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The use of compost in horticulture for controlling soil-borne pathogens

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Soil-borne pathogens can cause serious damages to economically important crops in Italy. A compost suppressive against these pathogens could enhance productivity, reduce waste production and avoid the use of peat and chemical pesticides and fertilizers. The aim of the research was to evaluate the suppressiveness of composts produced in Piedmont Region, in the North-West of Italy, for their use in horticulture. Composts originated from different composting plants and source materials, including biowaste, municipal and industrial sewage, green and yard waste. Suppressiveness of compost-amended (50%, 75% and 100% vol./vol.) peat-based amendments was determined against *Pythium ultimum* on cucumber, *Fusarium oxysporum* f. sp. *basilici* on basil and *Sclerotinia sclerotiorum* on lettuce. From the 36 bioassays involving 8 composts and 3 pathosystems, significant disease suppression was found in 46% of the cases. The increase of biomass of basil in compost compared to a peat amendment reached in some cases 42%. A mix of 75% vol./vol. of compost and 25% vol./vol. of peat showed the best results in terms of biomass production. Application of compost has in general a positive effect on disease suppression and could be used in horticulture partially as a substitute of peat.

Root girdling and distortion of ginseng seedlings caused by *Fusarium oxysporum*

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Root girdling, root tip decay, and distortion of developing roots on 1-year-old ginseng seedlings was observed during 2005 and 2006. Isolations from affected tissues yielded mainly *Fusarium oxysporum*. Mycelial growth in culture was highest at 25–30°C and pH 5.7–6.8. Pathogenicity tests conducted *in vitro* and in the greenhouse resulted in root tip decay and discoloration of ginseng roots. Sequence analysis of an EF-1 alpha gene region placed isolates of *F. oxysporum* from ginseng within the *F. oxysporum/F. redolens* cluster which included isolates originating from other hosts. The fungus was detected on blossoms, berries and seed of ginseng collected from several farms. Seed transmission is a likely source of inoculum for seedling infection by *F. oxysporum*, resulting in the previously undescribed symptoms of root girdling.

Population dynamics, growth and seed transmission of *Fusarium equiseti* in ginseng

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Fusarium equiseti is prevalent in ginseng soil, straw mulch and ginseng root tissues in British Columbia. Inoculum levels in fields were highest at 0–5 cm soil depth compared to 15 cm. Barley or wheat straw added to soil significantly increased population levels. Mycelial growth in the laboratory was highest at 28–30°C and at pH 7.2–7.5. Spore monitoring studies revealed air-borne inoculum of *F. equiseti* during June-August, 2006. Samples of flowers and berries, and harvested seed, contained DNA of *F. equiseti* detected using a *Fusarium*-specific DNA array. A high degree of genetic variation in the EF-1 alpha gene sequence was present among 52 isolates of *F. equiseti* from ginseng fields. At least 9 clades were identified. Inoculum dispersal from straw mulch used in ginseng gardens can result in seed contamination by the fungus.

Conceptual model supporting 4-day temperature evaluation in fire blight risk assessment

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Erwinia amylovora colonizes stigmas of apple and pear blossoms during warm dry conditions, and rain or heavy dew facilitates its downward flowers in the laboratory and Gala apple flowers in the orchard in 2005 and 2006. Both experiments demonstrated a decrease of disease incidence as flowers aged. Rate of declining susceptibility was dependent on temperature in the laboratory, and a dose effect was indicated in the orchard. A conceptual model that includes aspects of both bacterial growth on stigmas and susceptibility of hypanthia to infection offers an explanation for the predictive success of the 4-day temperature evaluation and could lead to improvements in fire blight risk assessment.

Seasonal and diurnal patterns of *Sclerotinia sclerotiorum* ascospore dispersal in canola fields

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Seasonal and diurnal patterns of ascospores dispersal by *Sclerotinia sclerotiorum*, which causes stem rot (SSR) on canola, were studied in the summers of 2005 and 2006 at two North Dakota locations (Langdon, and Cando) using 7-days volumetric spore samplers. Ascospores of *S. sclerotiorum* were trapped between June 24 and the end of July each season. Significant differences in the number of ascospores trapped and in the amount of disease produced were detected between seasons. During 2005 the number of ascospores trapped ranged from 23 to 139 spores\m^3\day; while in 2006, it ranged form 0 to 10 spores\m^3\day. Linear regression analysis was used to describe the relationship between the amount of ascospores trapped and the amount of diseased plants R^2 = 0.994 in 2005. In 2006 the amount of ascospores trapped during the same period was less than 10% of what was observed in 2005, and SSR did not develop in the field. During 2005, 80–90% of all ascospores trapped daily were collected between 10:00 A.M. and 1:00 P.M., while in 2006, 80–90% of ascospores were trapped between 3 to 7 A.M. In both instance air temperature was <21°C and relative humidity was >80% under the plant canopies. To our knowledge this is the first report that addresses this change in the pattern of *S. sclerotiorum* ascospores dispersal.

Susceptibility of Fraser fir to *Phytophthora capsici*

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Phytophthora blight limits production of Fraser fir, an important Christmas tree, causing losses up to 75%. *Phytophthora capsici* affects primarily vegetable crops worldwide. Crop rotation is limited by the long-term survival of oospores and uninfested fields are difficult to find. Studies to determine new hosts may increase crop rotation efficacy. Fraser fir seedlings were inoculated (no wound or 1- or 3-mm-diameter wound) with *P. capsici* OP97 and were incubated in growth chambers at 20 or 25°C. Four isolates of *P. capsici* representative of its diversity were used to inoculate seedlings (no wound or 1-mm-diameter wound) incubated at 25°C. Experiments were conducted twice and controls were included. Seedlings were evaluated by calculating the percentage of branches with bronzing. All *P. capsici* isolates caused disease in non-wounded and wounded seedlings. Wounded seedlings developed symptoms sooner than non-wounded, but after 5 weeks seedlings incubated at 25°C died. Symptoms developed slower in seedlings incubated at 20°C, they died after 7–8 weeks. The pathogen was reisolated from symptomatic seedlings and the phenotype (mating type and mefenoxam resistance) was confirmed. To our knowledge, this is the first report of *P. capsici* infecting Fraser fir. This study suggests that planting Fraser fir in fields infested with *P. capsici* could result in infection.

Management of early blight and basal stalk rot of celery

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Florida celery growers have made great strides in recent years in controlling their most important foliar disease, early blight (EB), caused by *Cercospora apii*, using reduced spray programs. Concerns remain however about basal stalk rot (BSR), incited by *Rhizoctonia solani*. An experiment evaluating 8 fungicide treatments for management of EB and BSR was conducted in Belle Glade. Treatments included a broad spectrum protectant, a sterol inhibitor, two strobilurins, three strobilurin/sterol inhibitor premixes, and a strobilurin/boscalid fungicide premix. A total of five fungicide applications were made at