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Abstracts

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Alphabetized by first author's last name

POSTHARVEST TREATMENTS WITH IPRODIONE WAX/OIL MIXTURES FOR CONTROL OF GRAY MOLD AND OTHER DECAYS OF STRAWBERRY. J.E. Adaskaveg, K.J. Furuiki, J.M. Ogawa, and W.D. Gubler, Dept. of Plant Pathology, Univ. of California, Davis 95616

Non-fungicidal, emulsified summer oils or food-grade wax/oil mixtures significantly enhanced the efficacy of iprodione in postharvest treatments by reducing lesion diameter/incidence of postharvest gray mold caused by *Botrytis cinerea* in wound-inoculated fruit from 6.3 mm/90%, to 2.4 mm/82%, and 0.3 mm/46% in the non-treated, iprodione, and iprodione-wax/oil treatments, respectively. Using either postharvest basket-dips or air-nozzle spray treatments of individual fruit, iprodione (227-454 g ai)-wax/oil (10% Decco 251-petroleum based, 10% Decco 255-vegetable-oil based, or 1% Omni Oil) significantly reduced the natural incidence of gray mold and rots caused by *Rhizopus stolonifer* and *Cladosporium* spp. as compared to iprodione alone or non-treated fruit. Iprodione alone was also effective but visible residues were apparent. Although currently there are no postharvest fungicide treatments for strawberry fruit, iprodione-wax/oil mixtures applied postharvest extended the shelf-life and improved marketability. Fruit appearance was improved by increasing shine and by preventing precipitation of macroscopic residues of the fungicide formulation. Pre-harvest iprodione (454 g ai/378.5 L)-oil treatments applied 1 day before harvest also reduced postharvest decays as compared to non-treated fruit.

DECLINE AND DECAY OF LEMON BY *CONIOPHORA EREMOPHILA* IN ARIZONA. D. M. BIGELOW¹, R. L. GILBERTSON¹, AND M. E. MATHERON². ¹Department of Plant Pathology, University of Arizona, Tucson, 85718 and ²Yuma Agricultural Center, University of Arizona, Yuma, AZ 85364.

An average of 30% (range 4-100%) of mature (average age= 29 yrs.) lemon trees in 11 orchards in Yuma were infected with a fungus tentatively identified as *Coniophora eremophila*. Symptoms were heartrot, breaking of branches, and tree decline. The fungus grows between 15 and 40C, optimum between 30 and 35C, indicating that it is a fungus well adapted to the high temperatures typical of the Yuma desert. In standard wood block decay tests, weight loss was 7-20 percent in 20 weeks. In vegetative incompatibility tests, five isolates were tested; all matings but two were incompatible and evidently represent different genotypes. This is presumptive evidence to indicate that infection is initiated by air-borne basidiospores. In standard ASTM fungicide trials, all compounds tested except for NECTEC[®], a wound dressing treatment, were ineffective in preventing wood decay.

OCCURRENCE AND DISTRIBUTION OF WHEAT VIRUSES IN COLORADO. W.M. Brown, Jr., R.C. French, R.W. Hammon and S.G. Jensen. Colorado State University, Fort Collins, CO 80523, Univ. of

Nebraska, Lincoln, NE 68583-6023, and Fruita Exp. Sta., 1910 L Road, Fruita, CO 81504.

Prior to 1983, only Wheat Streak Mosaic was confirmed in Colorado. In surveys conducted in Colorado since 1985, some previously unreported virus diseases of wheat were identified. Barley Yellow Dwarf, Agropyron Mosaic, Wheat Soil Borne Mosaic and Wheat Streak Mosaic have all been confirmed in Western, NE and SE Colorado. In the SW, only Barley Yellow Dwarf was confirmed. No virus diseases were found in the south central San Luis Valley spring wheat growing area. A new mite-vectored viral-like pathogen known to attack wheat, was found in corn from NE Colorado in 1993. This same disease caused by a similar mite-vectored viral-like pathogen is known to occur in Idaho, Kansas and Texas.

MORTALITY AMONG HYBRID POPLAR CLONES ASSOCIATED WITH MELAMPSORA LEAF RUST. G. Newcombe¹, G.A. Chastagner¹, W. Schuette², and B.J. Stanton². ¹Wash. State Univ., Puyallup, WA 98371 and ²James River Corp., Camas, WA 98607.

