Disease Notes


Curly dock (Rumex crispus L.) is a perennial deciduous plant in the family Polygonaceae. It is widely distributed in grasslands and orchards and is an important weed that is traditionally used as a medicinal herb. During the summers of 2000 and 2001, a severe anthracnose disease was observed on leaves of mature curly dock in the foothills near the western coastal area of Muchangpo, Uenhon, the district of Chungnam in Korea. Initial symptoms usually appeared in June as a small number of slightly soaked spots on leaves. Typical symptoms, generally observed in late July and August following a long, rainy, hot period, consisted of a number of brown leaf spots that expanded and often twisted, resulting in discoloration of whole parts to blackish brown or slightly reddish brown and defoliation. A fungus, which was isolated from the leaf lesion, was identified as Colletotrichum destructivum O’Gara based on previous descriptions (1,3). The fungus was characterized by conidia, which were long, relatively narrow, and straight to slightly curved with abruptly truncate base. Pathogenicity of the isolate was determined on 5-week-old Medicago sativa (Canary seed) and Crismonum arvense (the only other species described in the genus) with urediniophores of a domestic isolate of the fungus from C. arvense in Maryland. Of 51 inoculated plants of S. marianum, 23 became infected and produced uredinia. None of the 12 inoculated plants of S. eburneum showed symptoms of infection. In nature, C. arvense and S. marianum occupy different ecological areas. C. arvense is found predominately in humid temperate habitats, while S. marianum is found in habitats with a dry Mediterranean climate. Life cycles of each host are also different. C. arvense is a perennial that emerges in spring and dies back in winter, while S. marianum is a winter annual that emerges in fall and dies in late spring. Because of the differences in life cycles combined with the different geographical distributions, P. punctiformis from C. arvense may rarely encounter susceptible S. marianum plants in the field. Since fungal spores can be produced routinely on artificially inoculated plants, there might be potential to use P. punctiformis for biological control of S. marianum. To our knowledge, this is the first report of S. marianum as a host for P. punctiformis.


Mechanically transmissible viruses were isolated from two soybean (Glycine max Merr.) plants from Rustenburg, Northwest Province and Greytown, KwaZulu-Natal, South Africa, respectively (2). Viruses were isolated by two serial local-lesion transmissions on Chenopodium quinoa. Ringspot symptoms on Nicotiana benthamiana suggested the presence of tospoviruses. This was supported by the detection of typical tospovirus-like particles in ultrathin sections of infected plants. Serological analysis of samples using various tospovirus antiserum in a number of enzyme-linked immunosorbent assay formats suggested the two isolates had epitopes in common with Tomato spotted wilt virus (TSWV), Groundnut ringspot virus (GRSV), and Tomato chlorotic spot virus (TCSV). Nucleotide sequences were determined using reverse transcription-polymerase chain reaction (RT-PCR) for 857 bp of the nucleoprotein gene of the two isolates (GenBank Accession Nos. AF487516 and AF487517). These revealed a 99% nucleotide identity with each other. Sequence comparison with cognate regions of TSWV (GenBank Accession No. D00645, GRSV-SA-05 (GenBank Accession No. S54327), and TCSV (GenBank Accession No. S54325) revealed that both isolates share 97% nucleotide sequence identity with GRSV (SA-05) from peanut also originally from South Africa (1). Both isolates are therefore considered GRSV. To our knowledge, this is the first report of the natural occurrence of GRSV on soybean worldwide.


(Disease Notes continued on next page)

*Festuca amphi* is native to the Iberian Peninsula (4). Endophytic mycelium was observed by microscopy (2) in stem pith samples of two of eight asymptomatic plants of *F. amphi* collected in one population from a natural grassland in Salamanca, Spain. The fungus could be isolated (2) only from these two plants, and conidiophores and reniform conidia typical of *Epichloë* species (3) were observed in pure cultures. The two infected plants maintained in pots outside, developed ecotostromata in some reproductive stems (choke disease) the year after the field sampling. Six seeds collected from an infected plant were germinated, and all six seedlings were found to be infected based on microscopy (2), implying seed transmission of the endophyte. These observations suggest that this is a pleiotropic symbiont, having both mutualistic and pathogenic states in its host. An ergovaline concentration of 120 ng/g dry weight was detected in a sample of leaves and leaf sheaths of an infected plant. All of the above characteristics are typical of the genus *Epichloë*, and in particular of the fine fescue endophyte *E. festucae* (1,3). To determine the species, internal transcribed spacer and 5.8-rDNA sequences were cloned. Blasted in GenBank, *E. festucae* (3) was reisolated from all symptomatic plants. To our knowledge, this is the first report of this endophyte species in the grass *F. amphi*.


