New Wilt-resistant Tomato Varieties for Field and Greenhouse

By W. A. Huelein
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TO SECURE SEED

The Illinois Station is not in a position to supply samples of the seed of any of the new tomato varieties to the general public. Certain seed companies, however, have entered into a written agreement with the Station to grow these varieties and list them. The stock seed was raised by the Department of Horticulture of the Illinois Station and every effort was made to assure varietal purity.

Further particulars as to sources of seed will be supplied on request to the Agricultural Experiment Station, University of Illinois, Urbana.
New Wilt-Resistant Tomato Varieties for Field and Greenhouse

By W. A. Huelsen, Associate Chief in Olericulture

The rapid expansion of tomato acreage in Illinois and the difficulty of securing suitable varieties has directed much attention to the problem of breeding better adapted varieties of this popular crop. Most of the field varieties now in use have originated in the eastern states and few of them will produce a satisfactory crop in the constantly recurring heat and drought periods which characterize the corn-belt climate. In addition the danger of severe losses from Fusarium wilt, a disease which seems to be spreading rapidly, further limits the growers' choice to a few wilt-resistant varieties, none of which has proved particularly satisfactory in Illinois.

As the result of ten years of breeding work at the Illinois Agricultural Experiment Station, three new field varieties resistant to Fusarium wilt have been isolated and these are now being released to the public under the names Prairiana, Early Baltimore, and Illinois Pride.

Tomatoes as a greenhouse crop have also increased in popularity but, as is true of the field crop, there is a dearth of suitable varieties. Few growers will venture to raise a fall crop under glass because varieties of American origin yield poorly and those of English origin have fruits that are too small for American markets. For spring forcing most of the varieties grown are simply field types which may not yield well under glass. In addition, Fusarium wilt has become very prevalent in Illinois greenhouses, and this has limited the growers to not more than four varieties resistant to the disease.

Five new varieties resistant to Fusarium wilt have been bred at the Illinois Agricultural Experiment Station especially for greenhouse use and these have been released under the names Blair Forcing, Sureset Forcing, Urbana Forcing, Lloyd Forcing, and Long Calyx Forcing. These greenhouse varieties are not suitable for growing in the field.
PRAIRIANA
FOR FIELD
(Resistant to Fusarium wilt)

Origin. Selected in 1926 out of a variety test of Marvana, the plant being materially larger and later. Resistant to Fusarium wilt from the start.

Maturity. Second early, falling into the same class as Pritchard and John Baer.
**Vine type.** Intermediate in size, with somewhat finely cut foliage suggestive of Earliana, which was one of the parents of Marvana. Vine tends to be straggly but growth is definitely restricted. Blossoms set very freely, commencing early in the season. On poor soils vines have a very restricted growth and bear many small fruits. As total vine growth is restricted, Prairiana will produce well on well-drained, dark-colored silt and clay loams of the prairie type where other varieties frequently run to vine.

**Fruits.** Deep red, deeply oblate, and smooth, usually round in cross-section. Sutures are very shallow and blossom scar is small. The basin at the stem end is shallow. The flesh color is an unusually bright red and is evenly distributed, rind is thin, core small. Prairiana is a free seeder. The fruits are unusually juicy and acid. The seed cells vary in size and in number from five to seven. Cracking, when it occurs, is of the concentric type and is shallow.

**Yields per acre (U. S. No. 1 and U. S. No. 2)**

1930—On brown silt loam, prairie type

Prairiana, 6.69 tons; Marglobe check, 3.69 tons.

1931—On brown silt loam, prairie type

Prairiana, 10.65 tons; Greater Baltimore check, 3.59 tons.

1932—On rolling gravelly loam low in fertility

Prairiana, 8.80 tons; Marglobe check, 10.36 tons.

1934—On brown silt loam, prairie type

Prairiana, 10.06 tons; Marglobe check, 4.44 tons.

1935—On eroded brown silt loam low in fertility

Prairiana, 6.52 tons; Pritchard check, 6.45 tons.

1935—On heavy black clay loam high in fertility

Prairiana, 7.43 tons; Pritchard check, 6.62 tons.

Thus in the dry years of 1930, 1931, and 1934 Prairiana gave large increases over the varieties used as checks. In a normal year like 1932 on poor soil Prairiana was inferior to Marglobe. In the normal year 1935, Prairiana on poor soil was no better than Pritchard, but on a heavy, fertile soil it was slightly better.

**Use.** Prairiana is recommended for fertile soils, especially the heavy types, which are likely to be high in nitrogen in dry, hot years. It is suitable for canning and market purposes. It demonstrates its superiority in adverse seasons especially. Excessive vine growth has never been observed.
EARLY BALTIMORE
EARLY BALTIMORE
FOR FIELD
(Resistant to Fusarium wilt)

Origin. Selected originally in 1926 for resistance to Fusarium wilt out of a field of Indiana Baltimore badly infected with Fusarium wilt. Probably an accidental cross or a mutation.

Maturity. A second early type, maturing along with Pritchard and Prairiana.

Vine type. Intermediate in size, smaller than Indiana Baltimore; foliage finer cut and growth habit more decumbent. Blossoms set early and rather freely. No trouble has been experienced with excessive vine growth.

Fruits. Red, smooth, deeply oblate, small scar, small core, shallow basin at stem end, solid and meaty with a thick rind. Seed cells vary from four to many. Early Baltimore is only a moderate seeder. Fruits are about the same size as Marglobe. Cracking varies with the season but is mostly of the concentric type and shallow. The fruits retain most of the desirable characters of the Indiana Baltimore but mature a week or more earlier.

