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Strawberry Cultivars for the Intermountain West – Research Report

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There are many challenges facing strawberry growers in the Intermountain West. High pH soils, frequent late spring frosts, and harsh winters can make consistent production difficult. A useful resource on how to manage these difficulties is found in the USU fact sheet: Strawberries in the Home Garden. Cultivar selection is critically important for success, and many cultivars are currently available. However, there is very little information on how strawberry cultivars perform in the alkaline soils and high elevation valleys of the Intermountain West.

This fact sheet reports on a strawberry cultivar trial conducted at New Mexico State University's Alcalade facility (5,700 ft elevation). The location has a 137 freeze free day growing season. The soil at the test site has a high pH (8.0), low organic matter (1.7%) and frequently experiences spring freeze events. These conditions are similar to other agricultural areas in the region including much of Utah, some areas of Western Colorado, Southern Idaho, and Nevada.

Sixteen June-bearing strawberry cultivars were compared over two growing seasons. Bare-root plants were planted in the spring of 2011 into raised beds and fruit was harvested the following two years. Table 1 shows yield of each cultivar. 'Mesabi', 'Kent' and 'Cavendish' were the top three yielding cultivars in both years. The top performing cultivar, Mesabi, had an average yield of 1.5 lbs/ft which equates to approximately 1.13 lbs/plant in a black plastic hill planting system, and about 16,700 lbs per acre at the plant and row spacing used.

Table 1. Strawberry yield* for 2011 and 2012 of 16 June-bearing strawberry cultivars at Alcalde, NM (5398 ft elevation).

	2012	2013	Average	
Cultivar	**lb/ft**	**lb/ft**	**lb/ft**	**lb/acre**
Mesabi	1.4	1.7	1.5	16700
Kent	1.1	1.5	1.3	13900
Cavendish	1.4	0.7	1.0	11400
Cabot	0.7	0.6	0.6	6800
Jewel	0.7	0.5	0.6	6300
Brunswick	0.6	0.5	0.6	6000
Darselect	0.5	0.6	0.5	5500
Allstar	0.4	0.4	0.4	4500
Honeoye	0.3	0.4	0.4	4000
L'Amour	0.4	0.3	0.4	3800
Chandler	0.1	0.5	0.3	3500
Wendy	0.2	0.4	0.3	3200
Clancy	0.1	0.4	0.3	2900
Annapolis	0.3	0.3	0.3	2800
Ovation	0.3	0.2	0.2	2500
Earliglow	0.1	0.1	0.1	1000

*Plants were spaced either 18 inches apart in a single row (matter row system) or in double rows with staggered planting with 12 inch spacing between plants and 12 inches between rows (black plastic system). Yield results were averaged between the two systems due to a lack of difference between them.

Strawberry plants tolerate freezing temperatures but damage to the crowns of the plant occurs when temperatures reach 16 °F and death at 10 °F. Winter temperatures commonly reach these lows throughout the Intermountain West. Winter hardiness varies among cultivars and the 16 cultivars evaluated in this trial were rated based on winter survival. At the testing site, the average last spring freeze is May 12 and average first fall freeze is October 4. During the winter of 2012 there were 6 days with a minimum temperature of 14 °F. Temperatures in 2013 were colder with 8 days below 5 °F and a season low of -7 °F. The hardiest cultivars in the NM trial were Kent, Mesabi, Cavendish, Honeoye, Brunswick and Cabot (Table 2).

Table 2. Winter survival of strawberry cultivars in a black-plastic-covered system in 2013 at Alcalde, NM.

Cultivar	Survival rating*
Kent	2.85
Mesabi	2.83
Cavendish	2.8
Honeoye	2.73
Brunswick	2.6
Cabot	2.55
L'Amour	2.28
Ovation	2.18
Annapolis	2.13
Allstar	2.08
Earliglow	1.93
Darselect	1.9
Jewel	1.78
Clancy	1.53
Chandler	1.38
Wendy	1.2

*Winter survival was based on a rating of crown survival, where 0 = no surviving crowns from one original plant, 1= surviving crown, 2= two to three surviving crowns, 3=more than three surviving crowns from one original plant.

