Preliminary and Regional Reports

Survey of 575 Daylily Cultivars for Severity of Daylily Rust in a Southern Mississippi Landscape

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ADDITIONAL INDEX WORDS. *Hemerocallis*, *Puccinia hemerocallidis*, disease resistance, disease susceptibility

SUMMARY. Daylily (*Hemerocallis* sp.) is a popular and widely planted herbaceous perennial in the landscape, with over 78,000 cultivars registered with the American Hemerocallis Society. Daylily performs well in full sun, heat, humidity, and periods of dry weather, and has generally been considered to be pest free. However, a rust disease (*Puccinia hemerocallidis*) was introduced in the United States on imported plants in 2000, quickly spreading to become a widespread problem on daylily in and beyond the southern United States. In Aug. 2013, 575 daylily cultivars (mostly newer hybrids) were surveyed for daylily rust in a large landscape planting that had not received any fungicide treatment during the 2013 growing season. Weather conditions during the growing season were favorable for daylily rust. Individual clumps were rated as 1 (no or little visual sign of infection), 2 (moderate infection), or 3 (severe infection). In this survey, 119 cultivars (21%) received a median rating of 1 or 1.5, 230 cultivars (40%) received a rating of 2, and 226 (39%) received a rating of 2.5 or 3. Most cultivars were represented by a single clump, and may thus be more susceptible to daylily rust than a single rating might indicate. Diploid cultivars were associated with lower daylily rust severity ratings than tetraploid cultivars.

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Mention of trade names or commercial products in this article is solely for the purpose of providing specific information and does not imply recommendation or endorsement to the exclusion of other products that may also be suitable.

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Daylily is highly valued throughout the world as an easily grown herbaceous perennial for the landscape, with a proper selection of species and clonal hybrids providing an ongoing display of flowers from spring through fall. Daylily varies in growth habit; bloom season; and size, shape, and color of flowers. The robust and often fleshy roots of daylily withstand drought and their compact and sturdy, clumping growth habits allow daylily plants to tolerate competition from

garden weeds (Hill and Hill, 1991; Stout, 1986). Daylily flowers may be used to flavor and garnish culinary dishes (Pollard et al., 2004).

Daylily generally has few insect and disease pests in the landscape; however, daylily rust, caused by the fungus *Puccinia hemerocallidis*, was observed for the first time in the United States on plants of the cultivar Pardon Me at a nursery in Georgia in Aug. 2000, apparently introduced via plants imported from South America (Williams-Woodward et al., 2001). Daylily rust spread quickly throughout much of the United States through movement of infected stock (Buck and Ono, 2012). Before 2000, the pathogen was known only from eastern Asia (Hernández et al., 2002). Multiple pathotypes of the pathogen have been identified in the southeastern United States (Buck, 2013). Disease management strategies include quarantine of new nursery stock, use of disease-resistant cultivars, scouting for signs and symptoms of rust, and use of preventative fungicides (Buck and Ono, 2012).

The daylily rust pathogen produces yellow-orange to rust-brown pustules containing urediniospores on upper and lower leaf surfaces within 1 to 2 weeks after infection (Williams-Woodward et al., 2001). Additional symptoms reported on infected plants include bright yellow-orange spots and streaks, water-soaked tan spots with darker borders, large yellow lesions, and small discrete spots (Williams-Woodward and Buck, 2001). Mueller and Buck (2003) determined that temperatures around 72 °F with 5 h of leaf wetness are required during infection; however, disease development is not as sensitive to environmental conditions once infection has taken place. Cultivar-specific resistance and partial resistance to the pathogen involve hypersensitive cell death and a delayed latent period and reduced sporulation resulting from restriction of intercellular hyphal growth (Li et al., 2007).

Units			
To convert U.S. to SI, multiply by	U.S. unit	SI unit	To convert SI to U.S., multiply by
0.3048	ft	m	3.2808
2.54	inch(es)	cm	0.3937
(°F - 32) ÷ 1.8	°F	°C	(°C × 1.8) + 32

Table 1. Daylily rust severity ratings on 575 daylily cultivars growing in a large landscape planting in southern Mississippi in Aug. 2013. Plants had not received any fungicide treatment during the 2013 growing season. Weather conditions during the growing season were favorable for daylily rust.

Cultivar	Disease rating ^z	Bloom season ^y	Winter foliage ^x	Ploidy ^w	Registration ^v
Abilene Green Jeans	1	EM	S	Tet	Maddox, 2010
Abilene Jiving Jessica	2	EM	E	Tet	Maddox, 2011
Across the Galaxy	2	M	E	Tet	Trimmer, 2007
Adorable Perfection	1	E	E	Dip	Carpenter-J., 2006
Aerial Display	2	EE	E	Tet	Stamile, 2003
Alabama Sweet Tee	1	M	S	Dip	Herrington-K., 2009
Alan Lane Agin	2	M	D	Tet	Agin, 2007
Albino Vampire	2	EM	D	Tet	Phelps, 2007
Alex Sheets	3	EM	S	Tet	Crochet, 2006
Alexander's Ragtime Band	2.5	EM	E	Tet	Kirchhoff-D., 1998
All About Eve	1	EM	E	Tet	Kirchhoff-D., 2000
Alpine Ruffles	3	M	E	Tet	Stamile, 2007
Amalia Harrison	3	EM	S	Tet	George-T., 2007
Amber Rhum	2	M	S	Tet	Petit, 2008
American Freedom	2	E	S	Tet	Grace-Smith, 2003
An Easy Call	2	E	S	Tet	Salter-E.H., 2008
Ancient Image	2	MLa	E	Dip	Salter-E.H., 2011
Annick Verhaert	2	E	S	Tet	Kinnebrew-J., 2004
Appliqué	2.5	EM	E	Tet	Stamile, 2002
Apricot Cream Truffle	1	EM	E	Tet	Kirchhoff-D., 2007
Aquadisiac	3	EM	E	Tet	Harry, 2010
Artist Appliqué	2	E	S	Tet	Lambertson, 2009
Ashes in My Eye	3	M	S	Tet	Phelps, 2006
Asian Emissary	3	M	S	Tet	Salter, 2003
Atomic Glow	3	M	S	Tet	Smith-FR, 2007
Aunt Ethel	3	M	S	Tet	Smith-FR, 2006
Aunt Joanne	3	M	S	Tet	Smith-FR, 2006
Azure Wings	2	EM	E	Tet	Stamile, 2005
Baby Boomers Baby	2	EM	D	Dip	Herrington-T., 2003
Barcode	2	E	E	Tet	Stamile, 2007
Baubles and Beads	1.5	M	S	Tet	Salter-E.H., 2007
Beauty of His Grace	3	M	S	Dip	Bomar, 2006
Beauty of the King	3	M	E	Tet	Carpenter-J., 2004
Bella Sera	3	EM	E	Tet	Stamile, 2002
Belle Cook	3	M	S	Tet	Brooker, 2001
Bells and Whistles	2	M	S	Tet	Petit, 2006
Between Two Eternities	3	M	S	Tet	Shooter-E., 2008
Bicolor Beautiful	3	M	D	Tet	Carpenter-J., 2006
Big Navy	2	EM	E	Tet	Stamile, 2006
Big Ross	1.5	MLa	S	Dip	Bachman, 2001
Big Yellow Taxi	3	EM	E	Tet	Trimmer, 2005
Bill Chapman	3	M	E	Tet	Kirchhoff-D., 2005
Bit of Blue	2	EE	E	Tet	Stamile, 2004
Black Fathom Depths	2.5	EM	E	Tet	Salter-E.H., 2008
Blink of an Eye	3	E	S	Dip	Stamile-G., 2004
Blissful Blackberry Pie	2	M	S	Tet	Salter, 2005
Blue Beat	2	M	E	Tet	Stamile, 2008
Blue Elf	2	EM	S	Dip	Stamile-G., 2006
Blue Flirt	2	EM	S	Dip	Stamile-G., 2001
Blue Lake	3	E	E	Tet	Stamile, 2007
Blue Mountains	3	M	E	Tet	Stamile, 2007
Blue Ribbon Roundup	2	M	E	Dip	Payne-L.H., 2006
Bluebird Butterfly	1	MLa	E	Tet	Stamile, 2007
Bluegrass Music	3	EM	S	Tet	Grace-Smith, 2005
Blues Music	2	M	S	Tet	Salter, 2005
Bodacious Charmer	2	EM	E	Tet	Carpenter-J., 2007