Frogeye leaf spot, caused by *Cercospora sojina*, is an economically important foliar disease of soybean (*Glycine max* (L.) Merr.) in areas where growing conditions are warm and humid. During a survey conducted in 2000 and 2001 in soybean fields in Wisconsin, reddish brown, circular to angular spots varying in diameter from 1 to 5 mm were observed on soybean leaves in four fields in Dane and Iowa counties, and in five and six fields in Lafayette and Green counties, respectively. Soybean plants were grown in growth chambers at 85% humidity, 15 day photoperiod. The light output in the growth chamber was 300 µmol·m-2·s-1 during the inoculation period. Plants were removed from the box after 48 h and placed in a greenhouse with a 12-h photoperiod. The light output in the growth chamber was 300 µmol·m-2·s-1 and the temperature was maintained at 24 ± 3°C. The experiment was repeated once. Typical field symptoms appeared on each of the inoculated plant 8 days after inoculation, while the controls expressed no leaf symptoms. *C. sojina* was reisolated from all symptomatic plants. To our knowledge, this is the first report of *C. sojina* from soybean in Wisconsin.


Web (aerial) blight was observed in field plots of *Catharanthus roseus* (L.) Don (Madagascar periwinkle) during three consecutive summers at the Burden Research Center in Baton Rouge. Leaf spots formed first, followed by a general blighting of leaves and stems that resulted in circular areas of dead plants in the plots. Dead leaves were matted together but remained attached to plants. Mycelia, and occasionally small, brown sclerotia (1 to 3 mm) were observed on blighted foliage. During the first year, only prostrate-growing cultivars belonging to the Mediterranean series of *C. roseus* were infected, but in 2001 and 2002 upright-growing cultivars as well as those with prostrate growth habit became infected. The disease occurred in July and August during periods of hot, humid, and rainy weather. Among 52 cultivars in the 2001 trial, only ‘Tropical Pink’, ‘Tropical Rose’ and ‘Stardust Orchid’ were disease free. A *Rhizoctonia* sp. was consistently isolated from diseased plants and further characterized as *R. solani* Kühn AG-1 based on its multinucleate cells and hyphal anastomosis with several AG-1 tester isolates. On potato dextrose agar, colonies displayed morphologies with characteristics of AG-1 IA and AG-1 IB, therefore, identification to AG subgroup was not made. Mature colonies ranged from light tan to brown and produced sclerotia, individually or in clumps, at the edge of the culture dish. Pathogenicity tests were performed by placing agar blocks, taken from the margins of 7-day-old cultures, on stems of healthy Madagascar periwinkle plants (15 to 20 cm tall). Inoculated and noninoculated control plants were held in a dew chamber at 26°C for 3 days and then moved to a greenhouse. Leaves on all inoculated plants developed water-soaked spots that turned dark brown or black prior to death, whereas noninoculated plants remained healthy. *R. solani* was reisolated from inoculated plants and its cultural characteristics were similar to those of the original isolate. Web blight occurs in Louisiana on Madagascar periwinkle used as landscape bedding plants, but has not been observed on container-grown plants. Web blight caused by *R. solani* AG-1 was previously reported on Madagascar periwinkle from Alabama (1). *R. solani* AG-1 has been reported previously as causing web blight in Louisiana on rosemary (2), dianthus (4), and verbena (3). To our knowledge, this is the first report of web blight on Madagascar periwinkle (*C. roseus*) in Louisiana.


