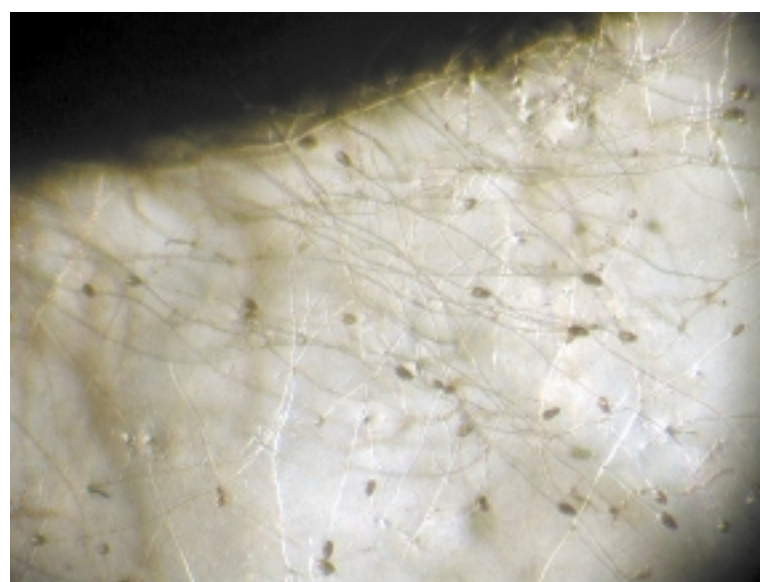




STUDYING PHYTOPHTHORA FOES OF FLORAL CROPS

*Trials conducted at
Cornell University show
which fungicides effectively
controlled Phytophthora
species on both poinsettia
and calibrachoa crops.*

**By
Margery
Daughtrey**



A view of P. drechsleri sporangia as seen through the dissecting microscope.

Phytophthora is one of the special group of plant pathogens termed “oomycetes” — Pythium and the downy mildews are close kin. Analysis of their DNA has indicated that these organisms are more closely related to algae than to fungi. This is the reason why Phytophthora, Pythium and downy mildews are successfully combated by unique fungicides, such as mefenoxam, metalaxyl and dimethomorph, that would not be effective against the true fungi. For convenience, we’ll still refer to Phytophthora as a “water mold”; this is a useful term for remembering that wet conditions favor its nefarious activities against plants.

EXISTING AND EXPANDING ENEMIES

Several Phytophthora species are fairly familiar foes, having caused a lot of problems on azaleas, rhododendrons, fuchsia, gloxinia and poinsettia over the years. However, new production systems featuring subirrigation — and recirculating systems,

in particular — have provided a new playing field slanted towards this pathogen. New species of Phytophthora are also getting into the act of attacking plants and causing new headaches for growers.

Previous Phytophthora problems on poinsettias have primarily come from *Phytophthora*



Growth of P. drechsleri from pieces of poinsettia tissue on a petri plate.



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Close-ups of root rot on poinsettia plugs caused by *P. drechsleri*.

parasitica, a species that thrives on warm, moist conditions. This is the same species that commonly causes symptoms on fuchsias and gloxinias. Stem discoloration and wilting typify the attack on poinsettias, whereas gloxinias show a crown rot that bleeds into the base of the leaves, and fuchsias contract a stem rot that also bleeds into the leaf bases.

Now there are several new *Phytophthora* threats of concern to flower growers. The late blight disease, caused by *Phytophthora infestans* and notorious for its effect on potatoes, occurs occasionally on both petunias and tomato transplants. For poinsettias, there is a new problem with the species *Phytophthora drechsleri*, which causes a root and crown rot. A third new *Phytophthora* disease has also begun to appear on calibrachoa, causing wilting and death of plants.

PHYTOPHTHORA DRECHSLERI ON POINSETTIAS

P. drechsleri on poinsettias has become a significant problem. This disease causes the most extensive losses in poinsettias being propagated in ebb-and-flood irrigation systems. Because the pathogen produces sporangia, which produce swimming spores that initiate new infections, the environ-

ment provided by a subirrigation system is perfect for distributing inoculum from plant to plant. *P. drechsleri* has a wide host range, so it is likely that it will appear on other flower crops if growers are not careful to disinfest areas where the disease has occurred on poinsettias.

Fungicidal Control. Since *P. drechsleri* is newly significant to the flower industry, our first efforts have been to determine whether the standard fungicides will indeed work. We are also looking ahead to see if products still under development would be of use against the diseases that it causes. We conducted a trial in 2001 to compare some familiar and some less familiar materials for their effect against *P. drechsleri* on poinsettia. We transplanted rooted cuttings of 'Freedom Marble' into ProMix BX on September 12, taking care to set the plants deeply into the mix to encourage a crown rot disease. There were five 3-plant replications for each of 15 treatments in a randomized, complete block design. Treatments with Biophos, Banol and BAS 500 02 F were made on a 21-day interval, whereas others were repeated after 28 days. Inoculum of *P. dreschleri* was added after the first application of the fungicide drenches by placing a disc of colonized agar into a depression about one inch away from each plant stem. We recorded symptoms of wilting and cankers on November 6, and also

rated the root health on a 1-4 scale (1=best roots, 4=complete root rot).

The results. Wilting was seen in two of the inoculated, untreated control plants on September 24. At the end of the trial, slightly over 50 percent of the plants in this untreated group were wilting, and all of these showed a canker at the base of the stem. Several treatments with registered fungicides gave complete suppression of root rot symptoms: Aliette 80WDG at 12.8 oz./100 gal., Truban 30WP at 6 oz./100 gal., Banol 66.5 percent EC at 20 fl oz./100 gal. and Heritage 50WDG at 0.8 oz./100 gal.