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Cultivar	Disease rating ^z	Bloom season ^y	Winter foliage ^x	Ploidy ^w	Registration ^v
Bold Bear	3	EM	S	Tet	Phelps, 2006
Bolero Eyes	3	EM	E	Tet	Carpenter-J., 2007
Boot Scootin' Beauty	2	E	E	Tet	Carpenter-Glidden, 2007
Born to Run	3	M	E	Tet	Stamile, 2006
Bottle Rocket	2	E	E	Tet	Stamile, 2006
Breath of Fresh Air	3	EM	S	Tet	Smith-FR, 2007
Broadway Showgirl	2	EM	S	Tet	Stamile-G., 2002
Broadway Tiny Tot	2	M	S	Tet	Stamile-G., 1999
Bubbling Up	3	EM	S	Tet	Smith-FR, 2007
Bumblebee Beautiful	2	E	E	Dip	Carpenter-J., 2005
Burgundy Twister	1	EE	E	Tet	Stamile, 2003
Butterflies Are Free	2	E	E	Tet	Morss, 2008
Butterfly Cove	3	EM	E	Tet	Stamile, 2007
Cactus Jack	2	M	E	Tet	Trimmer, 2007
Caesar's Head	2	EM	S	Tet	Smith-FR, 2007
Captain America	2	M	D	Dip	Gossard, 2010
Captain Jack's Eyes	3	EM	S	Tet	Salter, 2006
Caribbean Sunrise	2	EM	S	Tet	Salter, 2009
Carpathian Mystic	1	EM	E	Dip	Salter-E.H., 2005
Celestial Empire	3	EM	E	Tet	Trimmer, 2007
Celestial Flight	1	M	E	Dip	Salter-E.H., 2011
Celestial Shore	3	M	S	Tet	Stamile, 2007
Celtic Merchant	2	EM	D	Tet	Salter, 2006
Cerise Beauty	3	EM	E	Tet	Stamile, 2007
Cherokee Treasure	2	M	E	Tet	Carpenter-J., 2002
Child of Atlantis	1	M	S	Dip	Stamile-G.-Pierce, 2012
Chill Out	3	M	E	Tet	Rice-J., 2005
Christina Cook	3	E	E	Tet	Kinnebrew-J., 2007
Christmas Greetings	3	M	S	Tet	Salter, 2005
Cinnamon Sticky Bun	3	EM	S	Tet	Phelps, 2007
Circle of Fire	2	EM	S	Tet	Grace-Smith, 2005
Circle of Whimsy	1	M	E	Dip	Salter-E.H., 2012
Circle Upon Circle	1	EM	E	Dip	Salter-E.H., 2005
Circles in Time	1	M	S	Dip	Salter-E.H., 2005
Circus Truffle	3	E	E	Tet	Kirchhoff-D., 2008
City of New Orleans	3	EM	S	Tet	Smith-FR, 2007
Clark Gable	2	EM	E	Tet	Kirchhoff-D., 2004
Clear Mountain Morn	3	EE	E	Tet	Stamile, 2007
Clothed in Glory	3	M	E	Tet	Grace, 1996
Cloud Ballet	3	EM	E	Tet	Smith-FR, 2007
Coffee To Go	2	E	E	Dip	Anderson-H., 2003
Compliment Magnet	3	M	S	Tet	Salter, 2008
Cool Confections	2	EM	D	Tet	Salter, 2008
Coral Magician	3	EM	S	Tet	Salter-E.H., 2007
Cosenza	2	EM	E	Tet	Stamile, 2007
Cosmic Aftershock	2	M	E	Dip	Salter-E.H., 2012
Cosmic Kaleidoscope	2	M	E	Dip	Carpenter-J., 2006
Cosmic Odyssey	3	EM	E	Tet	Stamile, 2007
Cosmic Traveler	3	EM	E	Tet	Trimmer, 2007
Country Bouquet	3	EM	D	Tet	Salter-E.H., 2002
Crackling Fire	1.5	La	D	Dip	Shooter-E., 2009
Crazy Ivan	2.5	EM	S	Tet	Grace-Smith, 2005
Creation	1	MLa	S	Dip	Roberts-N., 2004
Creative Design	2	M	D	Dip	Gossard, 2011
Creole Moon	3	EM	E	Tet	Trimmer, 2007
Cricket Call	1	M	S	Dip	Roberts-N., 2004

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Cultivar	Disease rating ^z	Bloom season ^y	Winter foliage ^x	Ploidy ^w	Registration ^v
Cryptic Cypher	2	M	E	Dip	Salter-E.H., 2005
Crystal Blue Persuasion	2	M	E	Dip	Salter-E.H., 1996
Crystal Shadows	2	M	S	Tet	Salter-E.H., 2006
Cultural Bias	3	EM	S	Tet	Salter, 2008
Culture Club	2	EM	S	Dip	Salter-E.H., 2013
Curtis Montgomery	2	M	D	Tet	Morss, 2007
Dainty is the Word	1	M	S	Dip	Salter-E.H., 2008
Dancing Chevrons	3	EE	S	Tet	Stamile, 2006
Dancing Rainbow	3	M	S	Tet	Smith-FR, 2006
Dancy Nancy	3	EE	E	Tet	Kirchhoff-D., 2007
Deal with the Devil	3	M	E	Tet	Salter-E.H., 2008
Debary Canary	1	EE	E	Tet	Stamile, 2006
Debutante Double	2	E	E	Tet	Kirchhoff-D., 2002
Delicate Details	2.5	M	S	Tet	Salter, 2005
Delightful Duchess	3	M	S	Tet	Salter-E.H., 2005
Desert Blush	2	EM	S	Tet	Salter, 2008
Desert Icicle	1.5	EM	S	Dip	Roberts-N., 1995
Dick's Pick	3	M	D	Tet	Phelps, 2007
Dinett Sue	2	EM	S	Dip	Bomar, 2004
Dixie Highway	2	EM	E	Tet	Stamile, 2007
Dixieland Five	1	EM	D	Dip	Herrington-H., 1991
Dizzy Damsel	2	E	S	Tet	Lambertson, 2012
Double Blue Blood	2	EM	S	Tet	George-T., 2005
Doug Warner	3	M	S	Tet	Petit, 2008
Dragon Seeker	2	M	E	Dip	Gossard, 2011
Dragons of Gold	3	EM	S	Tet	Salter-E.H., 2005
Dream Child	3	E	D	Dip	Powell-L.K., 1988
Dream Sequence	2	M	D	Dip	Rice-JA, 2007
Dreamy Blue Eyes	3	M	S	Tet	Petit, 2009
Drop of Magic	2	M	E	Dip	Salter-E.H., 2008
Dutch Yellow Truffle	2	E	E	Tet	Kirchhoff-D., 2003
Early Morning Blessing	1	M	E	Dip	Bomar, 2007
Easter Courtship	3	M	S	Tet	Salter, 2008
Easy on the Eyes	1	M	S	Tet	Salter-E.H., 2004
Edwardian Charm	3	M	E	Tet	Salter, 2005
Egyptian Markings	2	M	E	Dip	Carpenter-Carpenter, 2011
Eleanor Roosevelt	2	E	E	Tet	Grace-Smith, 2004
Elegant Harmony	3	EM	E	Tet	Carpenter-J., 2007
Elegant Universe	3	E	E	Tet	Stamile, 2006
Ellis Powell	3	M	S	Tet	Carpenter-J., 2006
Eloquent Cay	2	M	E	Tet	Stamile, 2006
Eloquently Edged	1	M	E	Dip	Carpenter-J., 2004
Elvin Archer	2.5	M	S	Dip	Salter-E.H., 2005
Emma's Curls	2	EM	E	Dip	Falck-J., 2011
Evelyn Gates	1.5	E	E	Dip	Gates-L., 1997
Everybody Loves Earnest	1	E	D	Dip	Herrington-T., 2005
Fall Back in Time	2	MLa	E	Dip	Salter-E.H., 2012
Fantastic Fringe	3	EM	S	Tet	Salter, 2008
Feelin' Frisky	2	EM	D	Tet	Owen-P., 2010
Feliz Navidad	2	EM	E	Tet	Carpenter-J., 2006
Fiestaville	2	EM	S	Tet	Salter, 2008
Fiji	3	EM	E	Tet	Stamile, 2007
Fine French Porcelain	3	M	S	Tet	Petit, 2008
Firefly Frenzy	1	M	E	Dip	Joiner-J., 2002
Flamboyant Edges	3	E	E	Tet	Stamile, 2001
Flamenco Christmas	3	M	E	Tet	Stamile, 2002

