

# APS Potomac Division

## Abstracts

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### Alphabetized by first author's last name

EFFECT OF CERTAIN PESTICIDES USED IN BEAN PRODUCTION UPON *VERTICILLIUM LECANII*, A HYPERPARASITE OF *UROMYCES APPENDICULATUS*. L.R. Batra and J.R. Stavelly, Molecular Plant Pathology Laboratory, USDA, ARS, Beltsville, MD 20705-2350 USA.

A conidial suspension of *Verticillium lecanii*, applied as a spray, or dust, to uredinia of *Uromyces appendiculatus*, overgrows and parasitizes the bean rust fungus. To ascertain compatibility of *V. lecanii* with certain fungicides and insecticides, used in commercial field production of beans, test solutions or suspensions of active ingredients were prepared in deionized water at recommended rates for each chemical. Benomyl and Bravo prevented *V. lecanii* and thus eliminated it for biocontrol. Manzate, Methoxychlor, and Sevin on the other hand had little or no effect on growth of *V. lecanii* on uredinia of *U. appendiculatus*. The observations were identical with in vitro investigations of *V. lecanii* and the pesticides on water agar without rust spores.

GEOGRAPHIC DISTRIBUTION OF *PUCCINIA CARDUORUM*, A PATHOGEN OF MUSK THISTLE, FIVE YEARS AFTER RELEASE. Baudoin, A.B.A.M. and Bruckart, W.L., Dept. of PPWS, Virginia Polytechnic Inst. and State Univ. Blacksburg, 24061 and USDA-ARS, Frederick, 21701.

*Puccinia carduorum*, an introduced rust pathogen of musk thistle, was field-tested in Montgomery County, Virginia, starting in late 1987. No other known releases have been made, and no rust has been reported previously on musk thistle in the United States. In 1988, *P. carduorum* was detected only near the release site; in 1989 it was found at several locations up to 7 km from the release site. In the summer of 1992, *P. carduorum* was detected throughout western and northern Virginia, in western South Carolina, northern Georgia, east and central Tennessee, Kentucky, southeast Indiana, southern Ohio, Maryland, and Delaware. Distance from the release site to the furthest confirmed find was approximately 580 km. *P. carduorum* is now widespread in musk thistle populations east of the Mississippi River. We are aware of no finds on musk thistle west of the Mississippi River.

Camera-ready abstracts are published as they were submitted by the Division. The abstracts are not edited or typed in the APS headquarters office.

EVALUATION OF NATURAL PRODUCTS FOR INNOVATIVE DISEASE MANAGEMENT. J. C. Locke and M. R. Carter. Florist & Nursery Crops Laboratory, BARC-West, USDA, ARS, Beltsville, MD 20705.

Foliar application of 1% (v/v) neem seed oil (NSO) controlled *Puccinia antirrhini*, *Uromyces dianthi*, and *Erysiphe polygoni* on snapdragon, carnation, and hydrangea, respectively. NSO at 1% was 81-84% more effective than Sunspray 6E or soybean oil against *P. antirrhini*. Vernonia seed oil (VSO) and NSO at 1% equally suppressed *U. dianthi* and performed as well as the fungicide check. When both were applied at 14 day intervals, VSO at 2% controlled *E. polygoni* as well as 1% NSO. In vitro, 1% NSO reduced severity of blackspot (*Diplocarpon rosae*) on rose compared to the pathogen check and 1% VSO inhibited lesion development. Various solid amendments were incubated for 2 weeks prior to planting in nonsterile, soilless medium and tested against *Rhizoctonia solani* and *Pythium ultimum* on zinnia. Spent (solvent extracted) and ground neem seed (GNS) at 1 and 2% (w/w) increased stand counts significantly over the *R. solani* check and 2% GNS resulted in  $\leq 60\%$  increase in stand count for *P. ultimum*.

POWDERY SCAB SEVERITY AND INCIDENCE AMONG SIXTEEN POTATO CULTIVARS. Christ, B.J. and D. M. Petrunak. Dept. of Plant Pathology, The Pennsylvania State University, University Park, PA 16802.

