eastern U.S. must locate and incorporate sources of resistance which appears to occur in strong dosage in native species and feral genotypes.

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Performance of Strawberry Cultivars in the North Central Region of the United States[1]

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Abstract

Strawberry cultivar trials conducted in the North Central region of the United States between 1980 and 1988 were used to compare the productivity of 15 cultivars. 'Kent' and 'Honeoye' were the most productive cultivars tested extensively. 'Delite,' 'Allstar' and 'Scott' also performed well. A comparison of the yield stability of six selected cultivars indicated that 'Honeoye' and 'Earliglow' were among the most stable producers, whereas 'Guardian' and 'Redchief' were the least.

Introduction

The most important strawberry cultivars in the north central region of the United States (Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, Wisconsin), are 'Earliglow,' 'Guardian,' 'Honeoye,' 'Midway,' 'Raritan' and 'Redchief' (4). Other promising cultivars are 'Allstar,' 'Jewel,' 'Kent,' 'Lester' and 'Scott.' Strawberry cultivar trials

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are conducted regularly in most of these states to identify genotypes adapted to local conditions and markets. This paper summarizes the performance of cultivars tested extensively in this region between 1980 and 1988.

Mean yield of cultivars is a primary selection criteria, but consistency of production is also an important characteristic. The stability analysis of Finlay and Wilkinson (2) provides a measure of the relative response of cultivars to different environmental conditions, and has been used to compare the performance of strawberry cultivars over several years in Michigan (3) and Ohio (1). The same analysis is used here to compare the yield stability of selected cultivars under the diverse environmental conditions occurring in this region.

Materials and Methods

Yield data from replicated strawberry cultivar trials conducted between 1980 and 1988 were obtained from members of the North Central Regional Small Fruits and Viticulture Committee (NCR-22): Robert Skirvin (University of Illinois); Richard Hayden (Purdue University); Gail Nonnecke (Iowa State University); James Hancock (Michigan State University); James Luby (University of Minnesota); Michele Warmund (University of Missouri); Marilyn Odneal (Southwest Missouri State University); Joseph Scheerens (Ohio State University); and Elden Stang (University of Wisconsin). Trial locations included: Maryville, Simpson and Urbana, IL; Vincennes and West Lafayette, IN; Ames, Muscatine, Nashua and Whiting, IA; Clarksville, Sodus, and Traverse City, MI; Excelsior, Grand Rapids, Morris and Staples, MN; Columbia and Mountain Grove, MO; Wooster, OH; Arlington and Hancock, WI. Cultivars in each trial were managed in a matted row system. Plot size varied from 1.5-15m in length, and cultivars were replicated three to six times in each trial. Individual trials were maintained for one to four harvest seasons, and harvested by hand in multiple pickings.

Yield data were compiled and 15 cultivars compared (Table 1). Each cultivar had been observed at least 20 times at different locations during the nine year period. If a trial was harvested more than one year, each year

Table 1. Number of observations of selected strawberry cultivars in replicated trials in the North Central region, 1980-88.

	Observations[1]							
Cultivar	IL	IN	IA	MI	MN	MO	OH	WI
Allstar	10	5	9	3	7	6	6	3
Canoga	6	6	0	4	17	5	3	4
Crimson King	3	1	2	1	18	4	0	1
Delite	0	6	10	3	0	7	4	0
Earliglow	8	6	13	7	14	7	7	3
Gilbert	6	4	1	1	7	0	0	4
Guardian	7	6	12	4	9	8	6	1
Honeoye	11	6	11	5	24	5	3	4
Jewel	3	1	0	3	12	2	3	2
Kent	3	1	6	3	20	2	0	2
Lester	7	0	9	3	8	2	4	2
Raritan	0	5	1	3	2	3	3	4
Redchief	10	6	9	4	11	7	3	1
Scott	7	6	2	4	10	5	5	4
Surecrop	4	6	13	4	0	6	0	0

[1]Equals the number of years observed in various locations in each state.

was considered a separate observation. Cultivars which had been evaluated in only one or two states were omitted. Cultivar mean yields were calculated as the average of all observations for a given cultivar. Environmental means were calculated for each observation of a given cultivar as the average yield of all cultivars in the trial and year. The environmental mean reflects the overall effect of environmental and cultural factors on performance in a specific site and year.

Results and Discussion

Cultivars are ranked by mean yield across all observations (Table 2). 'Kent' and 'Honeoye' were among the highest yielding cultivars tested in these states between 1980 and 1988. 'Kent' was tested much more extensively in Minnesota (54% of observations) than other states, whereas 'Honeoye' was tested extensively throughout the region. 'Delite,' 'Allstar,' and 'Scott' also yielded relatively high. 'Earliglow' and 'Crimson King' were among the lowest yielding cultivars compared in this study.