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Cultivar	Disease rating ^z	Bloom season ^y	Winter foliage ^x	Ploidy ^w	Registration ^v
Flames of Beauty	2	E	S	Tet	Salter-E.H., 2008
Flavored Peach	3	E	S	Tet	Salter, 2008
Flower Faces	2	MLa	E	Dip	Salter-E.H., 2008
Flying Monkeys	2	EM	D	Dip	Herrington-K., 2008
Frank's Adorable Candy	3	EM	E	Tet	Smith-FR, 2007
Frank's Black Eyed Susan	3	EM	S	Tet	Smith-FR, 2009
Frank's Hot Tamale	3	EM	S	Tet	Smith-FR, 2007
Free Wheelin'	3	EE	E	Tet	Stamile, 2004
Frilly Bliss	1	MLa	E	Dip	Joiner-J., 1998
Gail Reese	3	M	E	Dip	Reese-R., 2001
Gale's Glory	3	EM	S	Tet	Phelps, 2006
Garden Butterfly	1	M	D	Dip	Gossard, 2011
Gary Colby	2	M	S	Tet	Petit, 2005
Geometric Wizard	2	EM	S	Tet	Salter-E.H., 2012
Gilded Butterfly	3	M	S	Tet	Petit, 2008
Glory to His Name	3	E	D	Tet	Carpenter-J., 2006
God Alone	3	M	E	Tet	Bell-T., 2007
God Save the Queen	2.5	E	E	Tet	Morss, 2005
Godsend	2	M	E	Tet	Jaques, 2012
Going Green	3	EM	E	Tet	Stamile, 2007
Goldenzelle	2	M	S	Tet	Smith-FR, 2006
Googies	2	M	S	Tet	Rice-J., 2005
Gorgeous Smile	2	MLa	D	Tet	Rice-Potter, 2001
Got the Blues	1	EM	S	Dip	Stamile-G., 2002
Grapefruit Truffle	2	La	E	Tet	Kirchhoff-D., 2002
Green Rainbow	1	EM	D	Dip	Herrington-T., 2005
Green Revolution	3	EM	E	Tet	Stamile, 2007
Green Treat	1.5	M	S	Dip	Salter-E.H., 2002
Groovy Chick	3	EM	S	Tet	Pickles, 2007
Guadalajara	1	M	S	Tet	Carpenter-J., 2003
Happy Halloween	3	M	S	Tet	Salter, 2005
Heart of Savannah	2	M	E	Tet	Joiner, 2006
Heartbeat of Heaven	3	MLa	S	Tet	Emmerich, 2004
Heavenly Blues	2.5	M	E	Dip	Salter-E.H., 2005
Heavenly Realms	1	M	E	Dip	Bomar, 2004
Heaven's Artwork	1	EM	S	Tet	Phelps, 2006
Heaven's Majesty	2	E	S	Tet	Carpenter-J., 2006
Heavens Rest	2	EM	E	Tet	Salter-E.H., 2005
Helix	2	EE	E	Tet	Stamile, 2002
His Highness	3	EE	E	Tet	Stamile, 2000
Hog Heaven	1	EM	S	Tet	Smith-FR, 2007
Hold Your Horses	2.5	EM	E	Tet	Trimmer, 2004
Holy Water	3	EM	S	Tet	Smith-FR, 2007
Home Run King	1.5	E	E	Dip	Carpenter-J., 2009
Hot and Hip	2	EM	S	Tet	Salter-E.H., 2012
Hot Flashes	3	EM	S	Tet	Phelps, 2007
Hot Scheme	2	M	S	Tet	Salter-E.H., 1997
How Lovely You Are	2	MLa	S	Tet	Rice-J., 2006
Hunters Quest	1	M	D	Tet	Taylor-O., 1981
I Know Who Holds Tomorrow	2	M	D	Dip	Bomar, 2005
I Remember You	2	EM	S	Tet	Smith-FR, 2005
Ida Mae Norris	2	M	D	Dip	Norris-R., 2009
Irish Icon	1	M	E	Dip	Salter-E.H., 2008
Isabelle Phelps	3	M	S	Dip	Phelps, 2006
Isabelle's Inspiration	2.5	M	S	Tet	Phelps, 2006
Isle of Wight	2	E	E	Tet	Trimmer, 2004

