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Strawberry Cultivar Evaluation in Missouri[1]

MARTIN L. KAPS, MARILYN B. ODNEAL, JAMES F. MOORE, JR., AND RICHARD E. CARTER[2]

Abstract

Thirteen June bearing cultivars and twelve Maryland-USDA breeding program selections were tested in the south central Missouri Ozark region during the 1986-1989 seasons. Production was on ground level matted rows at 24 in (61 cm) by 42 in (107 cm) spacing. The highest yielding cultivars and selections were 'Earliglow,' MDUS 5076 (early); 'Kent,' 'Honeoye,' 'Redchief' (early-midseason); MDUS 5084, 'Allstar,' 'Jewel,' 'Lester,' (late-midseason); and MDUS 4740, 'Delite' (late). 'Earliglow,' 'Honeoye,' 'Allstar,' and 'Delite' yielded 30% less than in a previous station trial (three year average). This was due primarily to blossom mortality that occurred because of the lack of irrigation for frost control, Disease ratings showed no clear trends.

Introduction

Evaluation of strawberry germplasm for Missouri is an ongoing research project at the SMSU Fruit Experiment Station. Growers are interested in knowing how new cultivars perform in the state since those grown in eastern and other midwestern states may or may not do well in Missouri. Those that are adapted must withstand high summer temperature, disease pressure, and fluctuating winter temperature with little or no snow cover. Research at the station has shown ground level, matted row strawberry culture productive for southern Missouri (6). In addition a new planting in soil not previously grown to strawberries has not benefited from soil fumigation or organic matter addition (6). New cultivars were tested for three bearing seasons in a replicated trial that had several well adapted cultivars for comparison. Maryland-USDA (MDUS) selections were also included. A previous report from the station summarized the performance of strawberry cultivars some of which were included in this trial for comparison (7). Luby (9) recently summarized reports on strawberry cultivar performance for midwest and plains states.

Materials and Methods

The trial was conducted at the State Fruit Experiment Station of Southwest Missouri State University, Mountain Grove, MO. The soil is a Viraton silt loam about 10 in (25 cm) thick. The upper portion of the subsoil is a silty clay loam with a dense fragipan of cherty silty clay loam below (6). Permeability is moderate above the fragipan and very low in the pan. Available water holding capacity is low and soil reaction is acidic (pH 6.3). The planting site was plowed and disced in the fall of 1985. A soil test showed no deficiencies of P, K, Ca and Mg. Orchardgrass had previously grown in the site; therefore, it was not fumigated. On 5/1/86, thirteen named strawberry cultivars and twelve MDUS selections (courtesy of Dr. Gene Galletta, USDA, Beltsville, MD) were planted. Plant spacing in the row was 24 in (61 cm) with row centers 42 in (107 cm) apart. After planting, ammonium nitrate was broadcast at the rate of 156 lb/A (176 kg/ha). Plants were allowed to runner to form 24 in (61

[1]Accepted for publication.

[2]Associate Research Professor, Research Associate, Research Professor, and Research Associate, respectively. State Fruit Experiment Station of Southwest Missouri State University, Mountain Grove, MO 65711.

cm) wide matted rows for fruiting. Blossoms were removed in 1986.

Straw mulch was applied to rows in late November or early December at a depth of 3 in (7.3 cm) and raked to the aisles in March or April. Overhead irrigation was used to supplement rainfall during the growing season, but was not available for spring frost protection. Herbicides and pesticides were applied according to Missouri State Fruit Experiment Station and Missouri Cooperative Extension Service recommendations. In 1987 and 1988, plants were renovated after harvest. Rows were narrowed to 12 in (30.5 cm) with a rotovator, and ammonium nitrate was broadcast at the rate of 136 lb/A (153 kg/ha). The experiment was a randomized complete block with five replications. Each replicate consisted of five original plants in a 10 ft (3.05 m) row. Blocks were separated by 4 ft (1.2 m) alleys with guard rows along two sides of the planting.