Sixteen potato cultivars were evaluated for severity and incidence of powdery scab. Replicated field plots were established in a field infested with *Spongospora subterranea*, the causal agent of powdery scab. Three plants from each plot were harvested on August 20 to examine the root/stolon system and tubers. The remainder of each plot was harvested on October 6. Tubers were placed into one of five categories based on percentage of tuber area covered with scab lesions. The total number of tubers for each category was determined. There were significant differences among cultivars for all disease parameters examined. Russet Burbank, NYE11-45, Katahdin, and Norchip had galls but only on one of the root systems per replication. The severity and number of tubers with typical scab lesions increased from the first to the second harvest. Ranking of cultivars for either disease incidence or severity was similar between the two harvests. NCO12-19, NY-84, and AF828-5 had over 10% of the tubers with 50% or greater severity. Those same cultivars also had over 15% of the tubers with 25-49% severity. For the overall severity, Russet Burbank, NYE11-45, B0256-1, Superior, Atlantic and Katahdin were consistently below 2% severity at either harvest date.

INCREASED VIRUS INCIDENCE AND SEVERITY IN CORN AS AFFECTED BY POSTEMERGENCE JOHNSONGRASS (*SORGHUM HALEPENSE* [L.] PERS.) CONTROL. J.W. Eberwine, Jr., E.S. Hagood, Jr., and E.L. Stromberg. Virginia Polytech. Inst. and State Univ., Blacksburg, VA 24061.

Field experiments were conducted in 1991 and 1992 at Whitethorne, Va. to evaluate the hypothesis that postemergence johnsongrass control increases the incidence and severity of MDMV and MCDV in corn as a result of increased feeding of vectors on the crop. A subsequent experiment was conducted in 1992 to further elucidate the relationship between postemergence johnsongrass control, vector movement, and virus disease development through use of 1) insect traps to quantify

differential movement of vectors in response to treatment, 2) cages to restrict movement of vectors from infected johnsongrass thereby allowing quantification of the effects of herbicides on corn in the absence of disease, and 3) ELISA determination of the presence of MDMV and MCDV in corn leaf tissue as a response to herbicide treatment and insect exclusion. Virus transmission increased 350% where johnsongrass control was implemented relative to where no control measures were taken. Further, vector exclusion from treated corn significantly decreased virus injury to corn relative to that observed in treated corn without insect exclusion.

ESTABLISHMENT OF VIRUS-FREE ACCESSIONS FROM EXOTIC COWPEA SEEDLOTS. A. G. Gillaspie, Jr., M. S. Hopkins, D. L. Pinnow, USDA, ARS, Plant Introduction Stn., Griffin, GA 30223 and R. O. Hampton, USDA, ARS, Oregon State U., Corvallis, OR 97331.

Seedlings of 30 cowpea pre-introductions from Botswana were tested by ELISA for the presence of seven seed-borne viruses. Seeds of these lines were planted in insect-free greenhouses and the resultant seedlings were examined for virus-like symptoms and sampled for ELISAs. Plants found to be free of ELISA-detectable viruses were grown to maturity. From these mother plants virus-free accessions were established for each pre-introduction. Twenty-five pre-introductions contained one or more seed-borne viruses: 19 with blackeye cowpea mosaic potyvirus, 15 with cowpea severe mosaic comovirus, 15 with southern bean mosaic sobemovirus, 8 with cowpea aphid-borne mosaic potyvirus, 7 with cowpea mottle carmovirus, and 6 with cucumber mosaic cucumovirus. Cowpea mosaic comovirus was not detected in the 30 pre-introductions. Five pre-introductions were free of detectable seed-borne viruses.

DETERMINATION OF FUNGI ASSOCIATED WITH RED ROOT ROT OF CORN IN DELAWARE. W. Mag, R. B. Carroll and D. P. Whittington. Dept. of Plant and Soil Sciences, Univ. of Delaware, Newark, DE 19717-1303.

