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CEDAR APPLE RUST	QUINCE RUST	POWDERY MILDEW	APPLE SCAB - LEAF	APPLE SCAB - FRUIT	SB & FS	BLACK ROT	WHITE ROT	BITTER ROT
1995 Planting 								
Creston (most)	Shizuka (most)	Ginger Gold (most)	Ginger Gold (most)	Fuji Red Sport #2 (most)	GoldRush* (most)	Pristine* (most)	Fortune (most)	Pristine* (most)
GoldRush*	Cameo	Suncrisp	Orin	Pioneer Mac	Fuji Red Sport #2	Sunrise	Pristine*	Ginger Gold
Shizuka	Golden Supreme	GoldRush*	Pioneer Mac	Cameo	Braeburn	Orin	Golden Supreme	Honeycrisp
Cameo	Senshu	Creston	Cameo	Shizuka	Shizuka	Suncrisp	Creston	Yataka
Golden Delicious	Fuji Red Sport #2	Braeburn	Shizuka	Yataka	Golden Delicious	Ginger Gold	Ginger Gold	Sansa
Braeburn	Golden Delicious	Shizuka	Sunrise	Golden Supreme	Senshu	Senshu	Sansa	
Ginger Gold	Braeburn	Pioneer Mac	Yataka	Orin	Fortune	Honeycrisp	Golden Delicious	Arlet
Arlet	Sansa	Orin	Braeburn	Senshu	Enterprise*	Pioneer Mac	Senshu	
Pristine*	Creston	Golden Delicious	Fuji Red Sport #2	Sunrise	Orin	Fortune	Orin	Enterprise*
Senshu	Fortune	Honeycrisp	Suncrisp	Ginger Gold	Suncrisp	NY75414-1*	Sunrise	
Fuji Red Sport #2	GoldRush*	Cameo	Golden Delicious	Arlet	Cameo	Arlet	GoldRush*	Sunrise
Yataka	Suncrisp	Sunrise	Golden Supreme	Fortune	Yataka	Golden Supreme	Arlet	
Honeycrisp	Yataka	Arlet	Arlet	Braeburn	Gala Supreme	Shizuka	Braeburn	Golden Supreme
Orin	Gala Supreme	Sansa	Senshu	Creston	Creston	Cameo	Cameo	
Sunrise	Arlet	Golden Supreme	Creston	Suncrisp	Pioneer Mac	Sansa	Enterprise*	Pioneer Mac
Suncrisp	Enterprise*	Fortune	Fortune	Golden Delicious	Golden Supreme	Yataka	Fuji, B.C. No. 2	
Golden Supreme	Sunrise	Yataka	Honeycrisp	Sansa	NY 75414-1*	Creston	Shizuka	GoldRush*
Pioneer Mac	Orin	Fuji Red Sport #2	Sansa	Gala Supreme	Honeycrisp	Golden Delicious	Gala Supreme	
Fortune	Honeycrisp	Senshu	Gala Supreme	GoldRush	Ginger Gold	Enterprise*	NY75414-1*	Golden Delicious
Sansa	Pristine*	Pristine*	NY 75414-1	Honeycrisp	Arlet	Gala Supreme	Honeycrisp	
Enterprise*	Pioneer Mac	Enterprise*	GoldRush	Enterprise	Sunrise	Braeburn	Pioneer Mac	Creston
NY 75414-1*	NY 75414-1*	NY 75414-1*	Enterprise	Pristine	Pristine*	GoldRush*	Suncrisp	
Gala Supreme (least)	Ginger Gold (least)	Gala Supreme (least)	Pristine (least)	NY 75414-1 (least)	Sansa (least)	Fuji, B.C. No. 2 (least)	Yataka (least)	Fuji, B.C. No. 2 (least)