The planting was harvested two to three times a week. Total and marketable yield were measured in 1987 through 1989 and reported in kg per linear m and percent, respectively (Table 1). Blossom mortality was determined by counting the number of dead blossoms per 10 ft (3.05 m) of row (Table 2). Berry weight was determined from a random 25-fruit sample taken at every picking. A weighted average was calculated using the formula: summation 1 through N [(berry sample wt on day N/25 berry sample) × (yield on day N/total yield)] (Table 3). Row fill was determined as a visual estimation of the amount of canopy in the test row, 0.61 × 3.05 m (2 × 10 ft), and was used as a measure of runnering capability (Table 3, only 1986 data shown). Disease ratings were done after harvest prior to renovation using a scale of 0 = no infection, 1 = trace to 10% infection, 2 = 11 to 20% infection, ... 10 = 91 to 100% infection (Table 4). The following leaf diseases were rated: Leaf Spot *(Mycosphaerella fragariae)*, Leaf Scorch *(Diplocarpon earliana)*, and Leaf Blight *(Dendrophoma obscurans)*. Crown damage assessment was done in 1989 following a low February temperature of -19 °C (-3 °F) which was preceded by a mild December and January (data not shown). Data was analyzed by ANOVA and means separated by Duncan's multiple range test, 5% level.

Results and Discussion

Yield was low in the first bearing year (1987) with a yearly mean for all cultivars and selections of 10,731 lb/A (12,054 kg/ha) (Table 1). Temperatures of 25 °F (-4 °C) and 19 °F (-7 °C) that occurred respectively on the 6th (3/30) and 5th (3/31) day before the first blossoms opened undoubtedly caused a yield reduction. Boyce and Strater (1) reported a T_{50} value for strawberry bud mortality at a similar development stage to ours as being -5.4 °C when no ice crystals were present. This was about 2.8 °C colder than when ice crystal inoculation was used. It appears that strawberry buds may have supercooled in our unprotected field, but a 19 °F (-7 °C) temperature was probably low enough to cause spontaneous ice nucleation. Blossom mortality was greater in several early and early midseason cultivars and selections due to their more advanced stage of flower development (Table 2).

The second bearing year (1988) was the best production year with a yearly mean of 18,688 lb/A (20,992 kg/ha) (Table 1). A temperature of 28 °F (-2 °C) on April 19 caused some early season blossom loss, but it was less than the previous year (Table 2). Boyce and Strater (1) reported no strawberry bud mortality at -2 °C in the absence of ice crystals; whereas, 40% damage occurred with ice crystal inoculation.

The third bearing year (1989) showed a large drop in yield to half of that in 1988 (Table 1). Complete mulch removal was delayed 2 to 3 weeks be-

Table 1. Total and Marketable Yield of Strawberry Cultivars and Selections, State Fruit Experiment Station of Southwest Missouri State University, 1987 to 1989.