The role of Phoma terrestris, Pythium irregulare and Fusarium sp. in causation of red root rot (RRR) of corn was investigated during 1992. Field plots were fumigated with BUSAN 1020. Eight treatments included inoculation with all combinations of the three fungi and a non-inoculated control. Inoculum was infested grain, dried and applied with the seed. Design was a split-split plot with three replications. Hybrids tested were DK 572 and DK 582 which were previously reported as susceptible and resistant to RRR. Ratings for RRR, basal stalk rot and wilt started 10 days after emergence and continued every 15 days through harvest. Symptoms developed first and most rapidly in plants inoculated with P. terrestris + P. irregulare which also gave significantly higher ( $P > 0.01$ ) ratings for all disease measurements, indicating synergism and a causal role in RRR.

TRANSGENIC TOMATO PLANTS EXPRESSING SATELLITE RNA EXHIBIT TOLERANCE TO CUCUMBER MOSAIC VIRUS.

Peter B. McGarvey, M.M. Montasser, L.M. Geletka, J.M. Kaper, Molecular Plant Pathology Lab, USDA, Beltsville, MD 20705.

Transgenic tomato plants (Lycopersicon esculentum) expressing the cucumber mosaic virus (CMV) satellite "S-CARNA5" were produced by A. tumefaciens mediated transformation. F1 generation seedlings were inoculated with RNA and virion preparations of CMV-1. Challenged plants were scored for segregation of the recombinant insert and disease symptoms. Challenged plants were also examined for accumulation of viral RNA, satellite RNA, and virions by northern blots and ELISA. Transgenic plants showed mild disease symptoms two weeks post challenge followed by a decrease in symptoms until little difference between transgenic and uninfected control groups remained. Virus accumulation in the transgenic plants was one-tenth of that in controls. Plants challenged with CMV-16 or tomato aspermy virus did not show significant tolerance to virus induced symptoms.

INFLUENCE OF FUNGICIDES AND CULTIVAR SELECTION ON YIELD AND POWDERY MILDEW SEVERITY IN SUMMER SQUASH. M. T. McGrath and H. Staniszevska, Dept. of Plant Pathology, Long Island Horticultural Research Laboratory, Cornell University, Riverhead, NY 11901.

Development of Sphaerotheca fuliginea was suppressed in resistant PSX 2287 compared to susceptible Goldbar and by applying fungicides (chlorothalonil, triadimefon and benomyl) to either cultivar for 2 experiments conducted in 1992. Exp. 1 was transplanted on 10 June, symptoms were first seen on 13 July. Yield was reduced by powdery mildew only in Goldbar during the last third of the harvest period, 4 through 24 August (average cumulative fruit

weight of 3071 g/plant from non-treated versus 3716 g/plant of fruit from fungicide-treated). Goldbar produced more fruit than PSX 2287 during the first two weeks of harvest, 6 through 20 July (1955 g/plant versus 1361 g/plant). Exp. 2 was transplanted on 24 July, symptoms were first seen on 12 August. Powdery mildew development in nontreated plants was delayed until fruit production. Average severities on adaxial leaf surfaces on 2 September were 0.9% for non-treated PSX 2287, 0% for fungicide-treated PSX 2287, 32% for non-treated Goldbar, and 0% for fungicide-treated Goldbar. Exp. 2 was terminated prematurely due to Phytophthora crown and fruit rot. Fungicide treatment did not affect yield in the absence of powdery mildew.

EVALUATION OF GLIOCLADIUM VIRENS IN COMBINATION WITH TERRACLOR® AND TERRACLOR SUPER X® AS INFURROW FUNGICIDES FOR COTTON SEEDLING DISEASES. A. S. Mintz and A. W. Mittlehner. W. R. Grace & Co., Columbia, MD 21044 and Uniroyal Chemical Co., Inc., Middlebury, CT 06749.