Pathogenicity tests were conducted in a growth chamber using a known susceptible soybean cultivar, Blackhawk. Ten-cm-diameter pots each containing 4 plants was used. Twenty plants were inoculated and 20 served as noninoculated controls. Ten-day-old plants were inoculated with a spore suspension of 3 × 105 spores/ml by spraying inoculum over the entire leaf surfaces with a spray atomizer. Control plants were sprayed similarly with sterile distilled water. Plants were incubated in an enclosed, transparent fiberglass box with a humidifier that provided 95 to 100% humidity. Lighting in the growth chamber was adjusted to 18-h light and 6-h dark during the inoculation period. Plants were removed from the box after 48 h and placed in a growth chamber with a 12-h photoperiod. The light output in the growth chamber was 300 µmol·m-2·s-1 and the temperature was maintained at 24 ± 3°C. The experiment was repeated once. Typical field symptoms appeared on each of the inoculated plant 8 days after inoculation, while the controls expressed no leaf symptoms. *C. sojina* was reisolated from all symptomatic plants. To our knowledge, this is the first report of *C. sojina* from soybean in Wisconsin.

30°C. Symptoms developed 1 to 2 days in all four inoculated plants and lily to fulfill Koch’s postulates. Control plants were inoculated with reisolated from diseased plants, confirmed to be the inoculated pathogen, appeared to be identical to those observed on diseased material in aethiopica

During a survey in 2001, powdery scab-on was observed from a field and obtained at a farmers’ market. Scraping the lesions, and observing spore (Wallr.) Lagerheim f. sp. subterranea

In 2000, soft rot symptoms on white flowered calla lily (Zantedeschia aethiopica) were found in some nurseries in the Yang Ming Shan area, Taipei, Taiwan. The disease was characterized by foul smelling rot and collapse of flower stems. Isolations from diseased flower stems consistently yielded bacterial colonies that were translucent, white, and glistening on nutrient agar. Ten representative isolates were chosen for further characterization. All isolates were gram-negative rods, facultatively anaerobic, sensitive to erythromycin (25 μg/ml), negative for oxidase and arginine dihydrolase, and positive for catalase, phosphatase, tryptophanase (indole production), and lecithinase. They fermented glucose and reduced nitrates to nitrites. The maximum temperature for growth was 37°C. The isolates hydrolyzed gelatin and esculin, produced acids from utilizing D(+)–glucose, melibiose, amygdalin, L(+)–arabinose, D-mannitol, and sucrose, but not from trehalose, lactose, D-sorbitol, or maltose. They degraded pectate and rotted potato, carrot, sweet pepper, and onion slices. Bacterial suspensions (10^6 CFU/ml) were injected in stems of white flowered calla lily to fulfill Koch’s postulates. Control plants were inoculated with sterile distilled water. Inoculated plants were kept in a growth chamber at 30°C. Symptoms developed 1 to 2 days in all four inoculated plants and appeared to be identical to those observed on diseased material in nurseries. The four control plants did not rot. The bacterium was readily reisolated from diseased plants, confirmed to be the inoculated pathogen, and identified as Erwinia chrysanthemi. E. carotovora subsp. carotovora has been reported to cause soft rot of other calla lilies, such as Zantedeschia sp. cvs. Black Magic and Pink Persuasion and Z. elliottiana in Taiwan (1). However, to our knowledge, this is the first report of soft rot caused by E. chrysanthemi on white flowered calla lily in Taiwan.

**Reference**


In the summers of 2000 and 2001, shoot blight was observed in pistachios (Pistacia vera L.) grown in Kern County, California. Black, necrotic lesions developed at the base of shoots originating from contaminated or partially infected buds. Infection moved upward resulting in a progressive wilting and blighting of leaves. Leaf blight of pistachio caused by Botryosphaeria rhodina is of concern to the pistachio industry in California. To our knowledge, this is the first report worldwide of B. rhodina causing shoot blight of pistachio in California. T. J. Michailides, D. P. Morgan, and D. Felts, University of California Davis, Kearney Agricultural Center, Parlier 93648; and J. Phillimore, Pest Control Advisor, Bakersfield, CA 93308. Plant Dis. 86:1273, 2002; published on-line as D-2002-0906-02N, 2002. Accepted for publication 21 August 2002.

