

## Special Research Report #136: Disease Management Coleus Cultivars and Downy Mildew

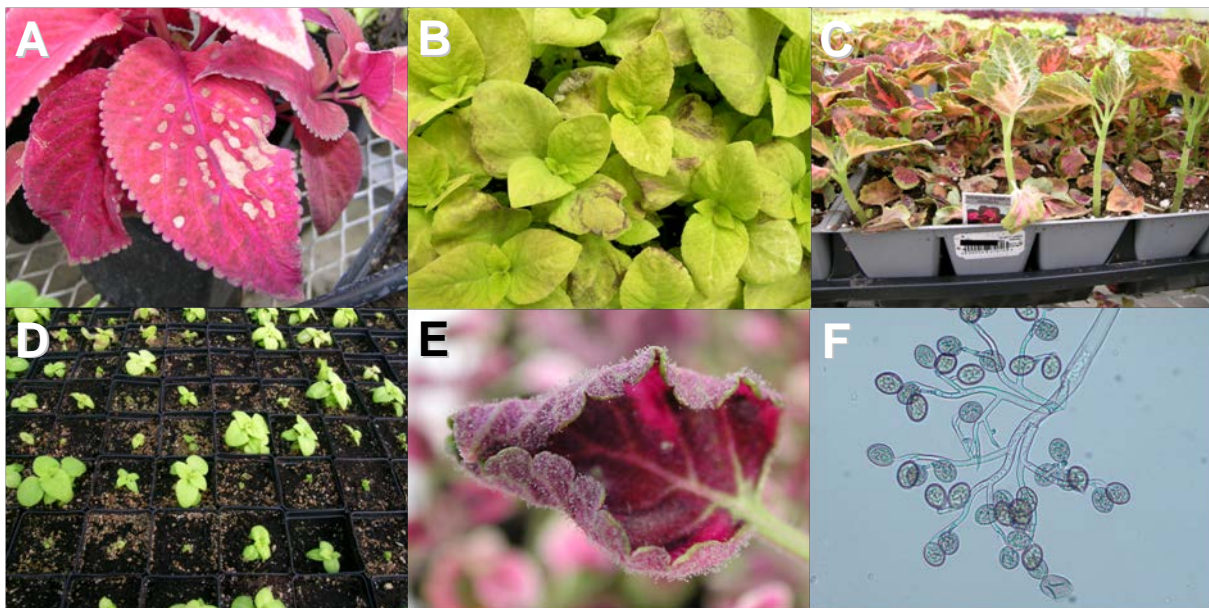
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### BACKGROUND

*Coleus* (*Solenostemon scutellarioides*) is prized by gardeners for its bright, colorful foliage. Downy mildew disease was first seen on coleus in New York and Louisiana in 2005 and throughout much of the U.S. by 2006. The pathogen was determined to be *Peronospora* sp. Symptoms of downy mildew on coleus include brown leaf spots, leaf drop, stunting and leaf curl (Figure 1A, 1B, 1C, 1D and 1E). Prior to the occurrence of this new downy mildew pathogen, coleus cultivars were selected based on consumer preference and ease of propagation; knowledge of the tolerance of coleus cultivars to downy mildew would be of benefit to growers and consumers.



**Figure 1.** A-B, leaf spotting; C, leaf drop; D, stunting of seedlings; E, sporulation on underside of coleus leaf; F, sporangia of *Peronospora* sp. on a sporangiophore.

### MATERIALS & METHODS

We evaluated 147 cultivars of seed- and cutting-propagated coleus, including current and heirloom varieties, for resistance to downy mildew at Michigan State University (MSU) and Long Island Horticultural Research & Extension Center (LIHREC) between 2006 and 2013 (Figure 2). The plants were tested in the greenhouse or in outdoor-grown containers. Coleus were watered and fertilized as needed to maintain plant health. Inoculum was prepared by placing leaf tissue with the sporulating pathogen into distilled water and agitating to release sporangia (Figure 1F). In MSU greenhouse trials, this sporangial suspension was diluted to a concentration of 4.4 million

sporangia/ml. Inoculum was sprayed on plants, and then the plants were immediately enclosed in plastic bags that were kept shaded, to provide for increased relative humidity during days 1-7. After this opportunity for infection, plants were removed from the bags for days 8-14 and then placed into baskets within plastic bags for increased humidity for sporulation to occur during days 15-21. The total number of leaves (healthy + diseased) and the number of leaves with sporulating downy mildew were counted on each plant and percentage of leaves with the sporulating pathogen (per plant) was determined. LIHREC plants were inoculated in the greenhouse similarly, but then moved outdoors to an area with overhead irrigation. There were 7 replications of each cultivar. All data were statistically analyzed for each of the individual experiments that are summarized here.