Cotton trials were conducted in 1992 at eight mid-south locations to evaluate Gliocladium virens (GlioGard™) as a granular in-furrow fungicide. Terraclor® 10G and Terraclor 10G Super X® were applied at the rate of ten pounds per acre. Gliocladium was applied at two rates (three and five pounds per acre), either alone or in combination with Terraclor® or Terraclor Super X® granular products at the reduced rate of five pounds per acre. Gliocladium alone did not provide consistent improvements. Combination treatments, however, resulted in yield and stand counts equivalent to Terraclor® treatments in the majority of tests. The results from this collaboration demonstrate the potential of chemical and biological pesticide combinations as an integrated pest management strategy.

POTENTIAL USES OF AN INEXPENSIVE PARTICLE GUN FOR SOYBEAN TRANSFORMATION STUDIES. Adam S. Pesce and Elizabeth A. Grabau, Dept. of Plant Pathology, Physiology, and Weed Science, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061-0331.

Biotechnology applications to agriculture are based on DNA transfer into target organisms. In plants that are not amenable to regeneration from single cells, recovery of transgenic plants has been limited. Development of the biolistic particle gun has largely overcome this hurdle by allowing introduction of DNA into regenerable material such as embryogenic cultures. The cost of commercially-available particle guns is often prohibitive. Following a recent report (Finer *et al.*, 1992, Plant Cell Rep. 11:323-328), we constructed an inexpensive particle inflow gun. DNA transfer and plant regeneration experiments utilizing particle bombardment are being conducted using soybean embryogenic cultures.

MOLECULAR DETECTION AND IDENTIFICATION OF A MYCOPLASMALIKE ORGANISM (MLO) IN NATURALLY DISEASED CHARDONNAY GRAPEVINE IN VIRGINIA. J.P. Prince, R.E. Davis, T.K. Wolf,\* I.-M. Lee, B.D. Mogen, and E.L. Dally. ARS-USDA Molecular Plant Pathology Lab, Beltsville, MD 20705. \*Virginia Agricultural Experiment Station, Winchester, VA 22601.

Since 1987, symptoms of yellowing, veinal necrosis, and decline have been observed in grapevines cultivated in Virginia (T.K. Wolf *et al.*, 1993, *Am. J. Enol. Viticult.* 44, in press). The disease resembled grapevine flavescence dorée known in Europe, but an association of MLOs with the disease in Virginia had not been demonstrated. In our work, an MLO was detected in diseased grapevine in Virginia by amplification of a 16S ribosomal RNA gene sequence in polymerase chain reactions. Restriction analysis of amplified rDNA revealed close affiliation of the Virginia grapevine MLO (strain FDVA1) with MLOs in the X-disease MLO strain cluster. Further analysis indicated that FDVA1 may be more closely related to Canada X- and western X-disease MLOs than to a third cluster member, clover yellow edge MLO. Thus far, we have not found in Virginia grapevines any aster yellows cluster MLO, such as previously found in grapevines in Italy (Prince, Davis *et al.*, in preparation). DNA-based methods offer new means to assess disease spread and identify vectors and alternate plant hosts.

CHARACTERIZATION OF THE VIRAL COMPLEX ASSOCIATED WITH LA FRANCE DISEASE OF THE CULTIVATED MUSHROOM. C. P. Romaine, B. Schlaghauser, and M. M. Goodin, Department of Plant Pathology, The Pennsylvania State University, University Park, PA 16802.

La France disease of the cultivated mushroom (Agaricus bisporus) is associated with several types of viruslike particles (VLPs) and nine double-stranded RNAs (dsRNAs) of 0.8-3.8 kbp. The dsRNAs are encapsidated by 36-nm isometric VLPs consisting of three polypeptides of 63, 66, and 129 kDa (LIV). A 19- x 50-nm bacilliform virus (MBV) having a 4.4 kb single-stranded RNA genome and a 24.5 kDa coat protein also is affiliated

with the disease. Western analysis of healthy and diseased mushroom isolates revealed that MBV only occurred as a coinfection with LIV and was not consistently associated with the disease. Healthy mushrooms contained three dsRNAs of >13.1, 5.2, and 2.4 kbp packaged in ca. 70-nm diameter fungal vesicles. No cross hybridization was detected among the various RNAs indicating that LIV, MBV, and the 'vesicle virus' are distinct viruses. Our data suggest that LIV is the primary etiologic agent of La France disease, MBV does not have an obligatory causal role, and vesicle-bound dsRNAs that are not overtly pathogenic reside in healthy tissues.