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Cultivar	Disease rating ^z	Bloom season ^y	Winter foliage ^x	Ploidy ^w	Registration ^v
It Is Finished	3	EM	E	Tet	Carpenter-J., 2004
J.J. Homsey	2	M	E	Tet	Homsey-P, 2004
J.T. Davis	1	M	E	Tet	Grace-L., 1999
Jacki Kropf	2	EM	S	Tet	Morss, 2004
Jade Glow	3	EM	E	Tet	Stamile, 2005
James Fennell	2	M	E	Dip	Salter-E.H., 2013
Jan's Marvel	1	M	E	Dip	Joiner-J., 2005
Jay Farquhar	2	M	E	Tet	Carpenter-J., 2003
Jealous Dancer	3	E	D	Dip	Carpenter-J., 2007
Jennifer Trimmer	3	EM	E	Tet	Trimmer, 2006
Johnny Bear	2	EE	E	Tet	Hansen-D., 2009
Jolly Red Giant	3	E	E	Tet	Stamile, 1999
Journey to Oz	2	EM	D	Dip	Herrington-K., 2001
Joy of Life	1.5	M	E	Tet	Carpenter-J., 2006
Joyce Lee Brown	2	EM	E	Tet	Joiner, 2005
Judy Farquhar	2	M	E	Tet	Stamile, 2004
Just As I Am	3	E	E	Tet	Carpenter-J., 2006
Just for Breakfast	2	EM	S	Dip	Threewitts, 1994
Kaleidoscope Jungle Cat	1	M	E	Dip	Carpenter-Carpenter, 2011
Kaleidoscope Puzzle	1.5	EM	E	Dip	Carpenter-Carpenter, 2010
Kaleidoscopic Intrigue	1	M	E	Dip	Carpenter-J., 2009
Katisue	2	MLa	D	Dip	Lewis-J., 1989
Kings Point	2	M	S	Tet	Trimmer, 2004
Kiss My Grits	2	M	S	Tet	Smith-FR, 2007
Korean Kite	2	M	S	Tet	Salter-E.H., 2005
Lacy Border	2	E	E	Tet	Stamile, 2006
Lacy Dusk	2	EE	S	Tet	Stamile, 2007
Lady Betty Fretz	3	M	S	Tet	Petit, 2005
Lala Fabulosa	3	M	S	Tet	Smith-FR, 2007
Land of Our Fathers	2	E	E	Tet	Carpenter-J., 2007
Late Afternoon Sunshine	1	M	D	Tet	Phelps, 2007
Laughing Skies	1	EE	E	Tet	Stamile, 2003
Lavender Blue Baby	2	EM	D	Dip	Carpenter-J., 1996
Lavender Exaltation	2	M	E	Tet	Carpenter-J., 2006
Lavender Handlebars	1	M	D	Dip	Roberts-N., 1994
Lavender Reflections	2.5	MLa	S	Tet	Salter, 2005
Leonardo's Perspective of Color	1	M	S	Dip	Faulkner, 2011
Let Loose	2	EE	E	Tet	Stamile, 2003
Levi Davis	3	M	E	Tet	Carpenter-J., 2005
Light and Lively	2	EM	S	Tet	Salter, 2008
Lillian's Jack Temple	1	M	S	Dip	Manning, 2007
Lillian's Jinger Bred	2	M	E	Tet	Manning, 2007
Lillian's Woman's Touch	2	M	E	Dip	Manning, 2002
Linda Beck	2	M	S	Tet	Agin, 2005
Linda's Magic	3	EM	S	Tet	Grace-Smith, 2003
Lisa's Smile	3	M	S	Tet	Phelps, 2006
Listen Missy	2	M	S	Tet	Phelps, 2006
Little Blue Belle	1	EM	S	Dip	Stamile-G., 2006
Little Enchantress	2	E	D	Dip	Stamile-G., 2004
Little Gold Nugget	1.5	EM	D	Dip	Herrington-T., 2005
Little Gypsy Girl	2	E	S	Dip	Stamile-G., 2003
Little Pink Cloud	1	E	S	Dip	Winniford-E., 1985
Little Raven	1	EM	S	Dip	Stamile-G., 2006
Little Red Dimples	1	E	D	Dip	Anderson-H., 2000
Little Secrets	2	EM	S	Dip	Stamile-G., 2006
Little Trooper	1	EM	S	Dip	Stamile-G., 2008

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Cultivar	Disease rating ^z	Bloom season ^y	Winter foliage ^x	Ploidy ^w	Registration ^v
Little Wizard	1	M	S	Dip	Stamile-G., 2008
Lone Star Wagon Wheel	2	EM	S	Dip	Payne-L.H., 2004
Lonesome Heart	3	M	E	Tet	Stamile, 2006
Long Tall Sally	2	EM	D	Tet	Trimmer, 1996
Look Here Mary	1.5	M	S	Dip	Cranshaw, 1986
Lost in Illusion	2	M	E	Dip	Salter-E.H., 2011
Lotus Position	2	EM	E	Tet	Rice-J., 2007
Lynnstar	1	La	D	Dip	Anderson-H., 2006
Magic Maker	2	M	S	Dip	Gossard, 2011
Magic of Oz	2	M	D	Dip	Herrington-H., 1995
Magical Mystery Show	3	E	E	Tet	Stamile, 2007
Magnificent Obsession	3	EM	S	Tet	Smith-FR, 2007
Make Your Point	1.5	M	E	Dip	Salter-E.H., 2008
Malaysian Marketplace	3	EM	S	Tet	Salter, 2005
Mandalay Bay Music	3	EM	S	Tet	Salter, 2001
Margaret Marie Wenberg	3	M	D	Tet	Todd, 2004
Mark's Bouquet	1	E	E	Dip	Agosta, 2006
Mars Everlasting Fury	2	EM	E	Dip	Salter-A., 2009
Marseilles Watercolor	1	EE	E	Tet	Stamile, 2007
Mary Alice	3	EM	S	Tet	Smith-FR, 2007
Mary Ethel Anderson	2	MLa	S	Dip	Salter-E.H., 1995
Masked Marauder	3	M	S	Tet	Petit, 2010
Maude Reese	1	E	E	Dip	Reese-R., 2008
McKenzie Agin	3	M	D	Tet	Agin, 2007
Medicine Feather	2	EM	S	Dip	Roberts-N., 2001
Mediterranean Muse	2	M	S	Tet	Salter, 2006
Memories Remain	2	EM	E	Tet	Carr, 2005
Merely Mystical	3	EE	S	Tet	Salter-E.H., 2008
Merlin's Prophecy	1	M	S	Dip	Salter-E.H., 2008
Micro Dots	2	E	E	Dip	Trimmer-J., 2003
Midnight in Oz	2	M	D	Dip	Herrington-K., 2009
Mike Longo	3	E	E	Tet	Kinnebrew-J., 2004
Miss Lula Mae	2	M	S	Tet	Smith-FR, 2006
Mississippi Earl Watts	3	EM	S	Tet	Kinnebrew-J., 2007
Mississippi Man	3	E	E	Tet	Trimmer, 2006
Mississippi Red Dragon	2	EM	D	Tet	Carpenter-J., 2005
Mitch Ensor	3	EM	S	Tet	Phelps, 2007
Mix and Match	1	M	D	Tet	Salter-E.H., 2012
Mixed Berry Jam	2	M	S	Dip	Salter-E.H., 2009
Moon Magic	1	M	D	Dip	Womble, 1949
Moon Sworn	2	M	E	Dip	Salter-E.H., 2013
Morning All Day	1	EM	D	Dip	Herrington-K., 2001
Morrie Otte	2	M	S	Dip	Salter-E.H., 1996
Mount Herman Morning Beauty	3	M	E	Tet	Carpenter-J., 2007
Much Ado About Magic	3	M	S	Tet	Salter, 2005
My Friend Floyd	1	M	S	Dip	Roberts-N., 2005
My Sunny Valentine	3	M	S	Tet	Salter, 2007
Natural Born Charmer	2	EM	S	Tet	Salter-E.H., 2007
Navajo Princess	2	MLa	S	Dip	Hansen, 1992
Nebula on Fire	2	EM	S	Tet	Grace-Smith, 2005
New Hampshire Heaven	3	M	E	Tet	Carpenter-J., 2006
Nile Jewel	2	M	E	Dip	Salter-E.H., 2006
Off To See the Wizard	2	M	S	Dip	Herrington-K., 2009
Oh So Awesome	3	M	S	Tet	Salter, 2008
On the Lookout	2	M	E	Tet	Salter-E.H., 2005
One Way Home	2	EM	S	Tet	Smith-FR, 2007

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Table 1. (*Continued*) Daylily rust severity ratings on 575 daylily cultivars growing in a large landscape planting in southern Mississippi in Aug. 2013. Plants had not received any fungicide treatment during the 2013 growing season. Weather conditions during the growing season were favorable for daylily rust.