					
CEDAR APPLE RUST	QUINCE RUST	POWDERY MILDEW	APPLE SCAB - LEAF	APPLE SCAB - FRUIT	SB & FS
1999 Planting 					
CQR10T17* (most)	Crimson Crisp (Co-op 39)* (most)	CQR10T17* (most)	Cripps Pink (most)	Cripps Pink (most)	Delblush (most)
Scarlet O'Hara (Co-op 25)*	Princess (CQR12T50)*	Crimson Crisp (Co-op 39)*	Silken	Ambrosia	Chinook
Chinook (BC 8S-27-51)	NJ 109	Delblush	Rogers McIntosh	Silken	Hampshire
Princess (CQR12T50) *	September Wonder (Jubilee Fuji)	Sundance (Co-op 29)*	Delblush	Rogers McIntosh	Sundance (Co-op 29)*
Pinova	Zestar!® (Minnewashta)	Cripps Pink	Chinook (BC 8S-27-51)	NJ 90	Golden Delicious
Crimson Crisp (Co-op 39) *	CQR10T17*	Golden Delicious	Hampshire	Hampshire	Ambrosia
Golden Delicious	Ambrosia	Pinova	NJ 90	Chinook (BC 8S-27-51)	Scarlet O'Hara (Co-op 25)*
Ambrosia	BC 8S-26-50	Chinook (BC 8S-27-51)	Ambrosia	September Wonder (Jubilee Fuji)	September Wonder
Cripps Pink	Delblush	NJ 90	Zestar! ® (Minnewashta)	Zestar! ® (Minnewashta)	Cripps Pink
NJ 109	NJ 90	Runkel	September Wonder (Jubilee Fuji)	Delblush	Runkel
BC 8S-26-50	Pinova	Rogers McIntosh	Autumn Gold	Autumn Gold	Rogers McIntosh
September Wonder (Jubilee Fuji)	Golden Delicious	Scarlet O'Hara (Co-op 25)*	Golden Delicious	Golden Delicious	Princess (CQR12T50)*
Rogers McIntosh	NY 79507-72*	NY 79507-49*	Runkel	Runkel	CQR10T17*
Hampshire	Scarlet O'Hara (Co-op 25) *	BC 8S-26-50	Pinova	BC 8S-26-50	NY 79507-49*
Delblush	NY 79507-49 *	NJ 109	NJ 109	Pinova	NY 65707-19*
Runkel	NY 65707-19 *	Princess (CQR12T50)*	BC 8S-26-50	NJ 109	NJ90
NJ 90	Cripps Pink	Ambrosia	NY 79507-72	CQR10T17	Crimson Crisp (Co-op 39)*
Zestar! ® (Minnewashta)	Rogers McIntosh	NY 65707-19*	NY 65707-19	NY 79507-72	NJ109
Sundance (Co-op 29) *	Chinook (BC 8S-27-51)	NY 79507-72*	Princess (CQR12T50)	Princess (CQR12T50)	Pinova
NY 65707-19 *	Runkel	Hampshire	Sundance (Co-op 29)	NY 65707-19	BC 8S-26-50
NY 79507-72*	Sundance (Co-op 29) *	Zestar!® (MN 1824)	CQR10T17	Scarlet O'Hara (Co-op 25)	NY 79507-72*
NY 79507-49* (least)	Hampshire (least)	September Wonder (least)	Scarlet O'Hara (Co-op 25)	Sundance (Co-op 29)	Silken
			NY 79507-49 (least)	NY 79507-49 (least)	Zestar! (least)

Introduction
The susceptibility ranking of various apple cultivars to pathogens often depends on observations at single locations made by plant pathologists, plant breeders, growers and/or nursery personnel in the field. Several researchers have observed differences among apple cultivars to the major pathogens, although there have been few new reports during the past decade or longer. In 1994, a regional project was initiated to examine the performance of new apple cultivars in replicated trials under a wide range of climatic and edaphic conditions. The project (NE-183), entitled "Multidisciplinary Evaluation of New Apple Cultivars" (currently NECC-1009 "Multidisciplinary Evaluation of New Tree Fruit Cultivars"), began with 26 cooperators in 18 states and two Canadian provinces. A primary objective of project NE-183 was to evaluate horticultural qualities and pest and pathogen susceptibility of new apple cultivars, strains, and advanced selections with commercial potential and to determine the limitations and positive attributes of these cultivars. The objective of this study was to evaluate, at several field locations, the relative susceptibility of new apple cultivars and selections to the various apple pathogens in the region.