Melampsora medusae f.sp. *deltoidae* was the primary cause of leaf rust in a stoolbed planting in Westport, OR, of 41 clones of two hybrid poplar classes, *Populus trichocarpa* X *P. deltoides* and *P. trichocarpa* X *P. maximowiczii*. Each clone was represented by approximately 1000 ramets planted in a block in spring of 1992. Rust severity was rated using the Schreiner scale (0-100) on 28 August, 18 September, and 28 October, 1992. Of the 41 clones, 1, 12 and 21 clones scored 100 (maximal rust) on the 3 dates. Percentage mortality varied from 0-100 on 19 May 1993. Correlation coefficients ($r=0.89, 0.85, \& 0.63$) indicate rust severity and subsequent mortality were highly correlated ($P<0.0001$) on all dates. The highest correlation occurred on 28 August when only the most susceptible clone had a maximum infection rating.

FIELD EVALUATION OF VIRUS RESISTANCE IN TRANSGENIC YELLOW SQUASH. George H. Clough, Philip B. Hamm and Joy Jaeger. Oregon State University, Hermiston Agricultural Research and Extension Center, PO Box 105, Hermiston, OR 97838.

Three transgenic hybrids of yellow crookneck squash (*Cucurbita pepo* var. *pepo* cv. Pavo) were evaluated in field trials for resistance to zucchini yellow mosaic virus (ZYMV), watermelon mosaic virus 2 (WMV2), and cucumber mosaic virus. Two (ZW-B and ZW-H) of the 3 hybrids exhibited complete resistance to

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ZYMV under conditions favorable to disease development; 100% of the controls became infected. Disease severity in the third hybrid (CZW), a cross between heterozygous transgenic and non-transgenic parents, was intermediate. AUDPC values were 44.2, 26.6, 2.1, and 0 for the control, CZW, ZW-B, and ZW-H, respectively. ELISA tests on mature plants of ZW-B and ZW-H were negative for ZYMV, but 5% were positive for WMV2. Marketable fruit yield was 3600, 3200, 2390 and 740 kg·ha⁻¹ for the ZW-B, ZW-H, CZW and susceptible control, respectively. Total yield did not differ between the resistant hybrids.

CONTROL OF RHIZOCTONIA ON POTATO WITH METAM SODIUM. James R. Davis, Leland H. Sorensen, and Ann T. Schneider. University of Idaho, Research and Extension Center, Aberdeen, ID 83210.

Field studies in 1992 showed Rhizoctonia to be controlled on the Russet Burbank potato following injection and soil incorporation of 468 l/ha metam sodium (MS) within the upper 15 cm of the soil profile. Field studies in 1993 showed these results to be reproducible. Comparisons of either spring or fall MS applications, or at rates of 468 l/ha or 936 l/ha, did not differ significantly on Rhizoctonia control. Infection and tuber scurf indices were significantly reduced by MS at 67% and 72%, respectively. With Rhizoctonia control following spring application of MS, tuber appearance was improved, mean tubers per plant were increased by 29% while tuber size observed early in season (July) was increased by 66%. At season-end (Sept.), malformed tubers were reduced by 43%. With this reduction, both total and U.S. #1 yields were respectively increased by 6.4 and 18.6%. In contrast to the control of Rhizoctonia, Verticillium wilt was not reduced.

LETTUCE CHLOROSIS VIRUS--A NEW WHITEFLY-TRANSMITTED CLOSTEROVIRUS IN THE SOUTHWEST DESERT. J.E. Duffus, H.Y. Liu, and G.C. Wisler, USDA-ARS, 1636 E. Alisal St., Salinas, CA 93905.

Lettuce infectious yellows virus (LIYV) has been a limiting factor in the production of crops in the desert regions of southwestern USA since 1981. Following the introduction of the B biotype of *Bemisia tabaci* into the region in 1990, the incidence of LIYV dropped significantly. A mixture of viruses including LIYV and a previously undescribed closterovirus herein termed lettuce chlorosis virus (LCV) have been isolated since 1991 from yellowed lettuce plants in the desert. LCV has long filamentous particles, and is transmitted by both the A and B biotypes of *Bemisia tabaci*. LCV can be distinguished from LIYV and other whitefly-transmitted closteroviruses by serology, dsRNA analysis, host range and insect-virus relationships.

FIELD REACTION OF BRASSICA SPP., RAPHANUS SATIVUS AND SINAPIS ALBA TO NACOBBUS BATATIFORMIS, RHIZOCTONIA SOLANI AND ALTERNARIA BRASSICAE. F. A. Gray, D. W. Koch and J. M. Krall, PS&IS, University of Wyoming, Laramie, WY 82071.