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Occurrence of Potato Powdery Scab Caused by Spongospora subterranea

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First Report of Phytophthora ramorum on Coast Redwood in California. P. E. Maloney and D. M. Rizzo, Department of Plant Pathology, One Shields Ave., University of California, Davis 95616; S. T. Koike, University of California Cooperative Extension, 1432 Abbott Street, Salinas; and T. Y. Harnik and M. Garbelotto, Department of Environmental Science, Policy and Management, Ecosystem Science Division, 151 Hilgard Hall, University of California, Berkeley 94720; Plant Dis. 86:1274, 2002; published on-line as D-2002-0906-03N, 2002. Accepted for publication 26 August 2002.

Phytophthora ramorum S. Werres & A.W.A.M. de Cock was isolated from discolored leaves and cankers on small branches (<0.5 cm in diameter) on 27 coast redwood (Sequoia sempervirens) saplings (2 to 17 cm in diameter) at two locations in California (Jack London State Park, Sonoma County and Henry Cowell State Park, Santa Cruz County). Symptoms were observed on branches throughout the crowns of affected trees. Isolates were identified as P. ramorum by their abundant chlamydospores and caducous, semi-papillate sporangia (2) and internal transcribed spacer rDNA sequences identical to those of P. ramorum from Quercus spp., Lithocarpus densiflorus, and Rhododendron (1.2). P. ramorum was also detected in dying basal sprouts on mature redwood trees from an additional five locations in coastal California by polymerase chain reaction (PCR) amplification of the ITS region using DNA extracted from symptomatic tissue and P. ramorum-specific PCR primers. To test for pathogenicity, foliage inoculations were conducted on redwood seedlings in two trials by misting 30 leaves per trial (five leaves per seedling plus controls) with sterile distilled water and pinning inoculum plugs to the upper surface of leaves. Inoculation resulted in lesions of 1 to 20 mm on individual leaves, and P. ramorum was recovered from 43% of inoculated leaves. Symptoms were not restricted to inoculated leaves because 15 inoculations of individual leaves led to discoloration of two or more adjacent leaves. On one inoculation, 60 mm of the adjacent stem was killed. Stems of redwood seedling (approximately 1 cm in diameter) were wound inoculated (1) in two trials consisting of 10 inoculated seedlings per trial plus 10 controls. After 6 weeks, lesion lengths in the cambium caused by P. ramorum averaged 13.7 mm (range 4 to 21 mm). P. ramorum was recovered from 100% of inoculated stems. Entire branches near the inoculation point became chlorotic even though no direct connection was evident between the lesion and the branches. No chlorosis was observed among the control inoculations. Mean lesion lengths of inoculated stems were significantly greater in both trials than those of control inoculations (mean 6.2 mm) at P < 0.05 based on analysis of variance (ANOVA). Redwood saplings (2.5 to 4.5 cm in diameter) were also wound inoculated in a separate trial. No phloem or cambial discoloration was observed after 7 weeks, but necrotic lesions in the xylem had a mean length of 39 mm (range 12 to 73 mm). In addition, narrow streaks, 1 to 2 mm in diameter, were also noted in the xylem extending from the necrotic areas upward to 90 cm. P. ramorum was recovered from 70% of inoculated stems in this trial. Mean lesion lengths of P. ramorum were significantly greater in all trials than those of control inoculations (mean 20 mm) at P < 0.05 based on ANOVA. While P. ramorum causes a lethal canker on Quercus spp. and L. densiflorus (1), we have not observed unusual mortality or disease symptoms on overstory redwoods in natural forests. The impact of P. ramorum branch tip dieback for growth and reproduction of Douglas-fir is unknown. Douglas-fir is present in many forests in California and Oregon already infected by P. ramorum, yet we have found infection of plants at only one location. At this site, symptomatic Douglas-fir saplings were surrounded by bay laurel (Umbellularia californica) trees with extremely high levels of P. ramorum infection. P. ramorum is known to sporulate prolifically on bay laurel leaves. More studies are necessary to determine if the incidence of P. ramorum in Douglas-fir extends to other locations or if it is limited to this one locale.