Cultivar	Disease rating ^z	Bloom season ^y	Winter foliage ^x	Ploidy ^w	Registration ^v
Only Believe	3	EM	S	Tet	Grace-L., 1998
Our Friend Tom Wilson	1	EM	E	Dip	Carpenter-J., 2004
Out in Style	3	M	S	Tet	Salter-E.H., 1996
Out of the Blue	1	M	E	Dip	Salter-E.H., 2002
Over the Line	1	M	E	Dip	Salter-E.H., 2005
Over the Mountain	3	M	E	Tet	Stamile, 2007
Paco Bell	3	E	D	Tet	Salter, 2008
Painted Pattern	1	E	S	Dip	Lambertson, 2012
Parting the Red Sea	2	EE	E	Tet	Hansen-D., 2009
Passion's Blush	3	E	S	Tet	Phelps, 2007
Pathway to Paradise	3	M	E	Tet	Salter, 2005
Pattern Pleaser	1	E	E	Dip	Carpenter-J., 2009
Peach Cupcake	1	EM	D	Dip	Herrington-T., 2000
Peach Wine	3	EM	S	Tet	Phelps, 2006
Peggy Imrie	1	E	E	Dip	Lambertson, 2012
Peppermint Pinwheel	3	M	S	Tet	Salter, 2005
Picture in Picture	3	M	E	Tet	Stamile, 2007
Pigment of Imagination	2	M	D	Dip	Norris-R., 2008
Pineapple Moon	2	EM	E	Tet	Trimmer, 2007
Pink Enchilada	1	M	D	Dip	Roberts-N., 2005
Pink Lemonade	3	EM	E	Dip	Durio, 1975
Pink Lemonade Party	2	M	S	Tet	Salter, 2006
Pinwheel Princess	1	EM	E	Dip	Salter-E.H., 2010
Pirate King	2.5	EM	S	Tet	Grace-Smith, 2004
Pixie Pageantry	3	MLa	S	Tet	Salter-E.H., 2004
Pixie Pinwheel Party	1	M	E	Dip	Salter-E.H., 2008
Planet Max	1.5	EM	S	Dip	Reed, 1996
Pleasantly Plum	2	M	S	Tet	Salter, 2008
Plum Cupcake	1	EM	S	Dip	Herrington-T., 1998
Plum Eyed Delight	3	EM	S	Tet	Carpenter-J., 2006
Pocketful Of Patterns	2.5	EM	E	Tet	Salter-E.H., 2005
Positively Electric	3	E	S	Tet	Salter-E.H., 2008
Precious Candy	3	E	E	Tet	Stamile, 2006
Priceless	3	EM	S	Tet	Smith-FR, 2007
Princess of Wales	3	EM	E	Tet	Stamile, 2006
Private Showing	3	M	S	Tet	Herrington-K., 1998
Pumpkin Mime	1	EM	S	Dip	Salter-E.H., 2005
Pure Indulgence	3	E	E	Tet	Carr, 2000
Purple Suspenders	1	M	D	Tet	Webster-Cobb, 1999
Quartz Rainbow	2	EE	E	Tet	Stamile, 2007
Quiet Reflections	2	EM	E	Tet	Salter, 2006
Radioactive Curls	2	M	E	Dip	Gossard, 2004
Random Thoughts	2	EM	E	Tet	Salter-E.H., 2005
Raven's Rage	3	M	S	Tet	Salter-E.H., 2002
Razor Eyes	2	M	S	Tet	Lambertson, 2006
Red Done Right	3	EM	S	Tet	Salter, 2008
Red Handlebars	1	MLa	D	Dip	Roberts-N., 2003
Refuge Point	2	EM	S	Tet	Salter-E.H., 2008
Regal Fantasy	2	EM	S	Tet	Salter, 2005
Reggie Morgan	3	M	D	Tet	Petit, 2008
Return to Oz	2	M	D	Dip	Herrington-K., 2000
Rhubarb Pie	2	E	E	Tet	Stamile, 2007
Ring the Bells of Heaven	3	EM	D	Tet	Carpenter-J., 2006
Rita Sue	3	M	S	Tet	Smith-FR, 2006
Road to Dixie	3	EM	S	Tet	Salter-E.H., 2005
Robert W. Grenkowitz	3	M	S	Tet	Petit, 2008

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Table 1. (*Continued*) Daylily rust severity ratings on 575 daylily cultivars growing in a large landscape planting in southern Mississippi in Aug. 2013. Plants had not received any fungicide treatment during the 2013 growing season. Weather conditions during the growing season were favorable for daylily rust.

Cultivar	Disease rating ^z	Bloom season ^y	Winter foliage ^x	Ploidy ^w	Registration ^v
Rock Candy	3	M	D	Tet	Stamile, 2007
Rocky's Eye	3	EM	D	Dip	Herrington-H., 1992
Rodeo Girl	1	M	E	Tet	Salter-E.H., 2006
Rolling Raven	2	EM	E	Tet	Stamile, 2007
Romancing Summer	3	EM	S	Tet	Salter, 2008
Rosabelle Van Valkenburgh	2	M	S	Dip	Salter-E.H., 2008
Rose Colored Glasses	3	EM	S	Tet	Smith-FR, 2007
Rose Heat	3	M	E	Tet	Stamile, 2007
Rough and Tough	3	M	E	Tet	Carpenter-J., 2007
Royal Celebration	2	EM	E	Tet	Trimmer, 1999
Ruffles Have Ripples	3	M	S	Tet	Petit, 2009
Running Hot	2	EM	E	Tet	Stamile, 2007
Sanford Crossfire	3	M	S	Tet	Morss, 2007
Santa Catalina	3	EM	E	Tet	Trimmer, 2007
Santa's Little Helper	1	EM	E	Tet	Trimmer, 2007
Sassy Sam	3	M	E	Tet	Carpenter-J., 2007
Saving Parrot Ryan	2	EM	E	Tet	Trimmer, 2010
Scarecrow	2	E	E	Tet	Stamile, 2005
Scrambled Eggs and Bacon	3	E	E	Tet	Hansen-D., 2009
Sebastian the Crab	2	M	E	Dip	Joiner-J., 2003
Sensational Pixie	3	EM	S	Tet	Salter-E.H., 2007
Serenity Bay	2.5	M	S	Tet	Salter, 2008
Shamrock Delight	2	EE	E	Tet	Trimmer, 2007
Shelton Holliday	3	E	S	Tet	Kinnebrew-J., 2004
Shipwreck	2	M	E	Tet	MacDonald-L., 2003
Signature Truffle	1	EM	E	Tet	Kirchhoff-D., 2004
Silver Rings	3	La	D	Tet	Stamile, 2007
Sing the Wonderous Story	2	M	D	Dip	Carpenter-J., 2008
Singing with Angels	2	EM	S	Tet	Smith-FR, 2007
Singular Sensation	3	EM	S	Tet	Stamile, 2004
Sinister Minister	2	M	S	Tet	Salter, 2008
Sir Francis Drake	2	M	E	Tet	Stamile, 2008
Sister Donna Marie	3	EM	S	Tet	Phelps, 2007
Skinny Dipping	2	E	S	Tet	Stamile, 1999
Skinwalker	3	M	D	Dip	Roberts-N., 1997
Small World Bird Watching	3	M	S	Dip	Miller-M., 2011
Small World Helicopter	2	M	S	Tet	Miller-M., 2010
Smile Again	2	EM	S	Tet	Grace-Smith, 2005
Smoke Shadows	3	M	S	Tet	Petit, 2008
Smoky Eyes	3	E	E	Tet	Stamile, 2006
Snow Crystal	2	E	E	Tet	Stamile, 2008
Snow Empress	3	EM	S	Tet	Smith-FR, 2005
Something to Remember	3	EM	E	Tet	Carpenter-J., 2006
Sophisticated Statement	2	M	S	Dip	Salter-E.H., 2012
Southern Blues	2	M	S	Dip	Stamile-G., 2006
Southern Dazzle	3	EM	S	Tet	Harry-Gaskins, 2008
Southwestern Memories	3	M	S	Tet	Salter, 2005
Spacecoast Better Late	2	La	S	Tet	Kinnebrew-J., 2008
Spacecoast Blood Diamond	1	EM	S	Tet	Kinnebrew-J., 2007
Spacecoast Devil's Eye	2.5	EM	S	Tet	Kinnebrew-J., 2006
Spacecoast Fantastic Finish	3	EM	E	Tet	Kinnebrew-J., 2007
Spacecoast Frills and Finery	2	EM	S	Tet	Kinnebrew-J., 2004
Spacecoast Gilded Robe	3	EE	E	Tet	Kinnebrew-J., 2007
Spacecoast Gone Bulldoggin'	3	EM	S	Tet	Kinnebrew-J., 2006
Spacecoast Hope Beacon	3	E	S	Tet	Kinnebrew-J., 2007
Spacecoast Shellcracker	2	EM	S	Tet	Kinnebrew-J., 2006

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Table 1. (*Continued*) Daylily rust severity ratings on 575 daylily cultivars growing in a large landscape planting in southern Mississippi in Aug. 2013. Plants had not received any fungicide treatment during the 2013 growing season. Weather conditions during the growing season were favorable for daylily rust.