## RESULTS

Due to the large amount of time needed to examine plants carefully for sporulation, only a limited number of cultivars could be tested at any one time. Because individual trials differed in disease pressure, it would be difficult to compare all varieties at one time statistically; therefore, researchers at MSU and LIHREC have collaborated to create Table 1 and Figure 2 to give growers a sense of the relative susceptibility of all cultivars tested. Table 1 is an alphabetical list of all cultivars tested. Of the 147 cultivars tested, 27.2% were rated as highly (**H**) susceptible to downy mildew, 29.3% had medium (**M**) susceptibility, 32.0% had low (**L**) susceptibility, 6.1% had low-medium (**L-M**) susceptibility, and 5.4% had medium-high (**M-H**) susceptibility.

**Table 1.** Downy mildew susceptibility of coleus cultivars (**L**=low, **M**=medium, **H**=high).

Cultivar	Rating	Cultivar	Rating	Cultivar	Rating
Alabama	M	Giant Rustic Red	M	Solar Eclipse	H
Alligator Tears	H	Glennis	M	Solar Furnace	L
Aurora Mocha	M	Glory of Luxemborg	L	Spumoni	L
Aurora Peach	M	Gold Edge	L	Stained Glass	M
Beauty	L	Gold Lace	H	Sun Splash	M
Beckwith's Gem	L-M	Golda	M	Tapestry	L
Big Blond	L	Golden Dream	L	The Whirlpool	H
Big Red Judy	H	Green Autry	L	Tilt A Whirl	L
Black Dragon	H	Harlequin	L	Trailing Burgundy	M
Black Ducksfoot	L	Henna	L	Trailing Garnet Rose	L
Brilliance	H	Honey Crisp	M	Trailing Odelisa	M
Burning Bush	M	Hunky Dory	L	Trailing Pink	M
Candy Store	H	Indian Summer	L	Trailing Plum	M
Chocolate Mint	M-H	Juliet Quartermain	H	Trailing Rose	H
Color Pride	H	Keystone Kopper	L	Trailing Swinging Linda	H
Copper	H	Kingswood Torch	H	Trailing Telltale Heart	M
Cranberry Bog	L	Kiwi Fern	L	Trusty Rusty	M-H
Cristata	M	Kong Mosaic	M-H	Twist of Lime	L
Dappled Apple	H	Kong Rose	M	Under the Sea Bone Fish	L

