EVALUATION OF SUGAR BEET VARIETIES IN CENTRAL OREGON, 1998

Marvin Butler and Neysa Farris

Abstract

Evaluation of sugar beet varieties (*Beta vulgaris*) in central Oregon was conducted in commercial fields near Culver and Prineville. Subsamples of seed for the thirty varieties were sent to the Beet Sugar Development Foundation to be evaluated for curly top resistance. The 3-row by 22 ft plots were rated for stand establishment prior to plants being hand-thinned to 7 in. apart. A single row per plot was harvested at both locations September 30, and samples evaluated by Spreckles Sugar for weight, percent sugar, and ppm Brie nitrate. The 1998 performance and 3-yr average performances are provided.

Introduction

The seed evaluation committee of the Central Oregon Beet Growers Association determines what varieties may be grown in central Oregon based on yield, sugar, and resistance to beet curly top virus. The objective of this ongoing project is to evaluate performance of sugar beet varieties in both the Prineville and Culver areas.

Methods and Materials

Thirty varieties submitted by five sugar beet seed companies were planted in commercial fields near Prineville on April 30 and near Culver on April 17 with replanting on May 8. An Earthway push planter was used for the 3-row x 22 ft plots, replicated four times in a randomized complete block design. Subsamples of seed from each variety were sent to the Beet Sugar Development Foundation at Kimberly, Idaho, to be evaluated for curly top resistance.

Four rhizomania resistant varieties were included in the evaluations at the request of the Central Oregon Beet Growers Association. The concern of the association was that the disease may have been brought into central Oregon on carrot stecklings or equipment from outside the area.

Plots were evaluated for stand establishment using a rating scale of 1 (poor) to 5 (excellent) on June 3 at Prineville and on June 11 at Culver. Both trials were hand-thinned to 7 in. between plants, with several subsequent passes through the fields to remove any remaining doubles, late germinating seed, and weeds. Varieties at both locations were evaluated September 29 for severity of powdery mildew using a rating scale of 0 (no powdery mildew) to 5 (total leaf coverage). The middle row of the three-row plots was harvested September 30 at both locations. Spreckles Sugar evaluated samples for weight, percent sugar, and ppm Brie nitrate. To determine change in percent sugar following the initial harvest, varieties approved for 1998 were resampled at both locations on October 8 and at the Culver location again on October 14 and 21.
Results and Discussion

Performance of sugar beet varieties at the Prineville location is provided in Table 1. Variety performance at the Culver location is shown in Table 2, and Table 3 provides the average performance across both locations. Varieties are listed in descending order based on total sugar.

Although some varieties were rated low on stand establishment, after thinning to 7 in. between plants, varieties generally had equal, full stands. As a result, germination ratings are not expected to influence yield.

Powdery mildew was more prevalent at Culver than in Prineville, with some statistically significant differences at Culver. However, ratings ranging from 1.8 to 3.3 in Prineville and 2.7 to 4.5 in Culver provide some trends for powdery mildew tolerance between varieties at both locations.

Average percent sugar increased between September 30 to October 8 by 0.6 percent at Culver and 0.8 percent at Prineville. Sugar increased in subsequent samples in Culver by 0.9 percent from October 8 to 14 and by 0.6 percent from October 14 to 21. The total percent sugar increase for the period from September 30 to October 21 was 2.3 percent, averaging approximately 0.1 percent per day.

Yield results for each of the four replications were evaluated for uniformity. There was good uniformity across the replications at Culver but random low yields across the replications at Prineville. As a result, the lowest yield for each variety was dropped at the Prineville location, with yield data based on the three remaining replications. Dropping the low-yielding plots at Prineville and the need to replant at Culver probably contributed to the lower yields reported for Culver.

A 3-yr average of variety performance is provided in Table 4. This information provides the basis for establishing approved varieties by the Seed Committee of the Central Oregon Sugar Beet Growers Association. The standards established by the committee include the following: 1) acceptable varieties will have a 125 percent or less curly top resistance rating compared to the stand variety USH-11, based on a 3-yr trial average, 2) varieties with two years of trial data that rate 125 percent or below could have limited planting, not to collectively exceed 10 percent of total acreage of the previous year's crop, 3) no planting of any seed varieties without the approval of the seed committee, and 4) no sales of seed prior to December 15 for the upcoming season.

