Wcc. Twenty isolates were tested *in vitro* on ¼-PDA amended with thiophanate-methyl, flutalonil, iprodione, azoxystrobin and propiconazole. On average, isolates tested at 100 mg/liter were inhibited >95% in growth compared to the non-amended check for flutalonil, iprodione, and propiconazole. On average, isolates were only inhibited by 34% at a dose of 100 mg/liter of thiophanate-methyl and 31% at a dose of 100 mg/liter of azoxystrobin and salicyl hydroxamic acid. There is a appears to be clear differential differential responses of Wcc to these fungicides and further *in vivo* testing should be performed to better understand chemical options for its control.

Comparative analysis of the mitochondrial genome organization in *Phytophthora species* and related Straminopiles

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The mitochondrial genome organization of Oomycete species *Phytophthora infestans*, *P. sojae*, and *P. ramorum* were compared to mitochondrial genomes of *Saprolegnia ferax*, and other Straminopiles (section Heterokonta) including the autotrophic species in the Bacillariophyceae (*Thalassiosira pseudonana*), the Chrysophyceae (*Chrysodidymus synuroideus*, *Ochromonas danica*), and the Phaeophyceae (*Laminaria digitata*, *Pylaiella littoralis*, *Dictyota dichotoma*, *Fucus vesiculosus*, *Desmarestia viridis*,) and the heterotrophic species in the Bicosoecida (*Cafeteria roenbergenesis*). *P. ramorum*, and *P. sojae*, contain a similar ~13 kb inversion in the mitochondrial genome when compared to the genome of *P. infestans*, but otherwise share nearly identical sets of genes. Sequence divergence within genes and changes in relative gene order were observed when *Phytophthora* species were compared to the closely related Oomycete *S. ferax* and to the Chrysophytes, Phaeophytes and Bacillariophytes. These differences observed at the whole mitochondrial genome level indicate that genera within the Stramenopiles are more divergent than single gene phylogenies would indicate.

Grafting provides a multi-strategic management tool for heirloom tomato production systems

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Demand for vine-ripened, organic heirloom tomatoes has increased in the US due to a consumer-based focus on fruit quality and environmental sustainability. Heirloom varieties are open-pollinated, and susceptible to an array of soil-borne diseases. On-farm research trials were implemented to determine the efficacy of grafted heirloom tomatoes to manage bacterial wilt in soils naturally infested with *Ralstonia solanacearum*. Under high disease pressure, plants grafted onto resistant rootstock (CRA 66 and Hawaii 7996) did not wilt and had significantly greater harvest yields than non-grafted plants. In contrast, 100% of the non-grafted and self-grafted plants wilted. In the absence of disease pressure, CRA 66 improved root vigor and plant dry weight compared to non-grafted plants and generated similar yields. Root vigor and plant dry weight for Hawaii 7996 and the self-grafted plants were intermediate. Crop productivity analysis in non-infested fields indicated that the use of alternative training methods may be able to significantly increase yields specifically where 'Maxifort' rootstock is used in an organic production setting. Grafting could be a valuable tool for heirloom tomato growers who need to manage soilborne diseases without the use of chemical treatments. The utility of grafting was highlighted through extension publication and an active outreach including advanced grower workshops.

Management of bacterial spot on tomato using acibenzolar-S-methyl, famoxadone and *Bacillus subtilis*

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Bacterial spot caused by *Xanthomonas perforans* is a major disease on tomato in Florida. Fifteen field trials were conducted between 1999 and 2005 testing famoxadone plus curzate (Tanos), *Bacillus subtilis* (Serenade), and acibenzolar-S-methyl (Actigard) at different application programs in combination and rotation with other products. In 51 multiple-product treatments containing famoxadone, 96% of the programs significantly reduced bacterial spot severity on plants compared to the untreated control (UTC) and were equal for disease suppression conferred by the standard (copper and mancozeb). In 11 trials evaluating treatments containing Actigard, the UTC plants had significantly more disease compared to the standard and the Actigard treated-plants. Serenade applied alone reduced disease severity significantly compared to the UTC in 3 out of 7 trials. Serenade plus copper did not significantly reduce disease severity compared to the standard but significantly reduced disease severity compared to UTC. Tanos was tested for bactericidal activity to *Xanthomonas in vitro*. Tanos did not cause a significant reduction in bacterial populations compared with the UTC. The combination of Tanos and various rates of Kocide reduced the number of surviving cells significantly compared to the UTC. Tanos, Serenade and Actigard may be useful tools in a management program for bacterial spot.