Varieties of seed oil rape (*Brassica napus*, and *B. campestris*), forage Brassicas (kale, *B. oleracea*; turnip, *B. rapa*; rape, *B. napus* and tyfon, *B. rapa* x *B. pekinensis*) and sugar beet nematode trap crops (fodder radish, *Raphanus sativus* and yellow mustard, *Sinapis alba*) were evaluated after 5 wk in 1992 and after 14 wk in 1993 for reaction to Rhizoctonia root and crown rot (*Rhizoctonia solani*, AG-2) and to the false root-knot nematode (*Nacobbus batatiformis*), both pathogens of sugar beet in Wyoming. All cruciferous crops were nonhosts to *N. batatiformis* and *R. solani*, except 'Adagio' radish which was rated as slightly susceptible (5.3% diseased roots) to *R. solani* in 1993. Percent diseased beets with *R. solani* and *N. batatiformis* in 1992 and 1993 were 41.3 and 81.0, and 23.3 and 20.0, respectively. Several weeds growing in the test site were also hosts of *N. batatiformis*. In 1993, *Alternaria* leaf spot (*Alternaria brassicae*) of sugar beet occurred in the test site and all 11 cruciferous crops were susceptible to this disease. The oil seed rape 'Colt' was the most susceptible entry, followed by 'Adagio' radish.

BRANCH DIE-BACK OF MACADAMIAS IN CALIFORNIA AND SOUTHERN AFRICA INDUCED BY BOTRYOSPHAERIA RIBIS. N. M. Grech¹, H. D. Ohr¹, and M. L. Arpaia², Department of Plant Pathology¹, and Botany and Plant Sciences², University of California, Riverside, CA 92521

After two dry years, a severe die-back of macadamias was seen in South Africa. *Botryosphaeria ribis* was isolated from infected samples which showed a brown-purple discoloration in the wood. In California,

the disease also appeared and caused considerable damage. Five 18-month seedlings were inoculated with agar plugs from an actively growing *Botryosphaeria* culture. Two plants began to wilt after 4 wk and were dead at 5 wk. These plants had typical brown-purple discoloration, and *Botryosphaeria* was re-isolated. Additional glasshouse trials and field surveys indicated water stress increased susceptibility to branch die-back. Pruning below the infection, spraying the wound with benomyl and sealing were effective controls of this disease.

SOIL FUMIGATION IMPACT ON SOILBORNE FUNGI AND POTATO YIELD. Philip B. Hamm, *Russell E. Ingham, +Bill Swanson, and Joy Jaeger. Hermiston Agricultural Research and Extension Center, Oregon State University, P.O. Box 105, Hermiston OR 97838; *Dept of Botany & Plant Pathology, Corvallis OR 97331; +Crop Production Services, P.O. Box 651 Umatilla, OR 97882.

Soil fumigation using 1,3-dichloropropene (D), metam-sodium (MS), and 1,3-dichloropropene plus chloropicrin (DC), applied alone or in combination, is widely used to control soilborne pathogens of potato in Oregon's Columbia Basin. To determine efficacy of these fumigants on reducing soil populations of *Verticillium dahliae*, *Fusarium* sp, and *Pythium* sp, pre-fumigation, post fumigation and mid-season soil samples were taken at 0-30 and 31-60cm, at different locations during 1992 and 1993. The following treatments were compared in a randomized, split plot design: not treated (control), D at 31L/ha, DC at 38L/ha, MS at 84L/ha, and MS+D at 84L & 31L/ha, respectively. At 0-30, MS reduced the populations of all fungi. D had no effect; the effects of DC were inconsistent. The fumigants were ineffective at 31-60 cm. Fungal populations were higher at 0-30 cm, regardless of treatment. MS increased potato yield (cv. Russet Burbank) each year (48.4 & 14.2%), DC during one year (40.7%), D had no effect.

STABILITY OF SLOW RUSTING RESISTANCE IN ASPARAGUS. Dennis A. Johnson, Washington State University, Pullman, WA 99164-6430.

The stability of slow rusting resistance in several asparagus cultivars was evaluated in two replicated field trials over an 11 year period. Inoculum of *Puccinia asparagi* originated each year from teliospores. Jersey Titan, Jersey Centennial, Jersey Giant, Delmonte 361, and UC-157 had significantly lower ($P = 0.05$) area under the disease progress curve (AUDPC) than Wash T2 and WSU-1 each year of the first trial, and they had lower AUDPC than Mary Washington but the difference was not always significant. Jersey Giant, Delmonte 361, and UC-157 had significantly lower AUDPC than European cultivars Cito, Larac, Gynlim, Largo 17-3, and Franklim each year of the second trial, and they had lower AUDPC than Luc 310, Tainan 1, and Luc 234 but the difference was not always significant.