Several experimentals also completely suppressed symptoms: Ardent 50WP at 0.6 and 0.8 lb./100 gal., EXP 10623 A at 7 oz./100 gal., Biophos 30.2L at 1 percent v:v and BAS 500 02 F 21.9 WP at 16 oz./100 gal. The appearance of symptoms on some plants in the SubdueMAXX 21.3 percent EC treatment (1.0 oz./100 gal.) suggests that there may have been some level of insensitivity to mefenoxam in the isolate of *P. dreschleri* that we used in this study. Benefits similar to that seen with SubdueMAXX were seen in treatments with Hurricane 48WP and Medallion. It appears that a number of the currently registered products, as well as some now in development, will be quite effective for managing *P. dreschleri* root and crown rot in poinsettias. ♦

Table 1. Control of *Phytophthora drechsleri* on *Poinsettia*

Treatments	No.	Form	Rate per 100 gal	Plants with symptoms (%)		Root rot rating ^{1,3}
				Wilt ¹	Stem canker ¹	
Control, uninoculated	1	—	—	0.0 a ²	0.0 a ²	1.3 ab ²
Control, inoculated	2	—	—	53.4 d	53.4 d	2.9 d
Ardent	3	50 WP	0.6 lb	0.0 a	0.0 a	1.3 abc
Ardent	4	50 WP	0.8 lb	0.0 a	0.0 a	1.2 ab
EXP 10623 A	5	FL	7 oz	0.0 a	0.0 a	1.3 abc
Biophos	6	30.2 L	1% v:v	0.0 a	0.0 a	1.5 abc
Subdue MAXX	7	21.3% EC	1 fl oz	20.0 bc	20.0 bc	1.7 bc
Aliette	8	80 WDG	12.8 oz	0.0 a	0.0 a	1.3 ab
Truban	9	30 WP	6 oz	0.0 a	0.0 a	1.3 ab
Banol	10	66.5% EC	20 fl oz	0.0 a	0.0 a	1.1 ab
Hurricane	11	48 WP	1.5 oz	13.3 abc	13.3 ab	1.6 bc
Medallion	12	48.2 WP	1 oz	26.7 c	33.3 c	1.9 c
BAS 500 02 F	13	21.9 WP	16 oz	0.0 a	0.0 a	1.0 a
Heritage	14	50 WDG	0.8 oz	0.0 a	0.0 a	1.3 abc
Heritage	15	50 WDG	1.8 oz	6.7 ab	6.7 ab	1.3 ab
				P=0.0001	P=0.0001	P=0.0001

¹ Values represent means of five replications.

² Values in a column followed by the same letter are not significantly different (Fisher's Protected LSD, P=0.05).

³ Root rating done on scale 1-4, 1=best roots, 2=some root rot, 3=root rot with some white roots, 4=complete root rot.

Table 2. Control of Phytophthora on Calibrachoa

Treatments	Form	Rate per 100 gal	Plants with stem canker or wilt (%) ¹	Root rot rating ^{1,3}
Control, not inoculated	—	—	3.3 a ²	1.2 a ²
Control, inoculated	—	—	70.0 c	3.2 c
Subdue MAXX	21.3% EC	1 fl oz	13.3 a	1.7 ab
Truban	30 WP	6 oz	3.3 a	1.5 ab
Aliette	80 WDG	12.8 oz	36.7 b	2.1 b
Banol	66.5% EC	20 fl oz	16.7 ab	1.5 a
			P=0.0001	P=0.0001

¹Values represent means of five replications of six plants.
² Values in a column followed by the same letter are not significantly different (Fisher's Protected LSD, P=0.05).
³ Root rating done on scale 1-4, 1=best roots, 2=some root rot, 3=root rot with some white roots, 4=complete root rot.

CALIBRACHOA CORRUPTION

For the past two years, the popular new hanging basket crop Calibrachoa has performed unevenly, with many growers reporting problems of wilting and root rot. We have isolated a number of Pythium and Phytophthora species from calibrachoa and are in the process of identifying these and determining their pathogenicity. In one 2001 trial, we tested some of the standard water mold controls (Subdue MAXX, Truban, Aliette and Banol) using six plants per treatment in five replications. Two months after inoculation with an unidentified species of Phytophthora, symptoms were dramatic in the untreated Calibrachos — 70 percent of these plants wilted and died. All of the fungicide treatments (applied at a 1-month interval) reduced the symptoms significantly. SubdueMAXX 21.3 percent EC at 1.0 fl.oz./100 gal. and Truban 30W at 6 oz./100 gal. were slightly more effective than the Aliette 80WDG at 12.8 oz./100; Banol 66.5 percent EC at 20 fl. oz./100 gal. was intermediate at the level of control provided.

WHAT SHOULD THE GROWER DO?

Growers should stay informed regarding which of their crops are prone to Phytophthora diseases and scout them especially carefully for any root rot or wilt symptoms. Examine the roots of all incoming plant material, and use a diagnostic laboratory to identify the agents of any root or stem rot symptoms on plants early in the production season. Fungicides can be effective for management, but these work by protecting plants against infection, so prompt use is essential. Utilize materials in rotation: Sole use of a mefenoxam or metalaxyl material is particularly inadvisable, since isolates of Phytophthora insensitive to this chemistry have been documented in flower production greenhouses. Meanwhile, we will continue to study Phytophthora management — the Floriculture and Nursery Research Initiative has invested in research at Cornell, Clemson, Michigan State and NC State to focus on this important need. GPN

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