A novel virus in *Angelica lucida* (wild celery) in Alaska

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Documentation of viruses in native plants is scarce despite the fact that affected plants may act as hosts for agronomical important viruses and impact natural ecosystems. In south central Alaska, wild celery (*Angelica lucida*, family *Apiaceae*) plants growing along roadsides near crops and in forests contained severe leaf mottling and vein-clearing. Leaves were collected and processed immediately or stored at –80°C. Virions were extracted, partially purified, and serologically assayed using universal potyvirus antiserum (Agdia, Inc.). Confirmation of a plant virus belonging to the family *Potyviridae* was by ELISA and detection of a coat protein ~35 kDa by Western analysis. PCR assays using a universal potyvirus primer set that targeted the coat protein and polymerase genes, generated the predicted ~ 2K nt fragment. A Blast search of nucleotide sequences obtained from the fragments determined that although the sequence was most similar to several potyvirus that may also may affect plant species in the family Apiaceae (*Carrot virus Y*, *Apium virus Y*, and *Turnip mosaic virus*), it was unique enough to be placed as a novel virus in the family *Potyviridae*, and tentatively named Angelica virus Y (AnVY). Although *A. lucida* is the only known natural host to AnVY, it is important to determine if this new virus is a potential threat to Alaska vegetable crops.

The impact of foliar diseases of soybean in Iowa during the 2005 growing season

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Foliar diseases of soybean are not considered economically important in Iowa. Consequently, local soybean growers do not currently make management decisions regarding the use of foliar fungicides. The arrival of Asian soybean rust in the United States has resulted in increased awareness and greater interest in the use of foliar fungicides. The seasonality, incidence and severity of foliar disease during the 2005 growing season in Iowa were determined in a soybean disease survey. At each of 2 to 5 fields per county, 30 plants were sampled at four growth stages. The presence and severity of each disease for each leaf on the main stem was assessed. The most prevalent fungal diseases (pathogens) were brown spot (*Septoria glycines*), frogeye leaf spot (*Cercospora sojina*), Cercospora leaf blight (*Cercospora kikuchii*) and downy mildew (*Peronospora manshurica*). The mean disease severity within fields over the season, ranged from 0.1% to 0.5% for brown spot, 0.1% to 12.8% for frogeye leaf spot, and 0.1% to 3.6% for downy mildew. The mean disease incidence (within fields) for Cercospora leaf blight ranged from 3–83%. Thus, foliar disease management in Iowa was probably unnecessary during the 2005 growing season. This statement is justified by additional data from fungicide efficacy trials in which fungicides did not result in significantly ($P < 0.05$) greater yields compared with unsprayed controls.

Occurrence of *Erwinia carotovora* on wasabi (*Wasabia japonica*) causing rhizome blackening

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Wasabia japonica (Miq.) Matsum. is a highly valued, slow-growing crop which is native to Japan. The rhizome is grated and eaten as a condiment in Japanese cuisine. In 2002, internal blackening of the rhizome was observed in a commercial wasabi greenhouse in British Columbia. Microscopic examination showed that xylem tracheid vessels were blackened. *Erwinia carotovora* (*Ec*) was isolated and identified using Biolog™. A bioassay performed on wasabi rhizomes using 10^7 cfu/ml showed slight tissue softening after 48 hr at 24°C, while on potato, 10^5 cfu/ml caused extensive tissue maceration after 48 hr. Wasabi plants from meristem-tip culture were grown for 2 mo under hydroponic conditions and in soil manure and inoculated with 10^8 cfu/ml *Ec*. Bacterial cells were suspended in 0.85% NaCl in phosphate buffer (0.01 M, pH 7) and injected into rhizomes. Control plants were inoculated with buffer solution or not at all. Plants were grown at 22°C, 90% RH and a 16 hr photoperiod for 6 wk. Plants grown in soil showed blackening in the