POTENTIAL SEED TREATMENTS FOR CONTROL OF FUSARIUM ON WHEAT SEED. R. H. Johnston and D. E. Mathre, Dept of Plant Pathology, Montana State University, Bozeman, MT. 59717.

Given the potential for a lack of quality seed for planting wheat fields in the northern US due to infection from *Fusarium graminearum* during the 1993 growing season, a study was undertaken to evaluate a number of fungicides for their efficacy in situ against this pathogen. A heavily infected spring wheat seed lot (2375) was obtained which had been produced near Twin Valley, MN on a field which had previously been planted to corn. Separation of nontreated seed into groups of red or bleached (tombstone) kernels had reduced germination of 95 and 9%, respectively. Germination was observed to be independent of seed size. Eight registered, five experimental and one biological treatment were applied to the seed and evaluated in laboratory and glasshouse tests. In laboratory blotter germination tests, imazalil and Maxim were the most effective materials tested. In glasshouse soil emergence tests plants initially emerged at varying rates, but within 11 days there was no difference among chemical treatments which on average increased emergence 50% over the control. Kodiak, which is a biological control agent had little effect on *Fusarium*.

FUNGICIDES FOR CONTROL OF LETTUCE DOWNY MILDEW. F.F. Laemmlein, A.O. Paulus, and M. Vilchez. University of California, Santa Maria (93455), and Riverside (92521), Ca.

Fluazinam 85DG (0.6 kg/ha) and 500G (1.0 l/ha) suppressed *Bremia lactucae* (1.5 and 1.5, resp., leaf lesion rating) better than 2.0 kg/ha mancozeb (1.9 rating), 2.0 kg/ha maneb (2.0 rating) or 3.0 kg/ha Aliette + 1.8 kg/ha KHCO₃ (3.5 rating). All treatments were significantly better than the untreated control (4.4 rating) at $p = .05$.

However, Fluzinam, at the above rates, used on a 10-day schedule on var. Alpha lettuce caused growth regulator (GR) effects resulting in light-weight, distorted heads. When rates for Fluzinam 85DG and 500G were reduced by half (0.3 kg/ha and 0.5 l/ha, resp.), no GR effects occurred. However, *B. lactucae* suppression was also reduced. Two kg/ha maneb 80W + 1.0 kg/ha copper hydroxide (7.8 lesions/20 plants), 2.0 kg/ha maneb 80W (8.2 lesions), 3.0 kg/ha Aliette + 1.8 kg/ha KHCO₃ + 1.5 kg/ha maneb 80W (8.5 lesions), 3.0 kg/ha Aliette + 1.5 kg/ha maneb 80W (10.8 lesions) and 2.0 kg/ha mancozeb 80W (13 lesions), all provided better *B. lactucae* suppression than 0.5 kg/ha Fluzinam 500G (14.2 lesions) and 0.3 kg/ha Fluzinam 85DG (41.8 lesions). Control by all materials, except Fluzinam 85DG, was significantly better than the untreated control (64 lesions), at $p = .01$, on var. Target lettuce.

VIRULENCE OF *STREPTOMYCES SCABIES* ON POTATO TUBERS AND SEEDLINGS OF OTHER PLANTS. R. H. Leiner^{1,2}, R. Loria¹ and D. E. Carling². Department of Plant Pathology, Cornell University, Ithaca NY 14853¹, and University of Alaska Fairbanks, Palmer Research Center, 533 E Fireweed, Palmer AK 99645²

Two strains of *Streptomyces scabies*, 87-22 and 84-34, isolated from common scab lesions on potato tubers, differed in virulence as determined by inoculation of minitubers produced on stem cuttings of potato plants. Mean percents of necrotic tuber surface area were 61% for 87-22, and 28% for 84-34, across two cultivars and five ages of minitubers. In *in vitro* assays on seedlings of 14 crop plants, inoculation with 87-22 reduced shoot height more than inoculation with 84-34. For example, mean shoot height of radish seedlings were 9, 16, 37, and 35 mm when treated with oatmeal broth (OMB) cultures of 87-22, 84-34, the nonpathogen *S. lividans* TK24, and sterile OMB, respectively. Similar reductions in shoot height resulted when radish seedlings were treated with cell-free extracts of OMB cultures of 87-22 and 84-34. Strain 87-22 produced 4.25 µg/ml of the phytotoxin thaxtomin A in OMB, whereas 84-34 produced only 0.17 µg/ml. The specific role of thaxtomin A and other extracellular products in pathogenesis on plant shoots and roots remains to be determined.

TUFTING AND ANASTOMOSIS CORRELATED IN *R. SOLANI* AG-8.