First Report of Phytophthora ramorum on Douglas-Fir in California. J. M. Davidson, Pacific Southwest Research Station, USDA Forest Service, P.O. Box 245, Berkeley, CA 94701; M. Garbelotto, Department of Environmental Science, Policy and Management, Ecosystem Science Division, 151 Hilgard Hall, University of California, Berkeley 94720; S. T. Koike, University of California Cooperative Extension, 1432 Abbott Street, Salinas; and D. M. Rizzo, Department of Plant Pathology, One Shields Ave., University of California, Davis 95616; Plant Dis. 86:1274, 2002; published on-line as D-2002-0906-04N, 2002. Accepted for publication 26 August 2002.

Phytophthora ramorum S. Werres & A.W.A.M. de Cock was isolated from three Douglas-fir (Pseudotsuga menziesii) saplings in a mixed-evergreen forest in Sonoma County, California. Symptoms on these saplings included cankers on small branches (0.5 to 1 cm in diameter) resulting in wilting of new shoots, dieback of branches, and loss of leaves as much as 15 cm from the twig tip. Symptoms were observed on most saplings growing in the same area. On several smaller saplings (<1 m tall), P. ramorum infection resulted in the death of the leader and the top several whorls of branches. Isolates were identified as P. ramorum by their abundant chlamydospores and caducous, semi-papillate sporangia (2) and internal transcribed spacer rDNA sequences identical to those of isolates of P. ramorum from Quercus spp., Lithocarpus densiflorus, and Rhododendron (1.2). To test for pathogenicity, foliage inoculations were conducted on seedlings in two trials by misting 30 leaves per trial (five leaves per seedling plus controls) with sterile distilled water and pinning inoculum plugs, taken from the margin of P. ramorum cultures, to the upper surface of leaves. Inoculation resulted in lesions ranging between 1 and 12 mm long, and P. ramorum was recovered from 47% of inoculated leaves. Symptoms were not restricted to inoculated leaves, and in 26 single-leaf inoculations, lesions 17 to 85 mm long developed on branches (5 mm in diameter) adjacent to the inoculated leaf. Isolation success from branch lesions was 50%, despite the fact that such lesions were apparently disjunct from the small 1-mm lesions developing on inoculated leaves. Stems of Douglas-fir seedlings (approximately 1 cm in diameter) were wound inoculated (1) in two trials consisting of 10 inoculated seedlings per trial plus 10 controls. After 6 weeks, lesion lengths in the cambium averaged 38 mm (range 12 to 62 mm), and three seedlings were completely girdled. P. ramorum was recovered from 75% of inoculated stems. Mean lesion lengths on seedlings inoculated with P. ramorum were significantly greater (P < 0.05) in both trials than those of control inoculations (mean 9 mm) based on analysis of variance. We have not observed unusual mortality or disease symptoms on overstory Douglas-fir trees in natural forests. The importance of P. ramorum branch tip dieback for growth and reproduction of Douglas-fir is unknown. Douglas-fir is present in many forests in California and Oregon already infected by P. ramorum, yet we have found infection of plants at only one location. At this site, symptomatic Douglas-fir saplings were surrounded by bay laurel (Umbellularia californica) trees with extremely high levels of P. ramorum infection. P. ramorum is known to sporulate prolifically on bay laurel leaves. More studies are necessary to determine if the incidence of P. ramorum in Douglas-fir extends to other locations or if it is limited to this one locale.

