Disease Notes

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Survey for Beet Western Yellows Luteovirus as a Major Component of the Potato Leaf Roll Disease in Central Brazil. M. E. N. Fonseca, V. L. A. Marinho, and D. C. Monte-Neshich, CENARGEN/EMBRAPA C.P. 02373, Brasilia-DF, Brazil; and L. S. Boiteux, NCPH/EMBRAPA C.P. 0218, Brasilia-DF, Brazil. Plant Dis. 80:1079, 1996; published on-line as D-1996-0701-01N, 1996. Accepted for publication 3 June 1996.

A survey was conducted to ascertain the involvement of beet western yellows luteovirus (BWYV) in the leaf roll disease of potatoes (*Solanum tuberosum* L.) in central Brazil. One hundred samples of potato plants showing leaf roll symptoms were collected in four sites in Brasilia-DF and in 16 sites in Minas Gerais State. An in vitro germ plasm collection composed of potato clones and cultivars introduced from the U.S., Germany, and Peru was also evaluated. Field-collected leaf samples and tissue-culture plantlets were tested by using a nitrocellulose membrane–enzyme-linked immunosorbent assay ("dot-ELISA") protocol essentially as described for tomato spotted wilt virus detection in *Capsicum annuum* L. (1). One polyclonal BWYV antiserum (provided by P. E. Thomas, Irrigated Agricultural Research and Extension Center, H. Rodgers Hamilton Laboratory, WA) and two polyclonal potato leaf roll virus (PLRV) antisera (provided by A. N. Dusi, CNPH/EMBRAPA, Brasilia-DF, Brazil) were cross-absorbed with healthy potato sap and purified by chromatography in DEAE-Sephacel. Negative controls consisted of virus-free potato plants obtained from tissue culture. All field samples tested negative for BWYV, whereas 100% were positive for PLRV. Likewise, only PLRV infection was detected in samples obtained from the germ plasm collection. Our work strongly indicates that BWYV has a very reduced epidemiological significance in the potato leaf roll samples from the U.S. and Canada (2).

References: (1) L. S. Boiteux et al. Euphytica 67:89, 1993. (2) P. Ellis and R. Stace-Smith. Plant Dis. 77:718, 1993.

Outbreak of Avocado Black Streak in Dade County, Florida. R. J. Schnell, USDA-ARS, National Clonal Germplasm Repository, Miami, FL 33199; and R. C. Ploetz, University of Florida, Homestead 33031. Plant Dis. 80:000, 1996; published on-line as D-1996-0708-01N, 1996. Accepted for publication 1 July 1996.

Black streak disease of avocado, *Persea americana* Miller, is a significant problem in production areas in California (1). To date, the disease has been observed only on cultivars of the Guatemalan race, var. *guatemalensis*, and no causal agent has been identified. During the fall of 1995, black streak was observed on 43 different accessions of avocado at the USDA's National Clonal Germplasm Repository in Miami. Reddish brown patches on the trunk or scaffold limbs of affected trees were often superficial, but necrosis progressed into the cambium in some cases. Lesions exuded a white, powdery substance that usually developed above the soil-line and was washed off by rain. Trees that were severely damaged by Hurricane Andrew (August 1992) were most apt to be affected. On a selective medium, *Phytophthora* spp. were not isolated from affected tissue, thus providing evidence that phytophthora canker did not cause these symptoms. In contrast to reports from California, there was no relationship between host race and the occurrence of the disease; racial hybrids and accessions of the West Indian and Mexican races were affected as often as accessions of the Guatemalan race. Although black streak was previously observed on single trees in the Canary Islands and Florida, this is apparently the first report of a significant outbreak of the disease outside California.

Reference: (1) R. L. Jordan et al. Phytopathology 73:1130, 1983.

Crater Disease and Patchy Stunting of Wheat Caused by the Same Strain of *Rhizoctonia solani*. Linda Meyer and F. C. Wehner, Department of Microbiology and Plant Pathology, University of Pretoria, Pretoria, 0002, South Africa; C. A. Kuwite, Selian Agricultural Research Institute, P.O. Box 6024, Arusha, Tanzania; and L. Piening, 5016-58 St. Lacombe, Alberta, T4L 1K7, Canada. Plant Dis. 80:1079, 1996; published on-line as D-1996-0701-02N, 1996. Accepted for publication 22 June 1996.