Cultivar	Disease rating ^z	Bloom season ^y	Winter foliage ^x	Ploidy ^w	Registration ^v
Spacecoast Two Eyed Jack	2	EM	S	Tet	Kinnebrew-J., 2006
Spacecoast White Chocolate	2	E	S	Tet	Kinnebrew-J., 2007
Spanish Fiesta	3	EM	E	Tet	Trimmer, 2006
Spanish Saga	2	E	E	Tet	Salter, 2005
Special Candy	2	EM	E	Tet	Stamile, 2006
Special Ovation	3	E	E	Tet	Stamile, 2005
Spellbound Spring	3	M	E	Tet	Salter, 2008
Sphere of Influence	2	M	E	Dip	Salter-E.H., 2012
Spirited Butterfly	1	M	E	Dip	Salter-E.H., 2005
Spirited Style	1	M	S	Dip	Salter-E.H., 2005
Spooky Hollow	3	EM	S	Tet	Salter, 2008
Spring Mystique	1	M	E	Dip	Carpenter-J., 2009
Star of the Show	2	M	D	Dip	Phelps, 2007
Star Over Oz	1	EM	S	Dip	Herrington-K., 2005
Static	3	M	E	Tet	Stamile, 2006
Steve Martin	3	EM	E	Tet	Salter, 2008
Stick Figure	2	E	D	Tet	Stamile, 2005
Stone Lovely	3	EM	S	Tet	Smith-FR, 2008
Storm Prince	2	M	S	Tet	Salter, 2005
Suburban Alice Essary	2	EM	S	Tet	Watts, 2006
Suburban Barbara Hayman	3	M	S	Tet	Watts, 2011
Suburban Barbara Huff	3	EM	S	Tet	Watts, 1997
Suburban Barry Brown	3	MLa	S	Tet	Watts, 2008
Suburban Big Ma	3	M	E	Tet	Watts, 2001
Suburban Blue Jay	2	M	E	Tet	Watts, 2012
Suburban Calvin	3	MLa	D	Tet	Watts, 2005
Suburban Cecil McClellan	1	MLa	E	Tet	Watts, 2013
Suburban Chris Howell	1	M	S	Tet	Watts, 2008
Suburban Coach Burnham	1	MLa	S	Dip	Watts, 2011
Suburban Daddy John	3	MLa	E	Tet	Watts, 2004
Suburban David Michael	2	MLa	S	Tet	Watts, 2011
Suburban Dixie Darling	2.5	MLa	D	Tet	Watts, 2006
Suburban Dynamo	1	MLa	D	Dip	Watts, 2004
Suburban Elizabeth Rush	1	M	E	Tet	Watts, 2012
Suburban Evelyn Jane	2	MLa	E	Tet	Watts, 2006
Suburban Fickle Fingers	1	M	D	Dip	Watts, 2002
Suburban Golden Eagle	3	E	E	Tet	Watts, 1998
Suburban Hazel Watts	1	M	S	Dip	Watts, 2011
Suburban John E. Watts	2	M	S	Dip	Watts, 2011
Suburban Jon Tibbetts	1	MLa	E	Tet	Watts, 2012
Suburban Ken Hayman	2	M	S	Tet	Watts, 2011
Suburban Lewis Watts	1.5	MLa	S	Dip	Watts, 2008
Suburban Louise McClellan	2	EM	E	Tet	Watts, 2008
Suburban Madison	1	M	S	Tet	Watts, 2011
Suburban Maria Diane	1	MLa	S	Tet	Watts, 2008
Suburban Mockingbird	2	M	E	Tet	Watts, 2012
Suburban Nancy Gayle	1	MLa	E	Tet	Watts, 2004
Suburban Newell Howell	2	MLa	S	Dip	Watts, 2008
Suburban Pete	1	M	E	Tet	Watts, 2012
Suburban Purple Martin	2	MLa	E	Tet	Watts, 2012
Suburban Ribbon of Hope	1	MLa	S	Dip	Watts, 2008
Suburban Rick Taylor	1	M	E	Tet	Watts, 2012
Suburban Sue Barnett	2	MLa	E	Tet	Watts, 2008
Suburban Sugar Britches	2	EM	E	Tet	Watts, 2005
Suburban Tassy	2	MLa	E	Dip	Watts, 1999
Suburban TR	1.5	MLa	S	Tet	Watts, 2008

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Table 1. (Continued) Daylily rust severity ratings on 575 daylily cultivars growing in a large landscape planting in southern Mississippi in Aug. 2013. Plants had not received any fungicide treatment during the 2013 growing season. Weather conditions during the growing season were favorable for daylily rust.

Cultivar	Disease rating ^z	Bloom season ^y	Winter foliage ^x	Ploidy ^w	Registration ^v
Suburban Virginia Kirkpatrick	2	M	E	Tet	Watts, 2008
Suburban Wren	2	M	E	Dip	Watts, 2012
Sugar Glider	3	E	E	Tet	Trimmer, 2005
Summer in Versailles	2.5	M	D	Tet	Salter, 2005
Sun Giant	2	EM	E	Tet	Trimmer, 2010
Sunday Sunshine	3	EM	E	Tet	Trimmer, 2007
Sunglasses Needed	1	M	E	Dip	Joiner-J., 2007
Sunshine All Day	2	EM	E	Tet	Smith-FR, 2007
Sunshine Cay	2	EM	S	Tet	Salter, 2008
Super Fancy Face	1.5	M	E	Dip	Carpenter-J., 2009
Susan Pritchard Petit	3	M	S	Tet	Petit, 2001
Swan Angel	2	E	S	Tet	Morss, 2007
Sweet Ole Man	2	M	S	Tet	Smith-FR, 2006
Sweet Reverie	3	M	S	Tet	Salter, 2008
Talladega	2	E	S	Tet	Stamile, 2008
Tapestry in Time	2.5	EM	S	Tet	Salter, 2005
Temple Truffle	3	E	E	Tet	Kirchhoff-D., 2005
Tequila Mockingbird	3	EM	E	Tet	Trimmer, 2005
Tequila Sunset	2	EM	S	Tet	Smith-FR, 2007
Texas Big Red	3	E	D	Tet	Carpenter-J., 2006
Texas Feathered Fancy	3	M	D	Dip	Carpenter-J., 2006
Texas Kaleidoscope	1	M	E	Dip	Carpenter-J., 2001
Texas Painted Eyes	3	M	S	Tet	Carpenter-J., 2007
Texas Whopper Stopper	2	M	E	Dip	Carpenter-J., 1996
The Hulk	2	M	E	Tet	Stamile, 2007
The Terminator	2	M	E	Tet	Stamile, 2006
Thin Man	2	M	E	Tet	Trimmer, 2002
Tidewater Pixie	1	M	E	Dip	Salter-E.H., 2008
Tilting at Windmills	2	M	S	Dip	Salter-E.H., 2006
Timeless Majesty	3	La	D	Tet	Carpenter-J., 2006
Tintoretto	2	MLa	E	Tet	Morss, 2008
Titanic Tower	3	M	S	Tet	Lambertson, 2006
To God Be the Glory	2	EM	E	Tet	Carpenter-J., 2006
Topspin	2	EM	E	Tet	Stamile, 2006
Tricolor	3	E	E	Tet	Stamile, 2006
Tropical Cooler	3	M	D	Tet	Salter, 2005
Tropical Daydream	2	EM	S	Tet	Salter, 2008
True North	3	EM	E	Tet	Trimmer, 2007
Trufflicious	2	E	E	Tet	Kirchhoff-D., 2005
Tutti Frutti Truffle	1	VLa	E	Tet	Kirchhoff-D., 2007
Twilight Text	1	M	S	Dip	Salter-E.H., 2008
Under Water Wonder	1.5	M	D	Dip	Salter-E.H., 2005
Uri Geller	2	M	S	Tet	Hanson-C., 2003
Velvet Ribbons	2	EM	E	Tet	Stamile, 2002
Velvet Throne	2	M	S	Tet	Petit, 2009
Verdant Spring	2	E	E	Tet	Stamile, 2007
Violet Becomes You	2	EM	E	Tet	Stamile, 2007
Waken to Winter	3	EM	S	Tet	Salter-E.H., 2005
Walking in Beauty	2.5	EM	E	Tet	Stamile, 2004
Walt Lowry	2	M	D	Tet	Holmes-S., 2011
Waxen Splendor	3	E	E	Dip	Carpenter-J., 2007
Wedding Gown	3	M	S	Tet	Smith-FR, 2007
What Fun	2	EM	S	Tet	Salter, 2008
Whimsical Witch	1	M	D	Tet	Salter-E.H., 2005
Whirlaway the Thoroughbred	3	M	S	Dip	Herrington-K., 2004
Whisper of Summer	2	EM	S	Tet	Salter, 2008