Materials and Methods
Data were collected from two groups of apple cultivars and selections (hereafter referred to as cultivars) established in 1995 (23 entries) and 1999 (22 entries). Planting groups from which disease data were collected were located near Ashville, NC (1995); Winchester, VA (1995 and 1999); Kearneysville, WV (1995); Highland, NY (1995 and 1999); New Haven, CT (1995), Belchertown, MA (1999), and East Lansing, MI (1999).
For the 1995 group, all trees of 23 apple cultivars were propagated by Adams County Nursery, Aspers, PA on M.9 NAKB 337 rootstock in 1993. Golden Delicious was included as a universal standard in all sites involved in project NE-183 since it performs well across a wide variety of climates. In addition, the Pioneer strain of McIntosh was included to serve as an additional standard cultivar with known susceptibility to apple scab. All locations received five replications of all 23 cultivars. For the 1999 group, all trees of 22 apple cultivars were budded in 1997 at Wafler Nursery in Walcott, NY, on M.9 NAKB 337 rootstock. Golden Delicious and Roger's McIntosh were included in the 1999 group as standards for comparisons among plantings. Most locations received five replications of 22 cultivars, with some differences.
The NE-183 Horticulture Subcommittee made cultural and management decisions the first two years that were applied over all plantings of the 1995 and 1999 groups. Trees were planted at an in-row spacing of 2 m with spacing between rows varying by location. Drive middles were planted with Kentucky-31 fescue, and a weed-free strip (1 m wide in the first year; 2 m wide in the remaining years) was maintained in the tree row with herbicides applied at recommended rates. Trees were headed at planting time and individually staked. Minimal pruning and training was done to allow assessment of natural tree structure, and to allow expression of natural flowering and fruit set tendencies. Trees were allowed to fruit in their third year and in subsequent years. Insecticides were applied as needed, as were fixed copper and/or streptomycin to manage fire blight. Fungicides were used only as needed in some locations to prevent disease levels from severely weakening the trees. The experimental planting design was a randomized complete block design with five single-tree replicates.

Color Key 	Golden Delicious Standard	McIntosh Standard	* Scab Resistant Cultivar	Very Susceptible	Moderately Susceptible	Less Susceptible
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Determining the relative susceptibility of apple cultivars to the various pathogens. Cooperators followed established protocols for disease evaluation, which involved rating all of the leaves on five to 20 terminal shoots in early to mid summer after it appeared that all lesions of the pathogens to be assessed had developed. For example, evaluation dates for apple scab usually were on or near: MI, 6 to 9 July; WV, 24 to 25 June; VA, 25 June to 9 July; NY, 2 August; and NC, 15 June. The dependent variables were the percentage of leaves with lesions (cedar apple rust, apple scab, and powdery mildew) and the percentage of fruit with lesions (quince rust, apple scab, sooty blotch and fly speck, and the rot pathogens).

Although disease incidence data were collected at all locations in all years, for the purposes of determining relative cultivar susceptibility, only data sets that showed a minimum of 10% leaf infection incidence on the standard cultivar were included in the analyses. Using apple scab as an example, for the 1995 planting, those data sets included NC (1998); VA (1996, 1997 and 1998); WV (1996, 1997, and 1998); and NY (1997 and 1998). For the 1999 planting, those data sets included VA (2000, 2002-2004); MI (2003, 2004); and NY (1999, 2000, 2002). Each variable was analyzed in a mixed model analysis of variance (PROC MIXED, SAS, Cary, NC) in which sources of error were the fixed effects (cultivar and location) and random effects of replicate, year, interaction of replicate and year, and interaction of cultivar and year, where each of these was nested within location. Susceptibility to rot pathogens was determined in the laboratory and the field with wounded and intact fruit (see the list of publications for additional details).

Publications:

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 Biggs, A. R., Sundin, G., Rosenberger, D. A., Yoder, K. S., and Sutton, T. B. 2010. Relative susceptibility of selected apple cultivars and selections to apple scab caused by *Venturia inaequalis*. Plant Health Progress doi:10.1094/PHP-2010-0408-01-RS.
 Biggs, A. R., Cooley, D. R., Rosenberger, D. A., and Yoder, K. S. 2010. Relative susceptibility of selected apple cultivars to sooty blotch and flyspeck. Online. Plant Health Progress doi:10.1094/PHP-2010-0726-01-RS.