Patchy stunting of cereals has been observed in wheat farms of the Hanang area in northern Tanzania since the early 1970s. The disease is characterized by patches of stunted and chlorotic plants typical of Rhizoctonia bare patch disease affecting cereals in other parts of the world. However, seminal roots of affected plants contain nodulose swellings and sclerotial sheaths, rather than displaying girdling and rotting as with bare patch (2), and in this regard the disease closely resembles crater disease of wheat (*Triticum aestivum* L.) occurring on the Springbok Flats in South Africa (1). Indeed, the only difference between crater disease and patchy stunting is that the former occurs exclusively in black montmorillonite clay soils, whereas the latter has also been observed in clay loam, silty clay loam, and silty loam soils. Crater disease is caused by a strain of *Rhizoctonia solani* Kühn not anastomosing with *R. solani* AG-8, the causal agent of bare patch (2). Isolates of *R. solani* recently collected from infected wheat roots in Tanzania caused stunting of wheat seedlings and produced nodulose swellings and sclerotial sheaths in roots in artificial inoculation studies. Isolates and reisolates anastomosed with the crater disease strain of *R. solani,* and with an isolate of *R. solani* collected from roots of an umbrella-thorn tree (*Acacia tortilis* (Forsk.) Hayne subsp. *heteracantha* (Burch.) Brenan) growing in virgin soil on the Springbok Flats. It thus appears that stunting of wheat in Africa is caused by a strain of *R. solani* indigenous to the African continent, and that the umbrella-thorn tree could be a natural host of the fungus. Previous attempts to isolate the crater disease *R. solani* from grass species native to the Springbok Flats were unsuccessful. A representative crater disease isolate has been deposited in the National Collection of Fungi of the Plant Protection Research Institute, Pretoria, as PREM 49315.

References: (1) J. W. Deacon et al. Trans. Br. Mycol. Soc. 85:319, 1985. (2) F. A. Roberts et al. Neth. J. Plant Pathol. 92:185, 1986.

First Report of Tomato Yellow Leaf Curl Virus in Portugal. D. Louro, Centro Nacional de Proteccao da Producao Agricola, 2780 Oeiras, Portugal; and E. Noris, F. Veratti, and G. P. Accotto, Istituto di Fitovirologia Applicata, CNR, 10135 Torino, Italy. Plant Dis. 80:1079, 1996; published on-line as D-1996-0711-01N, 1996. Accepted for publication 8 July 1996.

In late summer 1995, an epidemic outbreak of a disease associated with the whitefly *Bemisia tabaci* Genn. seriously affected the tomato (*Lycopersicon esculentum* Mill.) crops in Algarve, a region in southern Portugal where tomatoes are cultivated year round. The disease occurred mainly in greenhouse crops and occasionally in open field, with symptoms of general stunting of the plants and leaf curling, with or without yellowing. Autumn crops were severely affected (up to 100%) and yield was drastically reduced. Experimentally, the disease was transmissible by grafting and by whiteflies collected in infected fields. Geminivirus particles were visualized in extracts from infected tomatoes by immunosorbent electron microscopy with antibodies to tomato yellow leaf curl virus (TYLCV-Sr, kindly provided by E. Luisoni). Dot blots were hybridized with DNA probes specific for TYLCVs of different geographical origin (Spain, Sardinia, Sicily, and Israel). A very strong reaction was observed with TYLCV from Israel (1), while only a weak reaction was obtained with the others. Total nucleic acids from infected plants were digested with 15 restriction enzymes selected to help differentiate among TYLCVs. The pattern obtained was compared with that predicted from sequences available for several TYLCVs. The Portuguese TYLCV was similar to two isolates from Israel (EMBL accession nos. X15656 and X76319) with 12 and 13 enzymes matching, respectively, whereas only 3 enzyme patterns matched with TYLCV from Spain (Z25751) and 4 with TYLCVs from Italy (X61153 and Z28390). This is the first report of TYLCV in Portugal. So far the disease appears limited to the Algarve region.

Reference: (1) N. Navot et al. Virology 184:151, 1991.

(*Disease Notes* continued on next page)

First Report of *Fusarium oxysporum* on Clary Sage in North America. V. P. Subbiah, M. Riddick, and D. Peele, R. J. Reynolds Tobacco Company, Avoca Division, Merry Hill, NC 27957; and M. A. Cubeta, Department of Plant Pathology, North Carolina State University, Plymouth 27962. Plant Dis. 80:1080, 1996; published on-line as D-1996-0708-02N, 1996. Accepted for publication 26 June 1996.