Season and Cultivar or Selection	Total Yield (kg/Linear m row)[z]				Marketable Yield (%)[y]			
	1987	1988	1989	3 Year Means	1987	1988	1989	3 Year Means
Early								
Earliglow	1.60 c-e[x]	1.90 h-j	0.95 h	1.48	87 a	89 b-f	60 i	79
MDUS 4588	0.66 h	1.62 j	0.39 i	0.89	72 c-i	88 d-g	65 g-i	75
MDUS 5076	0.93 f-h	2.20 g-i	1.30 e-f	1.48	79 a-f	90 a-f	74 e-g	81
MDUS 5122	1.26 d-h	1.77 i-j	0.96 h	1.33	85 a-b	90 b-f	65 g-i	80
Early-Mid								
Cardinal	1.67 b-e	2.23 f-h	1.14 g	1.68	79 a-g	93 a-c	87 a	86
Honeoye	3.23 a	2.52 d-g	1.45 c-d	2.40	83 a-b	87 f-h	75 c-g	82
Kent	2.28 b	3.59 a	1.68 b	2.52	68 g-j	91 a-e	62 h-i	74
Redchief	1.99 b-c	2.75 c-f	1.25 f-g	2.00	82 a-c	92 a-d	72 e-g	82
Redcoat	1.44 c-g	2.34 f-h	0.92 h	1.57	79 a-f	88 e-g	67 g-i	78
MDUS 4463	0.92 f-h	2.53 d-g	0.89 h	1.45	71 d-i	83 h	72 e-g	75
MDUS 5120	0.81 g-h	2.48 d-g	1.24 f-g	1.51	70 e-i	84 g-h	72 e-g	75
MDUS 5136	1.03 e-h	2.49 d-g	0.87 h	1.46	80 a-e	92 a-e	71 f-h	81
Late-Mid								
Allstar	1.68 c-e	3.43 a-b	1.67 b	2.26	69 f-j	89 b-f	78 b-f	79
Arking	1.63 c-e	2.31 f-h	1.33 d-f	1.76	75 b-i	89 b-f	85 a-b	83
Canoga	1.33 c-g	2.75 c-f	1.25 f-g	1.78	74 b-i	93 a-b	78 a-f	82
Guardian	1.11 e-h	2.14 g-i	0.95 h	1.40	72 c-i	88 e-g	77 b-f	79
Jewel	1.85 b-d	3.09 b-c	1.69 b	2.21	65 i-j	90 b-f	78 a-f	78
Lester	1.54 c-f	2.87 c-e	1.65 b	2.02	69 f-j	89 c-f	77 b-f	78
MDUS 4552	1.39 c-g	2.44 e-g	1.13 g	1.65	75 b-i	89 b-f	79 a-f	81
MDUS 5084	1.42 c-g	3.76 a	2.17 a	2.45	60 j	88 d-g	73 e-g	74
MDUS 5146	1.39 c-g	2.41 e-h	0.84h	1.55	77 a-h	94 a	80 a-e	84
Late								
Delite	1.49 c-f	2.61 c-g	1.67 b	1.92	74 b-i	88 d-f	84 a-d	82
Lateglow	1.09 e-h	2.41 e-h	1.23 f-g	1.58	68 h-j	88 d-f	74 d-g	77
MDUS 5149	1.39 c-g	2.25 f-i	1.41 c-e	1.68	81 a-d	89 b-f	84 a-c	85
MDUS 4740	1.52 c-f	2.99 b-d	1.48 c	2.00	82 a-c	88 d-f	72 e-g	81
Yearly Means	1.47	2.56	1.26	1.76	75	89	74	80

[z]To convert to kg/ha multiply by 8,200; to convert to lb/A multiply by 7,300.
[y]Marketable yield was based on the formula (total yield wt - cull fruit wt)/(total yield wt) × 100.
[x]Means separation in columns by Duncan's multiple range test, 5% level.

yond the normal time (3rd week of March) due to windy conditions which blew straw and leaves back on the rows. New plant growth was somewhat yellow at uncovering. Boyce et al. (3) reported a significant crop loss in strawberry from a 3 to 4 week delay in mulch removal; a 2 week delay did not reduce yield (3). Low February temperature of -3 °F (-19 °C) in 1989 that was preceded by mild December and January weather caused crown injury (data not shown) in some of the plants which undoubtedly reduced yields. Crown injury may have been aggravated by mulch compaction due to a large amount of leaves which had blown into the planting. A 30 °F (-1 °C) temperature on May 2 caused some blossom loss (Table 2). Blossom mortality was based on one observation in 1989 and because of

Table 2. Blossom Mortality of Strawberry Cultivars and Selections, State Fruit Experiment Station of Southwest Missouri State University, 1987 to 1989.