THE FOUNDING OF NEMATOLOGY BY N. A. COBB AT THE BUREAU OF PLANT INDUSTRY, WASHINGTON, D. C. R. M. Sayre, Nematology Laboratory, USDA-ARS, 10300 Baltimore Ave., Beltsville, MD 20705.

During the years 1907 to 1932 Nathan A. Cobb labored to establish nematology as a discipline within the USDA Bureau of Plant Industry at Washington, D. C. His career story recounts the science's beginnings and early growth. Efficacious nematocides were not known during Cobb's time, nevertheless, the science grew under his leadership. He garnered fiscal support of nematology for a quarter of a century under less than ideal conditions with the support of only a few colleagues. Using a body of scientific information largely self-generated and a finely honed administrative ability Cobb maintained the USDA laboratory that gave birth to the discipline and insured it a place among the biological sciences.

INFLUENCE OF MATING TYPE DISTRIBUTION AND TEMPERATURE ON THE OCCURRENCE OF CLEISTOTHECIA IN *SPHAEROTHECA FULIGINEA*. H. Stanisewska and M. T. McGrath, Dept. Plant Pathology, Long Island Horticultural Res. Lab., Cornell Univ., Riverhead, NY 11901.

Influence of temperature on cleistothecial formation and distribution of the two mating types (*MAT1-1* and *MAT1-2*) of *Sphaerotheca fuliginea* were examined to determine if these factors could account for the rare observations of cleistothecia. Isolates were mated on detached leaves in culture. No cleistothecia were observed on leaves maintained at a constant temperature of 28 C or 32 C. Cleistothecia formed at 20 C and 24 C and also at 26/20 C day/night and 28/22 C day/night. Brown cleistothecia were observed first in the various experiments 9 to 12 days after inoculation at 23/19 C, 13 to 16 days at 20 C, 13 to 16 days at 24 C, 12 days at 26/20 C, and 19 days at 28/22 C. Mating type was determined for isolates collected in Long Island, NY, where cleistothecia have been observed; and MI and FL, where cleistothecia have not been observed. Of the 15 isolates from LI in 1991, 12 were *MAT1-1* and 3 were *MAT1-2*. All 4 isolates from MI in 1991 were *MAT1-1*. Of the 38 isolates collected from FL in March or April, 1992, 35 were *MAT1-1*, 2 were *MAT1-2*, and 1 was a mixture. In contrast, all 14 isolates collected in December, 1992, from FL were *MAT1-2*.

BIOLOGICAL CONTROL OF DOLLAR SPOT (*SCLEROTINIA HOMOEOCARPA*) ON CREEPING BENTGRASS (*AGROSTIS PALUSTRIS* HUDS.). K.K. Zimmerman and C. Hagedorn. Department of Plant Pathology, Physiology, and Weed Science, VPI & SU. Blacksburg, VA 24061-0331.

Twenty strains of pathogen-repressive bacteria (PRBs) were evaluated as alternatives to chemical fungicides for controlling dollar spot on creeping bentgrass. Field trials were conducted in 1992 at the VPI & SU Turfgrass Research Center and the PRBs were applied biweekly during the disease season as a liquid spray over four randomized replications of 60 X 120 cm plots. The negative control was an untreated check and the fungicide treatment was Daconil sprayed at 7.6L/92.5 sq.m. Biweekly visual disease ratings were based on percent blighted foliage in each plot. Three PRBs controlled dollar spot at levels equal to Daconil during a high disease pressure season, while two additional PRBs were better than the untreated check but not equal to Daconil. These results indicate some PRBs have been identified that are worthy of evaluation as biocontrol agents.