Clary sage (*Salvia sclarea* L.) is grown commercially in California, North Carolina, and Oregon for its essential oil and flavor compound sclareol. Six fungal diseases have been previously reported on clary sage: anthracnose (*Colletotrichum dematium* (Pers.) Grove), Ascochyta blight (*Ascochyta sclareae* (Sarwar)), Phomopsis blight (*Phomopsis sclareae* (Sarwar)), leafspot (*Podospora inaequalis*), powdery mildew (*Erysiphe polygoni* DC.), and Rhizoctonia root rot (*Rhizoctonia solani* Kühn) (1–4). None of these diseases has been reported from North America. In the summer of 1995, a seedling disease was observed in five clary sage production fields in North Carolina that reduced plant stand 40 to 50%. Diseased clary sage seedlings were stunted and roots exhibited reddish brown vascular discoloration and rotting. Diseased seedlings collected from each field were surface disinfested with 0.5% sodium hypochlorite for 3 min, rinsed with sterile distilled H_2O, placed on sterile filter paper in a moist chamber for 5 days at 26°C, and examined microscopically. Fungi developing from infected seedlings were isolated by spreading single spores on water agar. Isolations from vascular tissue of infected seedlings consistently yielded (>90%) *Fusarium oxysporum* Schlechtend:Fr. Species identification was confirmed by P. E. Nelson, Fusarium Research Center, The Pennsylvania State University, University Park. Four *F. oxysporum* strains from different fields were evaluated for pathogenicity. Forty 2-week-old clary sage seedlings (cvs. Early and English) were inoculated by dipping in a *F. oxysporum* suspension (1×10^6 conidia/ml) and planting in pasteurized potting mix. Seedlings dipped in sterile H_2O served as controls. In another experiment, seeds and seedlings were sown in pasteurized potting mix amended with rye kernels precolonized with *F. oxysporum* (10% wt/wt). Seeds and seedlings sown in pasteurized potting mix amended with noncolonized rye kernels served as controls. There were three replicates of each treatment and experiments were conducted twice. Inoculated seedlings were incubated in the greenhouse at 21 to 25°C for 2 to 3 weeks. All seedlings either dipped in a spore suspension or grown in potting mix with precolonized rye kernels of each *F. oxysporum* strain were stunted with root rot and died within 3 weeks. Control seedlings were healthy and exhibited no symptoms or death. *F. oxysporum* was recovered from 90% of the infected seedlings to complete Koch's postulates. This is the first report of a disease on clary sage caused by *F. oxysporum*. This seedling disease may become a major limiting factor in the production of clary sage.

References: (1) A. Pisi and M. G. Bellardi. Inf. Fitopatol. 37:57, 1988. (2) M. Sarwar. Indian J. Microbiol. 17:148, 1977. (3) A. D. Sharma and C. L. Jandaik. Indian J. Mycol. Plant Pathol. 9:86, 1979. (4) S. I. Udagawa and T. Muroi. Trans. Mycol. Soc. Jpn. 20:13, 1979.

First Report of Tobacco Streak Virus on Lisianthus in Brazil. Juliana C. de Freitas, Departamento de Fitopatologia, ESALQ/USP, Piracicaba, SP, 13418-900, E. W. Kitajima, Núcleo de Apoio à Pesquisa em Microscopia Eletrônica, ESALQ/USP, Piracicaba, SP, 13418-900, J. A. M. Rezende, Departamento de Fitopatologia, ESALQ/USP, Piracicaba, SP, 13418-900, Brazil. Plant Dis. 80:1080, 1996; published on-line as D-1996-0710-01N, 1996. Accepted for publication 8 July 1996.