Season and Cultivar or Selection	Blossom Mortality[z]		
	1987	1988	1989[y]
Early			
Earliglow	49.2 a[x]	11.4 a-b	0.25 e
MDUS 4588	3.4 e-f	3.2 b-c	0.50 e
MDUS 5076	5.2 d-f	11.6 a-b	4.00 d-e
MDUS 5122	18.8 b-d	16.0 a	3.50 d-e
Early-Mid			
Cardinal	8.4 b-f	0.4 c	10.50 b
Honeoye	23.0 b	3.0 b-c	15.25 a
Kent	17.0 b-e	0.6 c	1.75 d-e
Redchief	23.2 b	0.8 c	0.50 e
Redcoat	20.6 b-c	20.0 a	1.75 d-e
MDUS 4463	21.4 b-c	0.2 c	2.50 d-e
MDUS 5120	3.2 e-f	0.0 c	2.00 d-e
MDUS 5136	22.4 b	3.0b-c	4.50 c-e
Late-Mid			
Allstar	6.6 c-f	0.0 c	0.50 e
Arking	6.6 c-f	0.0 c	9.00 b-c
Canoga	1.0 f	0.0 c	1.00 e
Guardian	11.4 b-f	3.6 b-c	6.75 b-d
Jewel	13.4 b-f	0.0 c	1.00 e
Lester	1.8 e-f	0.0 c	0.25 e
MDUS 4552	1.0 f	0.0 c	0.50 e
MDUS 5084	4.2 d-f	0.0 c	1.25 e
MDUS 5146	2.6 e-f	0.0 c	3.00 d-e
Late			
Delite	2.8 e-f	0.0 c	4.50 c-e
Lateglow	2.0 e-f	0.0 c	0.00 e
MDUS 5149	2.0 e-f	0.0 c	4.50 c-e
MDUS 4740	0.2 f	0.0 c	0.25 e

[z]Number of dead blossoms per 3.05 m (10 ft) of row.
[y]Mortality based on one observation; early season mortality could have been underestimated.
[x]Means separation in columns by Duncan's multiple range test, 5% level.

this, early season mortality could have been underestimated. A previous station trial also showed a large drop in third season yield to approximately two-thirds of the second season yield (7). In the absence of plant injury due to mid-winter low temperature or spring frost, it is probable that third season yields could have been much better.

Approximately 80% of the overall yield was marketable over the three years (Table 1). This was considerably better than a previous trial where only 69% was marketable yield (7). Maryland USDA trials which included many of the same cultivars and selections also showed lower marketable yields (4, 11).

Berry weight was usually larger for midseason (early and late) cultivars and selections and smaller for those ripening earlier or later (Table 3). A weighted average was reported in the present trial which took into account the change in berry weight through the harvest season. This is more representative than peak mean reported in a previous trial (7). Because of blossom loss, mean berry weight could have been larger on some early and early midseason cultivars compared to other reports (8, 9). Loss of king blossoms which produce the larger berries would account for this. Loss of one of every four primary blossoms was shown to be 3.5% of potential fruit, but this corresponded to a 7.4% yield loss (2).

Row fill percentage averaged 92% for all cultivars and selections in the 1986 establishment year (Table 3). Only a small improvement in row fill occurred in the following years (1987, 1988). Lower row fill percentages occurred for several early (4588, 5076) and early-mid (4463, 5120, 5136) season USDA selections compared to named cultivars over three years (Table 3, only 1986 shown). This would contribute to lower yields in these selections. Galletta has not included any of these as promising selections in a recent report (5).

Disease rating yearly means showed 10 to 40% leaf infection depending on the year and disease organism (Table 4). Variation in disease severity and cultivar susceptibility occurred from year to year. No clear trends were observed because of this. Luby (9) summarized disease reactions of important midwest and plains states cul-

Table 3. Average Berry weight and row fill of Strawberry Cultivars and Selections, State Fruit Experiment Station of Southwest Missouri State University, 1986 to 1989.