The minimum, maximum and average environmental means are also given for each cultivar (Table 2). The environmental means (average of all cultivars in a trial) characterize the overall strawberry performance in one site and year. A low environmental mean indicates that environmental conditions were severe, whereas a high environmental mean indicates conditions were conducive to high yields. Minimum and maximum values varied by cultivar because all cultivars were not evaluated in the same trials. The fact that the average of all environmental means were similar for each cultivar suggests that cultivars were exposed to relatively similar environmental constraints. However, since different cultivars were evaluated in each trial, cultivar mean yields (Table 2) cannot be compared statistically.

High yielding cultivars may vary in yield stability over environments. The analysis of yield stability of Finlay

Table 2. Cultivar mean yield, and minimum, maximum and average environmental means for selected cultivars tested in North Central states, 1980-88.

	Cultivar mean yield			Environmental mean yield[1] (1000 kg/ha)		
Cultavar	Number observations	(1000 kg/ha)	Coefficient of variation	Min.	Max.	Ave.
Kent	37	16.5	35	6.0	22.4	11.5
Honeoye	69	15.4	41	2.2	19.8	11.2
Delite	30	13.7	47	3.5	16.9	11.0
Allstar	49	12.9	44	4.9	22.4	12.1
Scott	43	12.5	47	3.5	19.8	11.8
Guardian	53	12.0	53	3.5	19.8	11.7
Jewel	26	11.7	38	5.5	20.3	11.3
Gilbert	23	11.6	32	4.5	15.4	10.1
Redchief	51	11.1	52	3.5	19.8	10.9
Surecrop	33	10.8	46	3.5	19.8	11.7
Lester	35	10.5	36	6.5	19.3	12.6
Raritan	21	10.5	41	1.9	18.1	11.4
Canoga	45	10.4	57	2.2	19.8	11.3
Crimson King	30	9.7	41	3.5	16.9	11.0
Earliglow	65	9.6	53	2.2	19.8	11.3

[1]Average of all cultivars at one site during one year.

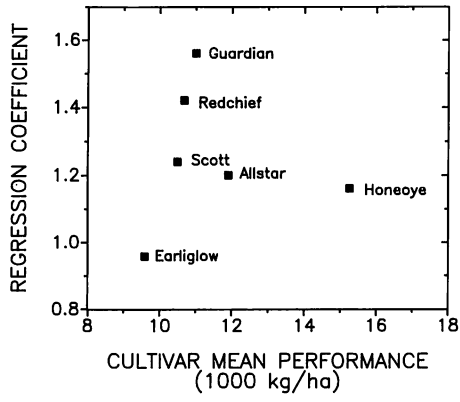

Figure 1. Regression coefficients for six strawberry cultivars plotted over cultivar mean performance (mean of 23 observations in north central states, 1980-1988).

and Wilkinson (2) has been used to compare the production consistency of strawberry cultivars over time in one state (1,3), but this analysis requires that all cultivars being compared are observed in the same trials. In this study, a group of six cultivars were selected which were observed in 23 common trials conducted in all states except Iowa. Cultivar yields were plotted against enviromental means (average of all six cultivars) for each trial, and a least squares linear regression function was calculated. The regression coefficient (slope) for each cultivar was then plotted against the cultivar mean yield (average of all 23 trials) (Figure 1).

Cultivars with high regression coefficients were more opportunistic, performing well when the environmental mean was high, but poorly when the environmental mean was low. Cultivars with low regression coefficients performed more consistently, regardless of the environmental mean. This analysis illustrates that 'Honeoye' is extremely high yielding, and a relatively consistent producer (regression coeff. = 1.15), regardless of environmental conditions. This agrees closely with repeated observations of 'Honeoye' at the same Ohio location (1). 'Earliglow' was the least productive overall, but also less influenced by the environment. 'Guardian' and 'Redchief' appeared to be the most opportunistic, but overall yields were intermediate. 'Guardian' was also relatively productive, but less consistent in Michigan (3) and Ohio (1). However, 'Redchief' was a relatively consistent producer when observed in Michigan (3) and Ohio (1). Comparisons of yield stability reported in this paper may reflect responses to more diverse environmental and cultural conditions because observations were made over a wide geographic area. This may explain why 'Redchief' was a relatively stable producer in Michigan and Ohio, but much less stable when evaluated over several states.

Local field trials are needed to accurately assess the potential of strawberry varieties for specific areas. The information presented here may be useful in identifying varieties most likely to perform well in this region or similar areas. Results may also be useful to breeders interested in developing genotypes adapted to wide geographic areas.

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