First Report of Bacterial Wilt of Common Bean Caused by Curtobacterium flaccumfaciens in Western Canada. T. F. Hsieh, H. C. Huang, R. S. Erickson, L. J. Yanke, and H.-H. Mündel. Agriculture and Agri-Food Canada Research Centre, Lethbridge, AB, T1J 4C9 Canada. The introduced soilborne pathogens Piptadeniastrum aphanidermatum and Microsphaera pluricaulis were expected to have become established in the introduced soil and therefore be available for the development of the disease. The symptoms of the disease more closely resemble those of Sclerotium rolfsii, the disease poses a major threat to forestry in the Dominican Republic. However, the symptoms of the disease more closely resemble those of little leaf disease of P. cinnamomi in the southeastern United States, which is a cause of forest dieback, and occurs mainly along roads and from diseased trees downslope following the path of water runoff. Initially, Leptographium serpens was isolated from necrotic roots and was thought to be the causal agent (1). However, the symptoms of the disease more closely resemble those of little leaf disease of P. cinnamomi in the southeastern United States, which is caused by the introduced pathogen Phytophthora cinnamomi Rands (3). Moreover, spread and dynamics of the disease are similar to the diebacks of Chamaecyparis lawsoniana in Oregon and Eucalyptus spp. in western Australia, which are caused by the introduced soilborne pathogens Phytophthora lateralis and Phytophthora cinnamomi, respectively. Soil samples containing the rhizosphere and fine roots of diseased P. occidentalis trees were collected in February 2005 at two sites near Celestina and Los Montones (Dominican Republic) and transported to the Bavarian State Institute of Forestry. The pathogen was baited from the soil by floating 3- to 7-day-old leaves of Quercus robur seedlings over flooded soil and placing the leaves on selective PARPNH agar (2). Phytophthora cinnamomi was isolated from the soil of all five sites. Crossing with A1 and A2 tester strains of Phytophthora cinnamomi confirmed that all isolates belong to the A2 mating type. In cross sections of necrotic fine roots, characteristic structures of Phytophthora cinnamomi such as nonseptate hyphae and chlamydospores could be observed. Our results indicate that the disease of P. occidentalis is caused by the introduced pathogen Phytophthora cinnamomi. Because of the ecological and economical importance of P. occidentalis, the disease poses a major threat to forestry in the Dominican Republic. Future research should include the mapping of the disease, pathogenicity tests on P. occidentalis and alternative pine species, in particular P. caribaea, screening for resistance in the field, and testing of systemic fumigicides such as potassium phosphate, which is known to be effective against Phytophthora cinnamomi.


Pinus occidentalis Sw. is an endemic species of the Caribbean island of Hispaniola (Dominican Republic and Haiti). It shows an extreme ecological plasticity and grows on a wide range of soil types from 0 to 3,175 m in elevation with annual mean temperatures ranging from 6 to 25°C and annual precipitation of 800 to 2,300 mm. P. occidentalis is a major component of forests above 800 m in elevation and forms pure climax forests above 2,000 m (4). For more than 10 years, stands of P. occidentalis in the Sierra (Cordillera Central) growing on a wide range of site conditions have suffered from a serious widespread disease. Symptoms include yellowing and drying of needles, a progressive defoliation and dieback of the crown, and finally, death of weakened trees often caused by attacks by secondary bark beetles. Mature stands are mainly affected, but the disease is also present in plantations and natural regeneration that is older than 10 years. Disease spread is rapid, and occurs mainly along roads and from diseased trees downslope following the path of water runoff. Initially, Leptographium serpens was isolated from necrotic roots and was thought to be the causal agent (1). However, the symptoms of the disease more closely resemble those of little leaf disease of P. cinnamomi and P. taeda in the southeastern United States, which is caused by the introduced pathogen Phytophthora cinnamomi Rands (3). Moreover, spread and dynamics of the disease are similar to the diebacks of Chamaecyparis lawsoniana in Oregon and Eucalyptus spp. in western Australia, which are caused by the introduced soilborne pathogens Phytophthora lateralis and Phytophthora cinnamomi, respectively. Soil samples containing the rhizosphere and fine roots of diseased P. occidentalis trees were collected in February 2005 at two sites near Celestina and Los Montones (Dominican Republic) and transported to the Bavarian State Institute of Forestry. The pathogen was baited from the soil by floating 3- to 7-day-old leaves of Quercus robur seedlings over flooded soil and placing the leaves on selective PARPNH agar (2). Phytophthora cinnamomi was isolated from the soil of all five sites. Crossing with A1 and A2 tester strains of Phytophthora cinnamomi confirmed that all isolates belong to the A2 mating type. In cross sections of necrotic fine roots, characteristic structures of Phytophthora cinnamomi such as nonseptate hyphae and chlamydospores could be observed. Our results indicate that the disease of P. occidentalis is caused by the introduced pathogen Phytophthora cinnamomi. Because of the ecological and economical importance of P. occidentalis, the disease poses a major threat to forestry in the Dominican Republic. Future research should include the mapping of the disease, pathogenicity tests on P. occidentalis and alternative pine species, in particular P. caribaea, screening for resistance in the field, and testing of systemic fumigicides such as potassium phosphate, which is known to be effective against Phytophthora cinnamomi.