Season and Cultivar or Selection	Average Berry Weight (g)[z]				Row Fill (%)[y]
	1987	1988	1989	3 Year Means	1986
Early					
Earliglow	7.6 k[x]	7.9 l-o	5.5 i-k	7.0	100 a
MDUS 4588	8.0 i-k	9.1 f-l	5.1 j-k	7.4	94 a-b
MDUS 5076	7.8 j-k	8.4 j-n	6.1 f-i	7.4	71 e
MDUS 5122	8.5 f-k	8.3 k-n	6.0 f-j	7.6	97 a-b
Early-Mid					
Cardinal	9.1 e-j	8.6 h-n	5.4 i-k	7.7	96 a-b
Honeoye	9.3 d-i	9.7 e-k	6.9 b-f	8.6	100 a
Kent	9.7 c-g	9.7 d-k	6.4 e-h	8.6	96 a-b
Redchief	8.2 h-k	7.4 m-o	5.9 g-k	7.2	98 a-b
Redcoat	8.2 h-k	6.7 o	5.6 h-k	6.8	96 a-b
MDUS 4463	8.8 f-k	10.7 c-e	7.7 a-b	9.1	80 c-e
MDUS 5120	10.8 b-c	13.5 a	7.6 a-b	10.6	78 d-e
MDUS 5136	8.6 f-k	7.2 n-o	5.0 k	6.9	75 d-e
Late-Mid					
Allstar	9.8 c-f	11.9 b-c	8.3 a	10.0	96 a-b
Arking	13.0 a	11.2 c-d	6.5 d-g	10.2	88 b-c
Canoga	11.9 b	12.9 a-b	7.5 a-b	10.8	98 a-b
Guardian	8.4 g-k	10.4 d-f	6.0 f-j	8.3	95 a-b
Jewel	9.4 d-h	10.0d-h	7.4 a-d	8.9	100 a
Lester	9.1 e-j	9.8 d-j	6.3 e-i	8.4	99 a
MDUS 4552	10.6 c-d	10.5 c-f	5.9 g-k	9.0	82 c-d
MDUS 5084	9.1 e-j	9.9 d-i	7.4 a-c	8.8	93 a-b
MDUS 5146	9.7 c-g	8.9 g-m	6.1 f-i	8.2	91 a-b
Late					
Delite	10.2 c-e	10.2 d-g	7.1 b-e	9.2	99 a
Lateglow	9.3 d-i	10.6 c-e	5.8 g-k	8.6	82 c-d
MDUS 5149	7.6 k	8.5 l-n	5.4 i-k	7.2	100 a
MDUS 4740	8.2 h-k	7.7 l-o	6.6 c-g	7.5	96 a-b
Yearly Means	9.2	9.6	6.4	8.4	92

[z]Average berry size was calculated based on the formula: summation 1 through N [(berry sample wt on day N/25 berry sample) × (yield on day N/total yield)].
[y]Row fill was recorded on 10/8/86, 8/28/87, and 10/7/88 and based on visual estimation of the amount of canopy in the test row.
[x]Means separation in columns by Duncan's multiple range test, 5% level.

tivars based on some of our data and others.

Leaf variegation (yellow, mottled symptoms) was observed in 1989 on 'Allstar,' 'Jewel,' Redchief,' MDUS 4463, 4588, 5084, and 5149. This condition occurred during a prolonged cool temperature period and was similar to that described by Otterbacher et al. (10). Symptoms were most severe on MDUS 4588 and could have contributed to decreased row fill and lower yield.

Early season. A previous study reported 'Earliglow' as the highest yielding cultivar during this season (7). Because of its early blossoming, it is particularly susceptible to spring frost injury in Missouri. Blossom loss occurred the first two years on this cul-

Table 4. Disease Ratings for Strawberry Cultivars and Selections, State Fruit Experiment Station of Southwest Missouri State University, 1987 to 1989.