Another major challenge to strawberry production in the Intermountain West is iron chlorosis. Chlorosis is a symptom of iron deficiency characterized by interveinal yellowing. Although soils in the region typically contain iron, the alkaline pH (>7.0) makes the iron relatively unavailable to plants. Different management practices can be used to mitigate this issue. Read USU's Iron Chlorosis in Berries fact sheet for more detailed information. Cultivars vary in their tolerance to high-pH soil. In this trial, chelated iron application, an effective but expensive management technique, was delayed in the first year after planting until August 5th to allow comparison of susceptibility to iron chlorosis (Figure 1). In the following years, chelated iron was applied regularly. 'Wendy', 'Brunswick', 'Honeoye', and 'Clancy' were the top four cultivars for tolerance to high pH soils. 'Allstar', 'Darselect', and 'Chandler' were the most sensitive cultivars (Table 3).

Table 3. Leaf color SPAD measurements* before chelated iron application.

Cultivar	Color Rating
Wendy	37.4
Brunswick	34.4
Honeoye	33.8
Clancy	32.4
Kent	31.3
Annapolis	31.2
Jewel	31.0
Cavendish	30.9
Earliglow	30.9
Ovation	30.7
Cabot	30.1
L'Amour	27.7
Mesabi**	23.9
Darselect	22.7
Chandler	15.5
Allstar	11.7

*Leaf color was measured with a SPAD-502 chlorophyll meter. High numbers indicate more green color and lower numbers less green.
**Mesabi has genetically yellowish leaves.

Study Summary

Although 'Wendy' had the best adaptation to high-pH soil, its winter early bloom and tender plants in winter make it unsuitable for use in our region. 'Mesabi' and 'Kent' were standouts in terms of yield and winter survival. 'Mesabi' has its genetic yellow leaves but when FeEDDHA was applied, green color was improved. Table 4 lists various characteristics of the 16 cultivars in this study as described by several nursery catalogs.

Figure 1. Strawberry leaf color before and after treatment with chelated iron (FeEDDHA) in 2011. FeEDDHA was applied on August 5 and 15.

Table 4. Various characteristics of the 16 cultivars in this study.

Cultivar	Production Season	Relative Fruit Size	Disease Resistance*	Flavor	Cold Hardiness
Allstar	Mid	Med/Large	LS,PM,RS,VW	Good	
Annapolis	Early	Large	RS	Good	
Brunswick	Early/Mid	Large	RS	Excellent	
Cabot	Mid/Late	Very Large	RS	Good	+
Cavendish	Early/Mid	Very Large	LS,LS,VW	Excellent	+
Chandler	Early/Mid	Large		Good	
Clancy	Mid/Late	Large	RS	Good	
Darselect	Mid	Large		Excellent	
Earliglow	Very Early	Small/Med	LS,RS,VW	Excellent	
Honeoye	Mid	Large		Good	+
Jewel	Mid/Late	Large	LS,RS,VW	Excellent	
Kent	Med	Large		Good	+
L'Amour	Early/Mid	Large	RS	Excellent	
Mesabi	Mid			Good	++
Ovation	Late	Large		Good	
Wendy	Early	Large	PM,RS	Excellent	++

*LS=Leaf Scorch, PM=Powdery Mildew, RS=Red Stele, VW=Verticillium Wilt

Common Strawberry Diseases

Leaf scorch (LS) is a fungus not common in the Intermountain West but may occur in the high humidity of a high tunnel. It spreads quickly in wet conditions and small, dark purple spots develop on leaf surfaces (without a white center like that of common leaf spot). **Powdery Mildew** (PM) is a fungus that grows on leafs. The edges of infected leaflets curl up and the underside are coated with grayish-white powdery fungal growth. Leaves later turn purplish or red. **Red Stele** (RS) lives in the soil and attacks roots. Heavy clay soils with poor drainage are more prone to infection. Infected plants have roots tinged reddish pink that will eventually turn black. Infected plants are undernourished and growth is stunted. **Verticillium Wilt** (VW) is another soilborne fungus. It can live many years in the soil. Avoid planting into soils that have grown potato, tomato, caneberries or pepper in the previous 5 to 8 years.

Additional Resources:

Black, B., M. Pace and J. Goodspeed. 2008. Strawberries in the Garden. Utah State University Extension. https://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=1516&context=psc_facpub

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Yao, S., S. Guldan, R. Flynn and C. Ochoa. 2015. Challenges of strawberry production in high-pH soil at high elevation in the Southwestern United States. HortScience 50:254-258.

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