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Anastomosis techniques are used to separate 12 AGs within *Rhizoctonia solani*. *R. solani* AG-8 can be sub-divided into five Zymogram groups (ZG1-1 to 1-5) using pectic isozyme patterns. If isolates from different ZGs are paired in an anastomosis test, they give a C2 (a strong or close anastomosis relationship) reaction. Pairing of two isolates from within the same ZG can give either a C2 or a C3 (a self or clonal anastomosis relationship) reaction, depending on whether they are or are not clones. If these confrontations are carried out on PDA amended with charcoal, all isolates giving a C2 produce a "tufting" reaction, whereas all isolates giving a C3 result in a "merging" reaction with no evidence of tufting. The implications of this will be discussed.

ENHANCEMENT OF HOT WATER WITH ETHANOL TO CONTROL POSTHARVEST DECAY OF STONEFRUIT BY *MONILINIA FRUCTICOLA*.

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Naturally-infected peaches and nectarines were immersed in hot water alone or with ethanol (EtOH) to control decay. EtOH significantly enhanced control. In 4 tests, 150 sec immersion in water at 46 or 50°C reduced decay from 82.8% in controls to 59.3 and 38.8%, respectively, while immersion in 10% EtOH at 46 or 50°C reduced decay to 33.8 and 24.5%, respectively. Decay after triforine (1000 ppm, 20°C dip) treatment was 32.8%. Two treatments were selected for evaluation (10% EtOH at 50°C for 150 sec and 20% EtOH at 46°C for 75 sec). After 14 da at 0°C and 4 da at 20°C, surface color, internal appearance, and soluble solids were not different among treatments. No off-flavors or odors were detected. In 7 of 9 tests, flesh firmness was significantly greater, ca. 1 lb. force, after EtOH treatment than in controls. Two late-season nectarines showed slight surface shrivel; removal of natural wax may have hastened drying. EtOH content of fruit treated with 10 or 20% EtOH was 504-535 ppm and 96-106 ppm within 1 da and after 14 da, respectively.

EFFECT OF METHAM ON COTTON DEVELOPMENT AND SEEDLING DISEASE. K. D. Marshall¹, J. J. Nunez and R. M. Davis, Dept. of Plant Pathology, University of California, Davis 95616. ¹present address: Dept. of Plant Pathology, University of Wisconsin, Madison 53706.

The effect of metham on cotton stand, growth, mycorrhizal development, and yield was studied in three locations in the San Joaquin Valley of California in

1992 and 1993. In a 2x3 factorial experiment, main-effect comparisons were made between nontreated seed vs. seed treated with Apron plus Nu-Flow ND and metham applied to soil at 0, 50, or 100 gal/A. In 1992, application of metham resulted in (by location): (1) improved stand but reduced yield due to decreased root infection by mycorrhizal fungi; (2) increased stand and yield and no effect on mycorrhizal infection; (3) no effect on stand and yield but reduced plant development and mycorrhizal infection. In 1993, metham reduced mycorrhizal infection but did not affect yield or growth, presumably due to adequate soil phosphorus. A decreased growth response in nonmycorrhizal plants was associated with phosphorus levels below 0.14% in seedling petiole tissue. Metham consistently reduced soil populations of *Thielaviopsis basicola* but generally did not reduce populations of *Pythium* spp. or *Rhizoctonia solani*.

EVALUATION OF COPPER SENSITIVITY IN STRAINS OF *PSEUDOMONAS SYRINGAE* PV. *TOMATO* AND CONTROL OF BACTERIAL SPECK OF TOMATO. P. A. Mauk, G. Miyao, and K. Conn, Univ. of California Coop. Extension, Sacramento 95827, Coop. Extension, Woodland 95695, and Dept. Plant Pathology, Davis 95616.

Bacterial speck, caused by *Pseudomonas syringae* pv. *tomato* (*P.s.t.*) is widespread in processing tomato fields in the Sacramento Valley of California from March through September. Growers have successfully used Cu-based materials for control of bacterial speck but in 1993, growers reported a lack of control. This study was initiated to determine copper sensitivity, efficacy of Cu-based products, and timing of application for control of speck. Strains of *P.s.t.* were sensitive to 2400 µg/ml copper using a Cu-disk agar assay. *In vitro* results indicated that strains of *P.s.t.* were sensitive to 2000 µg/ml ZnSO₄ and were sensitive to mancozeb (Dithane DF 1.13 lb a.i./25 gal). In greenhouse trials, tomatoes were untreated (check) or treated at the two true-leaf stage with zinc bordeaux, mancozeb, mancozeb+CuOH, maneb+Zn, maneb+Zn+CuOH, CuOH, or streptomycin sulfate. Ten days after treatment and inoculation, plants were rated for disease severity (DS) with 0=0; 1=1-5; 2=6-15; 3=16-25; and 4=25 lesions/leaflet. Treatments applied after an infection period were not effective. The most effective pre-infection period treatment in reducing DS was streptomycin sulfate (DS=0.02) with CuOH (DS=0.16), mancozeb+CuOH (DS=0.17), or maneb+Zn+CuOH (DS=0.253) also significantly reducing disease severity. Zinc bordeaux (DS=1.04) was significantly different from the check (DS=1.94).