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Table 1. (Continued) Daylily rust severity ratings on 575 daylily cultivars growing in a large landscape planting in southern Mississippi in Aug. 2013. Plants had not received any fungicide treatment during the 2013 growing season. Weather conditions during the growing season were favorable for daylily rust.

Cultivar	Disease rating ^z	Bloom season ^y	Winter foliage ^x	Ploidy ^w	Registration ^v
White on Rice	2	EM	S	Tet	Smith-FR, 2009
Who Do Voodoo	3	EM	E	Tet	Kinnebrew-J., 2007
Wild and Free	1	E	E	Tet	Stamile, 2005
Wild Red Heart	3	EM	S	Tet	Salter, 2008
Wild Winter Wine	3	EM	E	Tet	Kirchhoff-D., 2007
Wild Wookie	2	M	E	Tet	Stamile, 2002
Willa Jean	2	EM	E	Tet	Netherton-J., 2005
Willow Dean Smith	2	MLa	D	Tet	Rice-J., 2007
Windstar	1	EM	D	Dip	Herrington-K., 2001
Wings of Angels	3	EM	S	Tet	Grace-Smith, 2005
Winter's Crown	2	M	E	Tet	Salter, 2008
Wizard at Large	2	EM	S	Tet	Salter, 2008
Wonder of It All	3	E	D	Tet	Carr, 2005
World Traveler	3	E	E	Tet	Trimmer, 2006
You Angel You	1	M	S	Dip	Stamile-G., 1993

^z1 = no or little visual sign of infections; 2 = moderate infection; 3 = severe infection. Most cultivars (85%) were represented by a single clump of plants, 12% by two clumps, and 3% by three or more clumps. When there were two or more clumps of the same cultivar, the median is reported as the rating.

^yEE = extra early; E = early; EM = early midseason; M = midseason; MLa = late midseason; La = late; VLa = very late (American Hemerocallis Society, 2015).

^xD = dormant; S = semievergreen; E = evergreen (American Hemerocallis Society, 2015).

^wDip = diploid; Tet = tetraploid (American Hemerocallis Society, 2015).

^vOriginator of the cultivar and year of registration with the American Hemerocallis Society (2015).

Table 2. Mean maximum, average, and minimum daily air temperature; mean daily dew point, and total precipitation in June, July, and Aug. 2013 in Hattiesburg, MS.^z

Month	Maximum temp (°F) ^y	Avg temp (°F)	Minimum temp (°F)	Dew point (°F)	Precipitation (inches) ^y
June	91	81	70	71	5.08
July	89	80	71	72	5.85
August	90	81	71	72	4.03

^zWeather history for Hattiesburg Bobby L. Chain Municipal Airport, Hattiesburg, MS (Weather Underground, 2013).

^y(°F - 32) ÷ 1.8 = °C, 1 inch = 2.54 cm.

Identification of rust-resistant and rust-susceptible daylily cultivars is of benefit to breeders, commercial growers, and home gardeners, particularly in helping to reduce the time and expense involved in repeated fungicide applications in nurseries and landscapes. In Georgia, Williams-Woodward and Buck (2001) conducted a preliminary greenhouse study with pathogen-inoculated plants of 22 cultivars and Mueller et al. (2003) followed with a greenhouse study with pathogen-inoculated plants of 84 cultivars to assess relative resistance to daylily rust. Robbins and Vann (2002) surveyed 500 field-grown cultivars at a small commercial nursery in central Arkansas in 2001, with a follow-up survey of 500 cultivars in 2002 (Robbins, 2003), with 75% of these cultivars also surveyed in the prior year.

As of early 2015, over 78,000 cultivars have been registered with the American Hemerocallis Society (2015). Little information is available

on resistance and susceptibility of daylily cultivars that have been developed and registered since 2000. This report presents results from a survey of 575 mostly modern (registered from 2000 onward) hybrid cultivars of daylily growing in a landscape in southern Mississippi under conditions favorable for daylily rust.

Materials and methods

In Aug. 2013, a large, established, residential landscape planting of 575 daylily cultivars (Table 1) in Hattiesburg, MS, was made available on a short-term basis for a survey of daylily rust severity. Because of planned removal of the planting, the daylily plants had not been treated with any fungicides during 2013. The 2013 growing season was characterized by warm temperatures, humid conditions, and regular rainfall, with conditions being favorable for daylily rust (Table 2). The planting was irrigated daily with overhead sprinklers.

The 575 cultivars in the surveyed planting consisted of mostly modern hybrids, with 93% of the cultivars registered in 2000 or later and 76% of the cultivars registered in 2005 or later. Most cultivars (85%) were represented by a single clump of plants, 12% by two clumps, and 3% by three or more clumps. Clumps were well developed and contained a minimum of five fans (ramets), with fan count per clump varying by cultivar. Clumps of the same cultivar were in different locations in the planting. Clumps were spaced on ≈3-ft centers.

Individual clumps of each cultivar were visually assessed for daylily rust on 16 Aug. 2013 and rated by agreement of three raters using an ordinal scale of 1 (no or little sign of infection), 2 (moderate infection), and 3 (severe infection) (Table 1). When there were two or more clumps of the same cultivar, the median is reported as the rating. Additional information on each cultivar (bloom season, winter foliage, ploidy,

originator, and year of registration) was obtained from the database of the American Hemerocallis Society (2015).