Season and Cultivar or Selection	Leaf Disease Rating and Year Assessed[z]								
	1987			1988			1989		
	Spot	Scorch	Blight	Spot	Scorch	Blight	Spot	Scorch	Blight
Early									
Earliglow	2.2 b-e[y]	2.6 e-h	2.6 e-f	4.0 a-c[y]	2.4 e-i	3.0 b-e	1.6 d-f	2.6 d-g	2.4 d-g
MDUS 4588	1.4 e	1.6 i-k	2.0 f-g	3.2 a-d	2.6 e-i	3.4 b-d	1.4 d-f	4.4 a-e	2.6 d-f
MDUS 5076	1.8 c-e	3.4 c-f	3.4 c-e	2.6 c-d	1.4 i	2.4 c-e	1.8 d-f	3.0 c-g	1.8 f-g
MDUS 5122	1.8 c-e	2.0 h-k	2.2 f-g	4.2 a-c	3.6 b-f	2.2 d-e	2.4 c-e	4.2 a-f	2.4 d-g
Early-Mid									
Cardinal	2.2 b-e	2.0 h-k	2.6 e-f	3.2 a-d	2.2 f-i	2.4 c-e	2.6 c-d	2.6 d-g	2.4 d-g
Honeoye	3.0 b	3.6 b-e	3.8 c	3.0 b-d	2.4 e-i	2.8 b-e	1.6 d-f	1.4 g	1.8 f-g
Kent	6.0 a	3.2 d-g	2.6 e-f	4.8 a-b	3.2 c-g	2.6 b-e	1.6 d-f	4.0 b-f	1.4 f-g
Redchief	1.4 e	2.0 h-k	2.4 f	3.2 a-b	2.6 e-i	2.4 c-e	1.4 d-f	1.8 g	1.6 f-g
Redcoat	1.8 c-e	2.8 e-h	1.4 g	2.8 c-d	5.2 a	3.8 b	1.0 f	3.0 c-g	1.2 g
MDUS 4463	1.8 c-e	4.2 a-c	5.2 a	3.0 b-d	4.6 a-c	2.0 e	3.8 a-b	4.2 a-f	3.6 b-d
MDUS 5120	1.8 c-e	2.2 h-j	2.6 e-f	3.6 a-d	4.4 a-d	3.0 b-e	2.4 c-e	4.4 a-e	2.6 d-f
MDUS 5136	2.0 b-e	2.4 g-i	2.4 f	5.0 a	2.8 e-i	3.2 b-e	1.6 d-f	2.6 d-g	2.0f-g
Late-Mid									
Allstar	2.0 b-e	2.6 f-h	3.6 c-d	2.8 c-d	2.0 g-i	2.8 b-e	2.0 c-f	1.8 g	2.2 e-g
Arking	2.2 b-e	2.0 h-k	2.6 e-f	3.6 a-d	2.2 f-i	2.4 c-e	1.2 e-f	2.4 e-g	2.0 f-g
Canoga	2.2 b-e	3.6 b-e	4.2 b-c	2.8 c-d	4.4 a-d	5.2 a	4.8 a	5.6 a-b	5.4 a
Guardian	1.8 c-e	3.6 b-e	3.8 c	2.4 c-d	3.8 a-e	3.6 b-c	3.0 b-c	4.8 a-c	3.4 c-e
Jewel	2.2 b-e	4.6 a	5.8 a	3.4 a-d	3.8 a-e	3.8 b	4.4 a	4.0 b-f	4.6 a-b
Lester	2.6 b-d	4.0 a-d	5.4 a	2.8 c-d	2.0 g-i	3.4 b-d	4.0 a-b	4.0 b-f	4.0 b-c
MDUS 4552	2.8 b-c	4.2 a-c	4.2 b-c	2.6 c-d	5.0 a-b	3.0 b-e	1.8 d-f	4.6 a-d	1.8 f-g
MDUS 5084	1.6 d-e	2.8 e-h	3.4 c-e	2.8 c-d	2.4 e-i	3.2 b-e	2.0 c-f	2.2 f-g	2.4 e-g
MDUS 5146	1.8 c-e	2.8 e-h	2.8 d-f	2.6 c-d	2.0 g-i	2.0 e	2.2 c-f	6.2 a	2.2 e-g
Late									
Delite	1.8 c-e	1.4 j-k	2.6 e-f	3.2 a-d	2.2 f-i	3.0 b-e	1.6 d-f	1.6 g	1.6 f-g
Lateglow	2.2 b-e	4.4 a-b	5.0 a-b	1.8 d	1.6 h-i	2.2 d-e	4.4 a	5.4 a-b	4.4 a-c
MDUS 5149	2.4 b-e	1.2 k	1.4 g	3.0 b-d	3.2 c-g	2.6 b-e	2.6 c-d	4.4 a-e	2.6 d-f
MDUS 4740	1.6 d-e	3.8 a-d	3.6 c-d	3.4 a-d	3.0 d-h	2.4 c-e	2.2 c-f	5.2 a-b	2.4 d-g
Yearly Means	2.2	2.9	3.3	3.2	3.0	2.9	2.4	3.6	2.6