POTATO LATE BLIGHT AND SEXUAL LIBERATION John Niederhauser Dept. Plant Pathology, University of Arizona, Tucson AZ 85721

Two sexual strains (A1 and A2) of *Phytophthora infestans* were found in Mexico in the 1950's. Only in Mexico did both occur. In the rest of the world only A1 was found. In the 1980's it was revealed that the A2 strain had escaped from Mexico, and was spreading world-wide. This provoked great alarm. Populations of the fungus were more variable, strains resistant to fungicides appeared more often, potato blight resistance was more easily overcome, the sexual oospore was overwintering, and outbreaks of late blight have recently been more severe and frequent. A durable blight resistance is urgently needed to reduce the use of costly chemical fungicides that can affect the quality of the environment, and to include this resistance in a practical IPM program, particularly for sustainable agriculture. A new project in international cooperation (PICTIPAPA), based in Mexico, has been launched to coordinate a world wide effort to meet this challenge.

TRANSFORMATION OF *CEPHALOSPORIUM GRAMINEUM* WITH THE β -GLUCURONIDASE GENE. M. Qi, and T. D. Murray, Department of Plant Pathology, Washington State University, Pullman, WA 99164.

Cephalosporium gramineum, the cause of Cephalosporium stripe of wheat, was transformed with the β -glucuronidase (*GUS*) gene (*gusA*) from *Escherichia coli* and the β -tubulin gene (*bml1*) from *Neurospora crassa* as a selectable marker. Transformation frequency with *bml1* was 2-10 transformants/µg plasmid DNA and co-transformation frequency with *gusA* was 70-90%. The seven transformants studied were similar to the wild-type parent in sporulation, radial growth, and pathogenicity; however, only four of these were mitotically stable after seven single-spore transfers. Southern analysis of transformant genomic DNA showed that *bml1* was integrated in multiple copies and *gusA* was integrated in single or multiple copies. *GUS* activity increased with number of conidia and radial growth of the *gusA* transformants, and could be detected in roots and stems of plants inoculated with *gusA* transformants 10 days after inoculation. *GUS* activity was not detected in plants inoculated with the wild-type isolate.

ALTERNARIA LEAF SPOT OF ANAGALIS. Robert D. Raabe, Department of Plant Pathology, University of California, Berkeley CA 94720.

Anagalis arvensis, pimpernel or scarlet pimpernel, commonly is found as a weed though occasionally may be cultivated. Plants in Half Moon Bay, CA were found with circular to irregularly shaped, reddish brown leaf spots. A parasitic *Alternaria* was isolated belonging to the *A. dauci* group. The fungus proved by inoculation to be pathogenic on *Anagalis arvensis*, *A. arvensis* f. *caerulea*, *A. monelli*, and *A. monelli* subs. *linifolia*. In 1939, A. Raabe described, on *A. arvensis*, an *Alternaria* which he named *A. anagallidis*. The spore measurements of the form from California fell within the range of those described in Germany. In 1945, Neegard listed the fungus on *A. arvensis* and *A. arvensis* f. *caerulea* in Denmark. He found it slightly pathogenic on *Linaria maroccana*. He also found a similar form naturally on the same species, and named it *Alternaria anagallidis* v. *linariae*. In 1916, Bubak and Dearn listed *Macrosporium fallax* as a new species on *L. vulgaris* in Canada. When Joly revised the genus *Alternaria* in 1964, he used that as the first record and called the fungus on all of the plants listed as *A. fallax* (Bub. and Dearn.) Joly, and listed *A. anagallidis* Raabe as a synonym. This is believed to be the first report of *Alternaria* on *Anagalis* in the U.S. and possibly the first report of this fungus on *A. monelli* and on *A. monelli* subs. *linifolia*.

SEPTORIA LEAF SPOT OF SCABIOSA. Robert D. Raabe. Department of Plant Pathology, University of California, Berkeley CA 94720.

