicides, biopesticides, and resistant varieties for managing downy mildew in basil

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Experiments were conducted from 2010 to 2015 under field conditions with naturally-occurring inoculum (wind-dispersed spores) to evaluate management practices for downy mildew, caused by *Peronospora belbahrii*, in sweet basil for conventional and organic production. Downy mildew has occurred every year on Long Island since 2008. Effective management was achieved with resistant experimental lines, in particular those bred by Pyne and Simon at Rutgers University and commercial lines tested in 2015. Conventional fungicides were effectively applied following a preventive, 7-day schedule. Best control (at least 90%) was obtained with combination programs. Registered products used in these programs were Ridomil (soil drench after transplanting), Quadris, Ranman, Revus, and K-Phite (tank-mixed with Ranman and Revus). Biopesticides and other organic fungicides were not effective tested individually or in a program with multiple products applied on a once or twice weekly schedule. This may partly reflect challenge of delivering fungicide to the underside of leaves, where the pathogen develops. Plots were single rows of plants spaced 9 inches apart. Applications were made with a backpack sprayer using a boom with a nozzle directed down at the plant top plus drop nozzles on each side when plants were large. Downy mildew was assessed as percent symptomatic leaves, which is a rigorous assessment measure, but realistic reflecting zero tolerance for disease on fresh-market herbs.

New insights into host defense mechanisms following artificial inoculations with the butternut canker pathogen

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Ophiognomonium clavignenti-juglandacearum is considered to be the major pest of butternut and is threatening the tree's survival over its native range. In Canada, butternut was listed as endangered under the Species at Risk Act in 2005. While identifying, propagating and testing butternut putatively resistant to butternut canker, we found that a period of dormancy was necessary for the expression of symptoms in most seedlings that were artificially inoculated. Before dormancy and in some seedlings that seemed resistant even after dormancy, defense reactions such as wound closure and compartmentalization were obvious and contributed to greatly limiting pathogen development. Suberized tissues were detected in compartmentalization tissues, but most of them were only part of new periderms formed in the bark around the invaded portions of the stem. Phenolic compounds were commonly observed components of the defensive tissues and at times were intensely formed in a continuous band internally to the necrotic xylem that seems to correspond to a new reaction zone of the compartmentalization model. Tyloses regularly blocked the vessels of the invaded xylem. Following dormancy in most seedlings, the initial defensive barriers were regularly breached by the pathogen and then additional ones were tentatively produced by the host to contain the new lesions. These results indicate that some butternuts could be resistant to this canker and thus should be retained in programs aimed at conserving and restoring viable butternut populations.

Protein moonlighting in plant disease: Characterization of the dual function of a bacterial type III secreted virulence effector and chaperone as a toxin-antitoxin system

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Toxin-Antitoxin (TA) systems are bacterial self-killing systems comprised of an antibacterial protein toxin and a neutralizing antitoxin. Found on bacterial mobile genetic elements as well as in bacterial chromosomes, TA systems are thought to be involved in variety of mechanisms like plasmid maintenance, stress response, antibiotic resistance etc. AvrXo1 is a type III secreted effector (T3E) of *Xanthomonas oryzae* pv. *oryzicola* (Xoc), the causal agent of bacterial leaf streak of rice, with homologs in other plant pathogens of *Xanthomonas*, *Burkholderia*, and *Acidovorax*. AvrXo1 triggers a type III secretion-dependent hypersensitive resistance response (HR) in plants expressing the resistance protein Rxo1. *avrXo1* homologs are all encoded upstream of a short gene coding for AvrXo1 binding partner Arc1. The recently solved structure of AvrXo1 revealed its similarity to a *Streptococcus pyogenes* TA toxin belonging to the zeta-epsilon family of TA systems. In this study, a standard validation assay is used to demonstrate that AvrXo1:Arc1 is a functional TA system. A putative distant homolog of AvrXo1 found in a soil myxobacterium *Cystobacter fuscus* (Cf) demonstrated AvrXo1-like plant toxicity and Rxo1-triggering activity, but did not share the bacteriostatic effect of AvrXo1. These findings demonstrate that AvrXo1:Arc1 is an example of a TA system with dual function as a type III secretion-dependent avirulence gene.

Effects of chemical and biological products on pink rot of potato

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Pink rot, caused by *Phytophthora erythroseptica*, has been a persistent problem in potato production. Controlling pink rot becomes a challenge as mefenoxam is losing its effectiveness owing to the development of resistant populations of *P. erythroseptica*. To evaluate new strategies of pink rot management, field trials were conducted in 2014 and 2015 in Maine. *Phytophthora erythroseptica* inoculum was prepared in vermiculate mixed with V8 broth at 2:1 ratio (v:v) and incubated for four weeks at 22°C. Potato (cv. 'Russet Norkotah') seed tubers were planted at one-foot spacing. Inoculum was evenly distributed in the furrows at planting. Chemical products and biological control agents were applied either individually or in combinations, at planting or during the growing season, treatment dependent. Plant vigor and emergence were evaluated twice during the season. Tuber yield and disease severity were evaluated at harvest. Mefenoxam, fluopicolide, and oxathiapiprolin significantly reduced pink rot in the harvested tubers. Biologicals including *Bacillus subtilis* (Serenade Soil, Taegro), *Bacillus amyloliquefaciens* (Double Nickel, MBI-110), and extract of *Reynoutria sachalinensis* (Regalia) did not significantly reduce pink rot in the harvested tubers. However, the combination of either Presidio or A20941 and *Bacillus* sp. product significantly reduced pink rot in the harvested tubers. These results demonstrate the advantage of combining synthetic fungicides with biologicals in pink rot control.