[z]Disease ratings were done on 6/18/87, 6/23/88 and 6/22/89, and based on visual assessment of the plant using a rating of 0 = no infection, 1 = trace to 10% infection, 2 = 11 to 20% . . . 10 = 91 to 100% infection. Leaf Spot *(Mycosphaerella fragariae)*; Leaf Scorch *(Diplocarpon earliana)*; Leaf Blight *(Dendrophoma obscurans)*.
[y]Means separation in columns by Duncan's multiple range test, 5% level.

tivar and this showed in over 40% lower yield (3 year average) than in a previous trial (7). Blossom loss of the MDUS selections was less than for 'Earliglow' in 1987 (Table 2). Even so, the selections were lower yielding (Table 1). Both MDUS 5076 and 5122 yielded nearly as well as 'Earliglow' over three seasons. Berry size was small for the group at 7 to 7.6 g per berry (3 year average) (Table 3). A poor row fill of 51% was noted for MDUS 4588 in 1988 (data not shown) which likely reduced yield in 1989 (Table 1).

Early-midseason. The cultivars 'Kent,' 'Honeoye,' and 'Redchief' were generally highest yielding over three seasons (Table 1). A previous study reported 'Honeoye' as the highest producer with 'Readcoat' second and 'Redchief' third (7). 'Honeoye' had 40% lower yield in

this trial compared to the previous; 'Redchief,' 17% less; 'Redcoat,' 43% less; and 'Cardinal,' 4% less. The large yield reduction for 'Honeoye' and 'Redcoat' was probably due to blossom mortality in two of three years; whereas, the other cultivars and selections had mortality primarily in 1987 (Table 2). Berry size for the group was small to medium, 6.9 to 9.1 g, with the exception of MDUS 5120, which was larger (3 year average) (Table 3). Row fill was greater for the named cultivars than for the MDUS selections (Table 3).

Late-midseason. MDUS 5084, 'Allstar,' 'Jewel,' and 'Lester' were generally highest yielding over three seasons (Table 1). A previous report showed 'Allstar,' 'Arking' and 'Canoga' as highest producers (7). 'Allstar' had 20% lower yield in this trial compared to the previous; 'Arking,' 32% less; 'Canoga,' 20% less. Not as much blossom loss occurred in this group than the earlier season cultivars and selections (Table 2). Berry size was medium to large, 8.2 to 10.8 g (3 year average) (Table 3). Row fill was lower for MDUS 4552 in 1986 (Table 3).

Late season. MDUS 4740 and 'Delite' had similar yields over three seasons (Table 1). The previous study reported 'Delite' as the highest producer (7). 'Delite' had 19% lower yield in this trial compared to the previous. Blossom mortality was low for this group in all three years (Table 2). Berry size was medium, 7.2 to 9.2 g (3 year average) (Table 3). Row fill was lower for 'Lateglow' in 1986 (Table 3).

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FVJ Cover Cultivars

On each issue we have been attempting to have a cultivar featured on the cover that has been very important presently or in the past. This is then followed by an article that describes the cultivar, its history, and contribution to the industry and subsequent germplasm. In order to continue this tradition, I hope many of you will think of a suitable cultivar in your area and contact me if you or someone else might be willing to develop the cover story. Normally we need a year or so lead time to secure live material for the artist and to schedule. Please consider this opportunity and contact Dave Ferree, 216-263-3813 with your ideas.