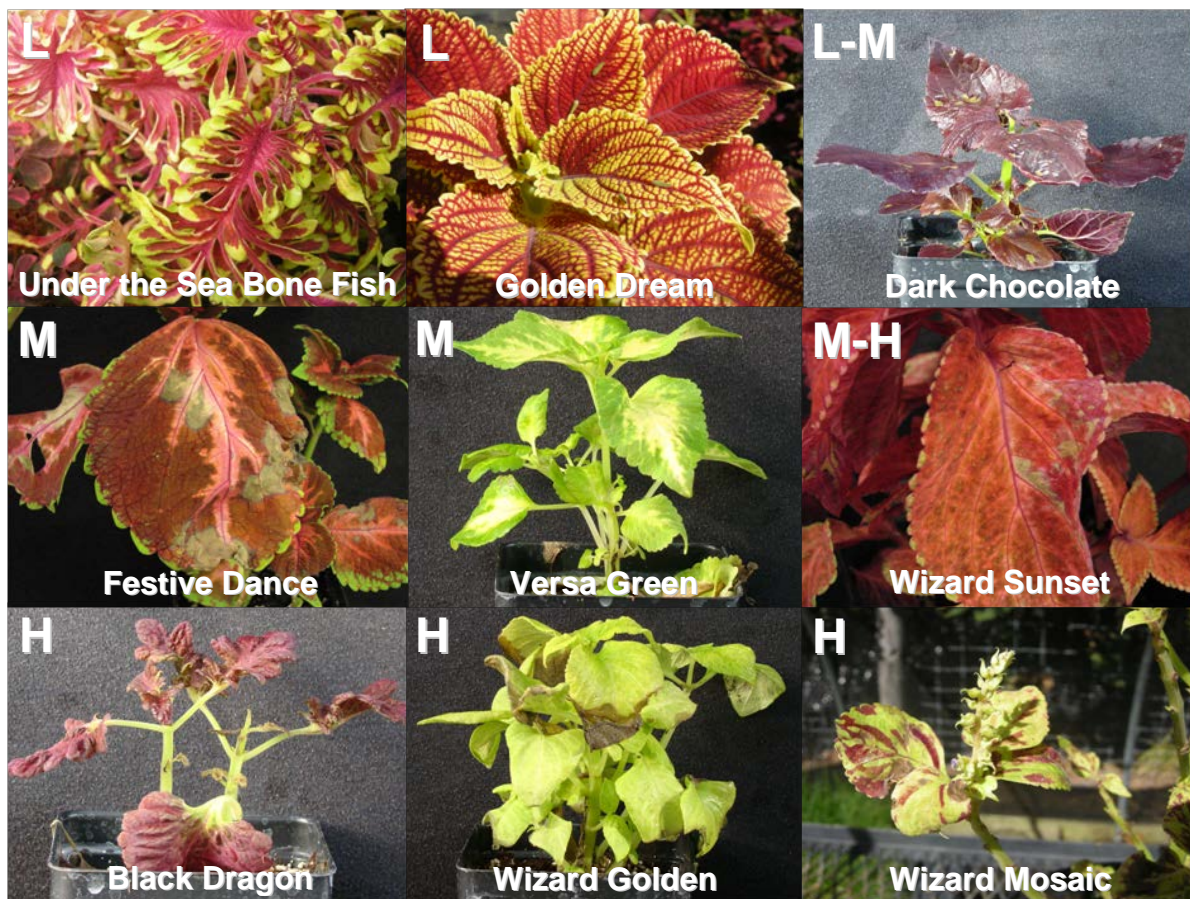
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<b>Cultivar</b>	<b>Rating</b>	<b>Cultivar</b>	<b>Rating</b>	<b>Cultivar</b>	<b>Rating</b>
Dark Chocolate .....	L-M	Life Lime.....	H	Under the Sea Electric Coral..	L
Dark Star .....	L-M	Lime Red.....	H	Under the Sea Gold Anemone	H
Defiance .....	H	Mardi Gras.....	M	Under the Sea King Crab .....	L-M
Dipt in Wine.....	M-H	Marooned .....	M	Under the Sea Langostino .....	L
Duke Yellow .....	M	Midnight Train .....	M	Under the Sea Lime Shrimp...L	
Electric Lime.....	H	Midway Curly Magenta .L		Velvet Mocha .....	L-M
Eruption.....	M	Mississippi Summer .....	M	Versa Burgundy.....	M
Etna .....	L	Molten Lava .....	M	Versa Crimson.....	M
Fairway Lemon .....	L	Moon Glow .....	M	Versa Green.....	M
Fairway Magic .....	H	Mrs. Harding .....	M	Versa Lime .....	L
Fairway Mosaic.....	M	Night & Glow .....	L	Versa Rose.....	M
Fairway Orange.....	L	Oompah.....	L	Versa Watermelon.....	H
Fairway Red Velvet .....	L	Pegasus.....	L	Violet Tricolor.....	H
Fairway Rose .....	L	Peter’s Wonder.....	M	Volcano .....	H
Fairway Ruby.....	H	Pineapple Beauty.....	L-M	Wasabi.....	H
Fairway Salmon Rose .....	L	Pineapple.....	H	White Gem .....	M
Fairway Yellow.....	L-M	Pistachio Nightmare .....	H	Wild Lime .....	H
Festive Dance.....	M	Play With Fire .....	M	Wild Streak.....	L
Fireball .....	M	Raspberry .....	H	Witch Doctor .....	M-H
Fishnet Stockings .....	M	Redhead.....	L	Wizard Coral Sunrise .....	H
Florida City Chuluota .....	H	Royal Glissade.....	M-H	Wizard Golden .....	H
Florida City Micanopy.....	H	Ruby Dream .....	L	Wizard Jade .....	H
Florida Sun Lava.....	L	Russet .....	L	Wizard Mosaic .....	H
Florida Sun Rose.....	L	Rustic Orange.....	L-M	Wizard Pastel.....	M-H
Florida Sun Rustic Orange..	M	Saturn .....	L	Wizard Pineapple .....	H
Freckles .....	L	Sedona .....	L-M	Wizard Pink.....	M
Fright Night.....	L	Shocking Pink .....	M	Wizard Rose .....	H
Gator Glory .....	L	Silk Sunset.....	M	Wizard Scarlet.....	M
Gay’s Delight.....	H	Smoldering .....	L	Wizard Sunset .....	M-H
Giant Palisandra.....	L	Snazzy .....	M	Wizard Velvet Red.....	H

Figure 2 (next page) shows some examples of cultivars that were classified into each susceptibility category.

## CONCLUSION

Differences in susceptibility to downy mildew were seen among coleus cultivars, ranging from low to high.



**Figure 2. Comparison of the susceptibility of coleus cultivars to downy mildew disease. Letters in upper left corners indicate susceptibility (L=low, L-M=low-medium, M=medium, M-H= medium-high, H=high susceptibility). Cultivar names are at bottom of photos.**

## INDUSTRY IMPACT

Differences in susceptibility to downy mildew disease among coleus cultivars affect holding quality in retail garden centers as well as customer satisfaction. If a grower chooses to grow a cultivar that is susceptible to downy mildew, additional costly disease management inputs including disease scouting, environmental monitoring, and fungicide applications may be necessary to produce a quality crop. Less susceptible cultivars will perform better during production and in the landscape, requiring less cost of production and providing more beauty in the garden.

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