Greasy Canker of Poinsettia Caused by *Pseudomonas viridiflava*

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ABSTRACT

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A strain of *Pseudomonas viridiflava* was the causal agent of a previously undescribed canker, leaf spot, and bud and bract blight of poinsettia (*Euphorbia pulcherrima* Willd.). The canker was associated with wounds and was favored by high temperature (28–32 C) and high relative humidity.

Bacterial canker and leaf spot of poinsettia (*Euphorbia pulcherrima* Willd.) have traditionally been attributed to *Corynebacterium poinsettiae* (9) and *Xanthomonas campestris* pv. *poinsettiicola* (7), respectively.

In the fall of 1979, however, a canker, leaf spot, and bract and bud blight of poinsettia was observed in California glasshouses. The canker, developing primarily at the point where pruning wounds occurred on the main stem, had an oily or greasy appearance and was not characterized by soft rot. Older portions of the canker that had dried out were light tan to brown with a papery texture. The leaf spots were water-soaked lesions with an associated chlorotic halo typical of bacterial infection. Bud and bract blighting was observed as a rapidly advancing area of necrosis that caused buds to dehisce and bracts to develop blemished areas with copious bacterial ooze. A fluorescent pseudomonad was isolated from all diseased plant parts.

This report describes this new disease of poinsettia and the *Pseudomonas* sp. that is the causal agent.

MATERIALS AND METHODS

The pathogen. Portions of infected stem, leaf, bud, and bract tissue were macerated in 2 ml of sterile, distilled water and loopfuls were streaked on plates of King's medium B (5), yeast dextrose calcium carbonate peptone agar (11), and *Corynebacterium nebraskense* selective medium (3).

Media were then incubated as long as 96 hr at 28 C to allow for the slow growth of possible *Corynebacterium* or *Xanthomonas* pathogens. Similar isolations were made from apparently healthy plants taken from the same nursery to detect epiphytic populations.

Isolates were removed from media, the purity of each isolate was checked, and the following tests were used to characterize them (4,6,8): Gram stain, production of cytochrome oxidase, fluorescence on King's medium B, levan production, tobacco hypersensitivity, potato rotting ability, arginine dihydrolase test, maximum growth temperature, sucrose utilization, utilization of D(−) tartrate, L(+) tartrate, L(+) lactate, D(−) lactate, erythritol, mannitol, sorbitol, sucrose, citrate, galacturonic acid, and L(−) lysine. Because preliminary tests indicated that the pathogen might be *Pseudomonas viridiflava*, a strain of known *P. viridiflava* (UCBPP1249) was used for comparison.

Host range. Pathogenicity of isolates was tested by inoculating newly emerging shoots or whole plants of three poinsettia cultivars, Jingle Bells, Dark Heeg, and Fantastic Rochford. Inoculations were made by wounding with a sterilized needle laden with bacterial cells, by "pinching back" terminal growth and spraying, or by spraying whole plants with a 10^8 colony-forming units per milliliter of bacterial suspension from a de Vilbiss atomizer until all leaves were covered with inoculum.

After inoculation, plants were placed in rooms at 25, 27, or 32 C and in the general greenhouse area, which ranged from 10 C at night to 28 C in the day. Plants were covered with clear polyethylene bags overnight or placed under mist for 24 hr to maintain high relative humidity. Final disease observations were made 10–12 days later.

Other host plants tested for susceptibility to this pathogen were 3-wk-old tomato (*Lycopersicon esculentum* Mill. 'Bonnie Bell'), cauliflower (*Brassica oleracea* L. var. *botrytis* L.) and pumpkin (*Cucurbita maxima* Duchesne) seedlings (9).

RESULTS

The pathogen. A fluorescent *Pseudomonas* sp. was consistently isolated from all plant parts taken from diseased poinsettia and from apparently healthy tissue on diseased plants. By biochemical and nutritional tests, this pathogen was identified as *P. viridiflava*, according to the groupings of Billing (1) and Hildebrand and Schroth (4). The bacterium has not previously been reported as causing a disease of poinsettia. Colonies were opaque,

Table 1. Tests used in identifying strains of bacteria isolated from poinsettia as *Pseudomonas viridiflava*

	Strain[a]	
	Poinsettia-C1	*P. viridiflava* (UCBPP1249)
Preliminary tests		
Oxidase[b]	−	−
Potato rot[c]	+	+
Levan[b]	−	−
Arginine dihydroiase[b]	−	−
Utilization of[d]		
Erythritol	+++	+++
D(−) Lactate[e]	+++	+++
L(+) Lactate	+++	+++
Mannitol	+++	+++
Sorbitol	+++	+++
Sucrose	−	+
D(−) Tartrate	+++	+++
L(+) Tartrate	−	−
Citrate	+++	+++
Galacturonic acid	+++	+++
L(−) Lysine	+++	+++
Pathogenicity		
Tomato stem rot	+	+
Poinsettia leaf spot	+	nd
Poinsettia canker	+	nd

[a] − = negative reaction in preliminary tests or no growth in substrate utilization tests. + = positive reaction for preliminary test and pathogenicity or weak to poor growth after 3 wk for substrate utilization tests. +++ = good growth on substrate in utilization tests. nd = not determined.
[b] As described in Billing (1) and Lelliott et al (6).
[c] As described in Sands et al (8).
[d] As described in Hildebrand and Schroth (4).
[e] D(−) Lactate is not utilized by *Pseudomonas syringae* (Hildebrand, *unpublished*), a key distinguishing characteristic.

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convex, entire with a dark center, shiny, and semifluid after 48 hr, and they produced a bright green, diffusible fluorescent pigment on King's medium B. Maximum growth temperature for all strains was 31 C. Results of identification tests for strain C1 are presented in Table 1.

Host range. Three strains of *P. viridiflava* isolated from cankers, leaf spots, and bract tissue of nursery-grown poinsettias reproduced all disease symptoms originally observed.

A rapidly advancing oily or greasy appearing canker formed only when associated with a wound, but chlorotic leaf spots and blights of bud and bract tissue were observed on spray-inoculated plants even when wounding was not employed. Disease occurred at all temperatures and advanced as long as relative humidity was high. Disease severity was increased at higher temperatures (27–32 C). The progress of developing cankers and bract blight was arrested when inoculated plants were removed from high relative humidity, and infected tissue soon became tan to brown and papery, characteristic of this disease. All three cultivars inoculated were susceptible.

The poinsettia strains also caused diseases of tomato, cauliflower, and pumpkin similar to those described by Wilkie et al (10).

DISCUSSION

The *Pseudomonas* sp. isolated from poinsettia in California appears similar to the descriptions of *P. viridiflava*, an opportunistic pathogen of a wide variety of plants (2,9). As evidenced by the first outbreak of this pathogen in 1979 and its continued presence in local nurseries, greasy canker can be a serious disease in poinsettia cultivation and propagation. The greatest threat would be the blemishing of the colorful bracts that determine marketability of the plant. The most direct controls of this disease would be sanitation during pruning, roguing of diseased plants, and maintaining low relative humidity.

The source of the pathogen in the initial disease outbreak is still undetermined, though the preceding crop of tomatoes in the same glasshouse is suspect (2). The ability of this *P. viridiflava* strain to colonize poinsettia tissue epiphytically would create an ideal situation to initiate disease during "pinching back" or pruning. The susceptibility of the various poinsettia cultivars to this pathogen remains to be determined.

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