In 1992, in a Napa Valley garden and in a Berkeley garden, a leaf spot was found on *Scabiosa atropurpurea*. Spots were circular, between 4.76 mm and 12.7 mm in diameter. Centers were white with scattered black pycnidia and were surrounded by a ring of purple. The causal organism was determined to be a species of *Septoria*. In 1853, Desmazieres described a *Septoria* on *Scabiosa* and named it *Septoria scabiosicola*. Although Crie, in 1878 called the fungus *S. scabiosae*, it presently is listed as *S. scabiosicola* Desm. Pycnidia are 80-100 µm in diameter and the conidia are 45-60 µm in length and 1-2 µm in width. In the European descriptions of the fungus, pycnidia were between 65-130 µm in diameter and the conidia were between 24-68 µm in length and between .7-2.0 µm in width. The measurements of the fungus found in California fall within the range of those for the fungus in Europe and therefore is considered to be *Septoria scabiosicola* Desm. Inoculations of 4 cultivars of *Scabiosa* were successful. This is believed to be the first report of this fungus in the United States.

EFFECT OF SEEDBORNE *ALTERNARIA ALTERNATA* ON SUGARBEET SEEDLING ESTABLISHMENT. Cynthia D. Strausbaugh and John J. Gallian, University of Idaho, Twin Falls Research and Extension Center, P.O. Box 1827, Twin Falls ID 83303-1827.

Isolations from diseased sugarbeet (*Beta vulgaris*) seedlings from fields with poor stands in Idaho have repeatedly yielded *Alternaria alternata*. Seed inoculated by vacuum infiltration with a suspension of 10^7 conidia per ml of *A. alternata* that had been isolated from commercial sugarbeet seed was grown in sterile sandy loam field soil in a controlled environment chamber with temperatures ranging from 2 to 15 C. Emergence was reduced 47% compared with uninoculated controls and disease ratings on a 0-5 scale (0=no disease, 5=plants dead) for the inoculated treatments ranged from 1.0 to 3.1 in two experiments. The effect of inoculation on germination was variable. At 23 C in sterile vermiculite, seedling disease ratings were higher and seedling vigor lower than controls, while germination and emergence were not significantly affected. Incidence of *A. alternata* in seed among nine commercial sugarbeet cultivars in 1993 ranged from 0 to 48%, while in previous years incidence has been detected as high as 56%.

MICROSCOPY AND CHEMICAL CHARACTERISTICS OF A *PHOMA* SP. ISOLATED FROM THE HIMALAYAN YEW, *TAXUS WALLACHIANA*. Gary Strobel, Julie Lee*, Xianshu Yang and W. M. Hess**. Dept. of Plant Pathology, Montana State University, Bozeman, MT 59717 *Dept. of Chemistry, Cornell University, Ithaca, NY 14853, and **Dept. of Botany & Range Science, Brigham Young University, Provo, UT 84601.

The fungus, an endophyte, was identified based upon its pinkish pigment production, pseudosclerotia, and pycnidia with unicellular spores (approximately 1.5x4 µm). This *Phoma* sp. produces a potent antibacterial compound, altersolanol A in culture. The compound was also found in *Taxus* inoculated with the fungus as determined by electrospray mass spectroscopy. The structure of the crystallized compound was confirmed by X-ray analysis. The fungus appears to have a mutualistic or semi-symbiotic relationship with the tree by producing an anti-bacterial substance as it survives in the intercellular spaces of the trees where it acquires carbon and nitrogen. It produces profuse quantities of pycnidiospores and Pycnidia range from approximately 50 µm to more than 100 µm.

PINK BLUSH AND RED ROT OF EDIBLE GINGER CAUSED BY *PYRENOCHAETA* SP. Trujillo, E.E., Nishijima, W., and Menezes, T. Professors, and research associate, Plant Pathology Department, University of Hawaii, Honolulu, HI 96822. A new disease of ginger, characterized by an extensive magenta-pink, discoloration of the periderm and a dry rot of the cortical tissues which becomes purple red in underground rhizomes, is caused by *Pyrenochaeta* sp. The incidence of red rot was enhanced by the wounding of rhizomes during the removal of plant shoots to induce early dormancy. Pycnidia formed on the surface of the diseased tissues. Applications of benomyl and metalaxyl prior to shoot removal suppressed the development of red rot. Hot water treatment of ginger rhizomes at 60C for 5 minutes killed the pathogen in the infected cork, but the viability of rhizomes was reduced by 70%.