For statistical analysis, median rust ratings were grouped into three ordinal categories: 1 and 1.5 (apparently resistant), 2 (apparently moderately susceptible), and 2.5 and 3 (highly susceptible). Ploidy level (diploid or tetraploid) of the cultivars was evaluated for association with the three ratings groups using Fisher's exact test (Freeman–Halton test). Bloom season, as ordinal categories (extra early, early, early midseason, midseason, late midseason, late, and very late), and winter foliage, as ordinal categories (dormant, semi-evergreen, and evergreen), were evaluated for correlation with the three ordinal ratings groups using the Cochran–Mantel–Haenszel statistic for nonzero correlation and as nominal categories using the Cochran–Mantel–Haenszel statistic for differing row mean scores (analysis of variance-type analysis). For comparison, the same statistics were calculated for cultivars in listings of rust-resistant and rust-susceptible cultivars previously published by Mueller et al. (2003), Robbins and Vann (2002), and Robbins (2003), with cultivar characteristics in the listings supplemented by information obtained from the American Hemerocallis Society (2015) when not provided by the authors. Statistical analyses were conducted using the FREQ procedure of SAS (version 9.4; SAS Institute, Cary, NC).

Results and discussion

A total of 119 (21%) of the 575 cultivars in the survey received a rating of 1 or 1.5 and 230 (40%) cultivars received a rating of 2 (Table 1), indicating apparent resistance and moderate susceptibility, respectively; however, some of these cultivars may be more susceptible to the disease than a one-time, single-clump rating might reveal. A total of 226 (39%) cultivars received a rating of 2.5 or 3, indicating them to be highly susceptible to daylily rust, and would likely require frequent applications of fungicides to control the disease. Although most of the daylily cultivars in the survey were represented by only single clumps of plants, the ability to evaluate 575 cultivars in one location

in a season with weather conditions favorable for daylily rust, along with the plants having not been treated with fungicides, provided a unique opportunity to collect data on potential disease resistance and susceptibility of these mostly modern hybrid cultivars.

In a preliminary study at the University of Georgia by Williams-

Woodward and Buck (2001) with pathogen-inoculated plants in a greenhouse, 4 cultivars were reported as showing little infection, 9 cultivars being moderately susceptible, and 13 cultivars as being highly susceptible. In further work at the University of Georgia reported by Mueller et al. (2003) with 84 cultivars obtained from three commercial nurseries and

Table 3. Distributions of diploid and tetraploid daylily cultivars among ratings for daylily rust severity in the current survey in a Mississippi landscape in 2013, previous nursery field surveys in Arkansas in 2001 and 2002, and a greenhouse study in Georgia reported in 2003.

Cultivars (% by rating)					Cultivars in survey (no.)
Ploidy	Mississippi (landscape) ^z				
	1 or 1.5	2	2.5 or 3		
Diploid	51	40	9	163	
Tetraploid	9	40	51	412	
<i>P</i> < 0.0001 ^y					
Arkansas (nursery) 2001 ^x					
	1 to 2	2 < rating < 4	4 to 5		
Diploid	78	18	4	293	
Tetraploid	69	28	3	195	
<i>P</i> = 0.0237					
Arkansas (nursery) 2002 ^w					
	1 to 2	2 < rating < 4	4 to 5		
Diploid	82	9	9	313	
Tetraploid	50	21	29	187	
<i>P</i> < 0.0001					
Georgia (greenhouse) ^v					
	R	MR	MS	S	
Diploid	15	24	26	35	46
Tetraploid	21	3	26	50	34
<i>P</i> = 0.0545					

^z1 = no or little visual sign of infections; 2 = moderate infection; 3 = severe infection.

^yFisher's exact test (Freeman–Halton test).

^x1 (very resistant) to 5 (very susceptible) (Robbins and Vann, 2002).

^w1 (very resistant) to 5 (very susceptible) (Robbins, 2003).

^vR = resistant; M = moderately resistant; MS = moderately susceptible; S = susceptible (Mueller et al., 2003).

Table 4. Distribution of 575 daylily cultivars by bloom season among ratings for daylily rust severity in a survey in a southern Mississippi landscape in Aug. 2013.

Bloom season ^z	Cultivars (% by median rating) ^y			Cultivars in survey (no.)
	1 or 1.5	2	2.5 or 3	
Extra early	20	45	35	20
Early	15	42	43	79
Early midseason	14	40	46	197
Midseason	25	39	36	235
Late midseason	38	43	19	37
Late	33	33	33	6
Very late	100	0	0	1
Correlation ^x : $P = 0.001$				
Mean scores difference ^w : $P = 0.0019$				

^zBloom season according to the American Hemerocallis Society (2015).

^y1 = no or little visual sign of infections; 2 = moderate infection; 3 = severe infection.

^xCochran–Mantel–Haenszel test for nonzero correlation (bloom season as an ordinal variable).

^wCochran–Mantel–Haenszel test for differing row mean scores (bloom season as a nominal variable).

Table 5. Distribution of 575 daylily cultivars by winter foliage among ratings for daylily rust severity in a survey in a southern Mississippi landscape in Aug. 2013.

Winter foliage ^z	Cultivars (% by median rating) ^y			Cultivars in survey (no.)
	1 or 1.5	2	2.5 or 3	
Dormant	31	38	31	75
Semi-evergreen	17	38	45	248
Evergreen	21	43	36	252

Correlation^x: $P = 0.6836$ Mean scores difference^w: $P = 0.0119$ ^zWinter foliage according to the American Hemerocallis Society (2015).^y1 = no or little visual sign of infections; 2 = moderate infection; 3 = severe infection.^xCochran–Mantel–Haenszel test for nonzero correlation (winter foliage as an ordinal variable).^wCochran–Mantel–Haenszel test for differing row mean scores (winter foliage as a nominal variable).

inoculated in a greenhouse, 17% were classified as resistant, 15% as moderately resistant, 26% as moderately susceptible, and 42% as fully susceptible. In a survey of rust severity conducted with nursery field-grown plants in Arkansas in 2001 and 2002 (Robbins, 2003; Robbins and Vann, 2002), 75% and 70%, respectively, of the cultivars examined in each year received ratings of ≤ 2 (out of 5) and were recommended for breeders and consumers. Ratings of ≥ 4 were received by 4% and 16% of the cultivars in 2011 and 2012, respectively; thus, Robbins and Vann (2002) recommended that these cultivars should best be avoided. Intermediate ratings (>2 and <4) were received by 21% and 14% of the cultivars in 2001 and 2002, respectively. A total of 500 cultivars were examined in each year, and the majority ($>75\%$) were rated in both years. None of the cultivars reported in the current survey in Mississippi were included in the aforementioned studies in Georgia and Arkansas. Results of the current survey of daylily cultivars in a Mississippi landscape under conditions favorable to daylily rust are more in line with results reported by Williams-Woodward and Buck (2001) and Mueller et al. (2003) using inoculated plants in a greenhouse in Georgia, whereas percentages of nursery field-grown cultivars in Arkansas reported by Robbins and Vann (2002) and Robbins (2003) as being very resistant to moderately resistant appear to be higher. Environmental conditions in Arkansas may have been less favorable for daylily rust and the authors did not state if fungicides were used in the growing

seasons before the two surveys or discuss the likelihood that all plants had been exposed to inoculum.

In exploring relationships between daylily cultivar characteristics and severity of daylily rust in this study, the tendency for tetraploid cultivars to be associated with greater severity of daylily rust than diploid cultivars was of particular interest (Table 3). This association was also noted with cultivars surveyed in 2001 and 2002 in Arkansas (Robbins, 2003; Robbins and Vann, 2002) and cultivars examined in a greenhouse study in Georgia (Mueller et al., 2003) based on our analysis (Table 3). Also, there was a tendency for earlier-blooming cultivars in this survey to have higher ratings for disease severity than later-blooming cultivars (Table 4) and a tendency for a greater percentage of cultivars with dormant winter foliage to have lower disease ratings than cultivars with semievergreen or evergreen foliage (Table 5); however, such associations were not seen with cultivars in the aforementioned surveys in Georgia or Arkansas based on our analyses (data not presented). Such associations may be of interest to other investigators in future studies.

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