Variety performances in this report are best used to compare differences between variety performance under the same conditions, rather than making a direct comparison with other field harvest data. The average performance across the two locations should be helpful in determining performance across different locations and management practices. The 3-yr rolling averages provide an additional time dimension to the evaluations, which can increase confidence in the performance data.
A commercial-sized strip trial with six varieties was conducted at the same Prineville location as the variety evaluations. Those results are available as a separate research report.
Table 1. Performance of sugar beet varieties planted in a commercial field near Prineville, OR, April 30 and harvested September 30, 1998.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Stand rate</th>
<th>Powdery mildew</th>
<th>Yield (ton/a)</th>
<th>Sugar Sep 30</th>
<th>Sugar Oct 8</th>
<th>Total sugar (lb/a)</th>
<th>Brier nitrate</th>
<th>Curly top (%) of USH-11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta 8256 (Betaseed)</td>
<td>4.0 abc</td>
<td>2.0</td>
<td>35.3 ab</td>
<td>17.7</td>
<td>18.0</td>
<td>12,493</td>
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<td>121</td>
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<td>16.6</td>
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<td>12,209</td>
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<td>33.9 abc</td>
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<td>12,081</td>
<td>30</td>
<td>109</td>
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<td>34.1 abc</td>
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<td>11,478</td>
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<td>124</td>
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<td>H943226 (Speckels)</td>
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<td>34.6 ab</td>
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<td>32.8 abc</td>
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<td>30.7 abc</td>
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<td></td>
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<td>Crystal 203 (Crystal)</td>
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<td>31.7 abc</td>
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<td>17.4</td>
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<td>30.5 abc</td>
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<td>30.0 abc</td>
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</table>

Average for 1998 approved varieties: 16.7, 17.3

Variety results followed by the same letter(s) are not significantly different from one another. "Rhyzomania resistant variety funded by the Central Oregon Beet Growers."
Table 2. Performance of sugar beet varieties planted in a commercial field near Culver, OR, May 8 and harvested September 30, 1998.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Stand rating</th>
<th>Powdery mildew</th>
<th>Yield</th>
<th>Sugar Sep 30</th>
<th>Sugar Oct 8</th>
<th>Sugar Oct 14</th>
<th>Sugar Oct 21</th>
<th>Total sugar (lb/a)</th>
<th>Brie nitrate (ppm)</th>
<th>Curly top (% of USH-11)</th>
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<td>31.9 ab</td>
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<td>Owyhee (Novartis)</td>
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<td>3.7 ab</td>
<td>31.7 ab</td>
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<td>10,900</td>
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<td>10,591</td>
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<td>Beta 8256 (Betaseed)</td>
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<td>4.2 ab</td>
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<td>H943222 (Spreckels)</td>
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<td>3.5 ab</td>
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<td>Tomcat (Crystal)</td>
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<td>Chinook (Seedex)</td>
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<tr>
<td>Crystal 203 (Crystal)</td>
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<td>9,251</td>
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Average for 1998 approved varieties: 17.6 a 18.4 b 19.3 c 19.9 c

1 Variety results followed by the same letter(s) are not significantly different from one another 2 Rhyzomania resistant variety funded by the Central Oregon Beet Growers
Table 3. Average performance of sugar beet varieties across the Prineville and Culver locations in central Oregon during 1998.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Stand rating</th>
<th>Powdery mildew</th>
<th>Yield</th>
<th>Sugar 30-Sep (%)</th>
<th>Sugar 8-Oct (%)</th>
<th>Sugar 14-Oct (%)</th>
<th>Sugar 21-Oct (%)</th>
<th>Total sugar (lb/a)</th>
<th>Bire nitrate (ppm)</th>
<th>Curly top (%) of USH-11</th>
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</thead>
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<tr>
<td>Beta 5CG7010 (Betaseed)</td>
<td>2.0</td>
<td>3.2</td>
<td>35.3</td>
<td>16.9</td>
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<td></td>
<td></td>
<td>11,889</td>
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<td>139</td>
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<td>Beta 8256 (Betaseed)</td>
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<td>19.6</td>
<td>20.2</td>
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<td>33.6</td>
<td>16.5</td>
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<td>124</td>
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<td>32.5</td>
<td>17.0</td>
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<td></td>
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Rhyzomania resistant variety funded by the Central Oregon Beet Growers Association
Table 4. Three-year rolling average and yearly performance for the 1999 approved varieties of sugar beets planted in central Oregon from 1996 to 1998.

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<th>Variety</th>
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<th>Year</th>
<th>Yield (ton/a)</th>
<th>Sugar (%)</th>
<th>Total Sugar (lb/a)</th>
<th>Curly top resistance (% of USH-11)</th>
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Table 5. The two-year rolling averages and yearly performance for the limit sale varieties of suage beets grown in central Oregon, 1997 and 1998.

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