The cultivation of lisianthus, *Eustoma grandiflorum* (Raf.) Shinn. (Gentianaceae), for pot and cut flower production has increased recently in the State of São Paulo, Brazil. About 10 viruses have been reported infecting lisianthus throughout the world. A high incidence of plants showing viruslike symptoms is resulting in economic losses to commercial crops grown in the field in Ibiuna and Paranapanema counties. The main symptoms were irregularly shaped and necrotic ringspot lesions on the leaves. Flowers were slightly smaller and died earlier. Stems were apparently unaffected. Ultrathin sections of symptomatic leaves, examined in the electron microscope, showed numerous isometric particles, 25 to 30 nm in diameter, some of them associated with the plasmodesma. Extracts from diseased plants reacted strongly in plate trapped antigen—enzyme linked immunosorbent assay (PTA-ELISA) with two antisera against tobacco streak ilarvirus (TSV), from the Universidade de Brasília, DF, Brazil, and from R. W. Fulton, the University of Wisconsin, Madison. Sap from infected lisianthus was mechanically inoculated to Carborundum-dusted leaves of several species of plants belonging to the Amaranthaceae, Chenopodiaceae, Cucurbitaceae, Gentianaceae, Leguminosae, and Solanaceae. Symptoms shown by inoculated lisianthus were similar to those observed on naturally infected plants. *Nicotiana tabacum* L. cvs. Samsun, Turkish NN, Xanthi, and White Burley, and *Datura stramonium* L. developed characteristic symptoms of TSV strains (1). Extracts from these plants also reacted with TSV antisera. *Chenopodium quinoa* Willd., *C. murale* L., *Gomphrena globosa* L., *N. benthamiana* L., *N. glutinosa* L., *Phaseolus vulgaris* L.cvs. Manteiga and Black Turtle 2, *Physalis floridana* Rydb, and *Vigna unguiculata* (L.) Walp. were also infected with the lisianthus isolate of TSV. Based on the particle morphology, strong serological reaction with antisera against TSV, and characteristic symptoms induced on *N. tabacum* and *D. stramonium*, we concluded that lisianthus plants were infected by TSV. Infection of lisianthus with an ilarvirus, named lisianthus line pattern virus, was reported in Italy, but serological tests showed that it was distantly related to TSV (2).

References: (1) A. S. Costa and A. M. B. Carvalho. Phytopathol. Z. 42:113. 1961. (2) V. Lisa et al. Acta Hortic. 377:81, 1994.

Occurrence of Powdery Mildew, Caused by *Erysiphe cichoracearum*, on Endive and Radicchio in California. S. T. Koike, University of California Cooperative Extension, Salinas 93901; and G. S. Saenz, Department of Plant Biology, University of California, Berkeley 94720. Plant Dis. 80:1080, 1996; published on-line as D-1996-0715-01N, 1996. Accepted for publication 27 June 1996.

In January 1996, outbreaks of powdery mildew occurred on commercial plantings of endive (*Cichorium endivia* L.) and radicchio (*Cichorium intybus* L.) in coastal counties in California. On both hosts the white ectophytic mycelial and conidial growth was amphigenous on leaves, caused slight twisting of foliage, and resulted in quality loss of the harvested product. Mycelia ranged from effused and thin (endive) to moderately thick (radicchio) and grew in patches or covered the entire surface of the leaves. Morphological characters were similar for both endive and radicchio isolates. Appressoria were nipple-shaped and conidiophores were straight. Foot cells were cylindrical and straight, sometimes slightly attenuated at the basal septum, and sometimes had a curved basal part. Foot cells measured 9.0 to 11.5 × 48.0 to 67.0 µm, and were followed by one to three shorter cells. Conidia were produced in chains, cylindrical to slightly doliform in shape, and measured 11.5 to 16.0 × 28.0 to 39.0 µm. The conidial length-to-width ratio was 2.2. No fibrosin bodies were observed in the conidia, and conidia germinated at the ends. Cleistothecia were not present. The fungus was identified as *Erysiphe cichoracearum* DC. (1,2). Pathogenicity was demonstrated by collecting and suspending diseased leaves over test plants in an enclosed settling chamber for 24 h, incubating the plants in a moist chamber for 48 h, and then maintaining plants in a greenhouse. After 12 to 14 days, field isolates of *E. cichoracearum* from endive and radicchio colonized both endive (cvs. Ruffec and Tres Fine Maraicchere) and radicchio (cv. Rossana Rogers). Because of the extensive lettuce (*Lactuca sativa* L.) crop present in the coastal region, one radicchio isolate was inoculated onto lettuce plants (cvs. Red Eye Cos and Salinas), using the same inoculation method, to see if the isolate would be cross-infective. However, after four attempts, the radicchio isolate failed to infect lettuce. Although powdery mildew has been previously observed in California on endive and radicchio, this is the first report characterizing this pathogen on these crops in the state.

References: (1) H. J. Boesewinkel. Bot. Rev. 46:167, 1980. (2) U. Braun. Nova Hedwigia 89:1, 1987.