Preliminary evidence for thrips-transmission of Prunus necrotic ringspot virus to peach. J. K. Uyemoto^{1,3}, I. Greene², C. F. Luhn^{1,3}, and A. Rowhani³, USDA-ARS¹, Departments of Entomology² and Plant Pathology³, University of California, Davis, CA 95616

Prunus necrotic ringspot virus (PNRSV) and prune dwarf virus (PDV) are reportedly transmitted horizontally, i.e. in a venereal manner during pollination. Although fruit on healthy trees were commonly infected with PNRSV or PDV during six annual assays by ELISA, only two new systemic infections were detected among the same 100 trees tested; one prune with PNRSV and one cherry with PDV. Since reports of thrips transmissions of PNRSV and PDV to cucumber have appeared recently, we did a trial to determine if thrips could transmit PNRSV to peach. Two pollen sources of PNRSV and a source of healthy pollen were caged with or without thrips (*Frankliniella occidentalis*) onto one limb with flowers of 5 trees per treatment. Trees were assayed by ELISA and by sap-inoculations to cucumber a year later. One tree exposed to diseased pollen and thrips was infected. When purified virus preparations of the original pollen source and infected peach were electrophoresed in agarose gel, the migration profiles of their nucleoproteins were similar. Also, the same tree developed the typical shock symptoms associated with new infections. Trees in other treatments were negative for PNRSV. Thrips may be involved in orchard spread of PNRSV.

JUNIPER DIE-OFF IN NATURAL BRIDGES NATIONAL MONUMENT AND IN CANYONLAND NATIONAL PARK.

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Extensive foliar damage to Utah juniper (*Juniperus oosterperma* (Torr.) Little) has been observed in southern Utah. The distal foliage becomes chlorotic and dies. While junipers are plagued with a number of disease problems, no pathogenic agent or soil mineral appears to be responsible for the die-off. Some chlorotic branches were present due to insect twig cutters, but they do not appear to be the cause of die-off. Juniper die-off could be the combination of drought and temperature stress which reduce the water resources and increase the uptake of salts by the trees. These effects along with the crystal formation of iron, magnesium and calcium in the diseased yellow twigs could result in the die-off symptoms.

POWDERY MILDEW CONTROL WITH THE HYPERPARASITIC FUNGUS *AMPELOMYCES QUISQUALIS*. S.K. Whitesides, Ecogen Inc., 2005 Cabot Blvd. West, Langhorne, PA. 19047.

Ampelomyces quisqualis (AQ-10) is a highly selective biofungicide that controls powdery mildew disease by hyperparasitic activity. The efficacy of AQ-10 has been evaluated under rigorous field and greenhouse challenges in 1992 and 1993. Results indicate that AQ-10 can effectively control powdery mildew on grapes, cucurbits, and roses when applications are alternated with traditional chemical fungicides in an integrated pest management program.

INCIDENCE OF TWO SOIL BORNE VIRUSES OF SUGAR BEET IN THE USA. G.C. Wisler, J.E. Duffus, H.-Y. Liu¹, E. Kerr², and J.J. Gallian³. USDA-ARS, Salinas, CA¹, Univ. of Nebraska, Scottsbluff, NE², Univ. of Idaho, Twin Falls, ID³.

Soil tests for beet necrotic yellow vein virus (BNYVV) and beet soil borne mosaic virus (BSBMV) in sugar beet growing areas of the USA were summarized for 1992-1994. Only one field of 242 sampled in Nebraska had a 22% incidence of BNYVV, whereas BSBMV was found in 20% of fields tested. A region representing a 5.6 km radius in southeastern Idaho had a 7.6% incidence of BNYVV. Samples from Colorado had a 16.5% and 51% incidence of BNYVV and BSBMV, respectively. In samples from Wyoming and Michigan, BNYVV was not detected, but BSBMV was present in both states (9.1 and 6.6 %, respectively). BNYVV was detected in 20% of samples from California, but to date no BSBMV has been detected.

RELATIONSHIP OF MELOIDOGYNE KONAENSIS TO COFFEE GROWTH IN HAWAII. Fengru Zhang, and D. P. Schmitt, Department of Plant Pathology, University of Hawaii, Manoa, Honolulu, Hawaii 96822.

Meloidogyne konaensis, discovered in Kealahou, Hawaii in 1991 on coffee, was evaluated for its effect on the rate of coffee tree growth in a naturally infested field. The tree trunks of cultivar Guatemalan and Guatemalan scion-Deweveri stock were cut when the plants were 3-years-old. When new shoot growth was established, plant height measurements and nematode samples were taken. The sampling and measurements were continued for one year at 3-month-intervals. A negative linear regression existed between the initial population density of the nematode and the percent increase in tree height over the 12-month period. The decrease in growth rates was greater on Guatemalan than on Guatemalan scion-deweveri root stock. The regression slopes were -0.073 and -0.048, respectively. The negative relationship between nematode population density and plant growth provides evidence of the damage potential of this nematode on coffee.