Yields per acre (U. S. No. 1 and U. S. No. 2)
1930—Early Baltimore, 5.37 tons; Marglobe check, 2.38 tons.
1931—Early Baltimore, 7.82 tons; Greater Baltimore check, 2.18 tons.
1932—Early Baltimore, 9.39 tons; Marglobe check, 9.09 tons.
1934—Early Baltimore, 7.57 tons; Marglobe check, 4.30 tons.
1935—On eroded brown silt loam, low in fertility
   Early Baltimore, 6.51 tons; Pritchard check, 6.45 tons.
   Duplicate test in 1935 on heavy black clay loam, high in fertility
   Early Baltimore, 7.17 tons; Pritchard, 6.62 tons.

That Early Baltimore is particularly adapted to the midwestern conditions of extreme heat and dry weather is indicated by its superiority to the check varieties in the adverse drouth years of 1930, 1931, and 1934. In normal years such as 1932 and 1935 the yield was equal to Pritchard, Marglobe, or Greater Baltimore.

Use. Early Baltimore is excellent for market purposes and retains the high quality and quick, even ripening which make Greater Baltimore so popular for canning. The tests so far have shown that Early Baltimore may be grown on highly fertile soils without danger of excessive vine growth. On poorer soils its performance is satisfactory.
ILLINOIS PRIDE
FOR FIELD
(Resistant to Fusarium wilt)

Origin. One of the earliest wilt-resistant types produced by systematic breeding. Selected about 1913 by C. E. Durst, formerly of the Illinois Station, for resistance; by 1917 seed of the variety was produced under the name “Century” and distributed to growers in Union county, Illinois. “Century” was a selection out of a variety called “New Century” and had a high degree of wilt resistance. It did not become popular in Union county, possibly because the growers preferred a pink tomato. In 1925 the author found a few seeds of “Century” which, when grown in central Illinois, had tremendous vines and very late maturity. Continued selection has reduced the vine size and increased earliness so that Illinois Pride is now quite different from “Century.”

Vine type. Large vines of the Stone type, heavy foliage, blossoms rather late. The vines hold their leaves well. Excessive vine growth must be guarded against in the same manner as in other late varieties. The plants are unusually resistant to Fusarium wilt.

Fruits. Red, smooth, very deeply oblate, round or nearly so in cross-section. Rinds are thick, cell arrangement varies, and cell number varies from four to very many. The cores are small and there is a large, meaty central region which makes the fruits very attractive when cut. The blossom scar is medium size and the basin at stem end is shallow. Illinois Pride is a moderate seeder. In tests for solidity and shipping ability it was considerably superior to Marglobe.

Yields per acre (U. S. No. 1 and U. S. No. 2)

<table>
<thead>
<tr>
<th>Year</th>
<th>Illinois Pride</th>
<th>Marglobe check</th>
</tr>
</thead>
<tbody>
<tr>
<td>1930</td>
<td>4.49 tons</td>
<td>3.32 tons</td>
</tr>
<tr>
<td>1931</td>
<td>4.40 tons</td>
<td>2.60 tons</td>
</tr>
<tr>
<td>1932</td>
<td>9.76 tons</td>
<td>8.89 tons</td>
</tr>
<tr>
<td>1934</td>
<td>3.86 tons</td>
<td>3.74 tons</td>
</tr>
<tr>
<td>1935</td>
<td>5.43 tons</td>
<td>5.31 tons</td>
</tr>
</tbody>
</table>

Illinois Pride has given small but consistent increases over Marglobe from year to year. It tends to have a larger fruit than Marglobe and does not crack so badly.

Use. Illinois Pride is a good market tomato and a good shipper. It has excellent canning qualities, according to actual tests, and is now being used extensively for that purpose by one canner. On highly fertile prairie soils it should be grown with caution because of the danger of excessive vine growth. Various trials in southern and in northern Illinois have given very satisfactory results.
BLAIR FORCING
BLAIR FORCING
FOR GREENHOUSE
(Resistant to Fusarium wilt)

Origin. A cross between Louisiana Pink and Grand Rapids Forcing, introduced in 1930, described in Illinois Station Bulletin 361. Selection has been continued to the fifteenth generation, but without any particular success in changing or improving the type.

Vine type. Very rapid and vigorous in growth; reaches the usual topping height of 9 feet two or three weeks sooner than Bonny Best or Marglobe. Blooms very freely and sets an average of 3.4 mature fruits per cluster in the fall without hand pollination; daily shaking of the vines is all that is required. Averages 5.6 mature fruits per cluster consistently in the spring. Foliage is medium green.

Fruits. Pink, smooth, flattened, with five or more small seed cells usually arranged in irregular order. Small core, rind medium in thickness, and fruit very solid and usually free from the puffiness which characterizes many varieties. The flavor is tart and pleasant. Blair Forcing is a free seeder. The blossom scar is small and basin at stem end shallow. The flesh is deep red and the fruit is excellent for slicing. In adverse seasons the fruits on some clusters may become rough, but the set is heavy enough to permit thinning these out at a very early stage.

Yields. Yields of Blair Forcing are much superior to those of Bonny Best and Marglobe and only a little less than yields of Lloyd Forcing (see table, page 20). The fruits are somewhat smaller than Lloyd Forcing.

Use. Blair Forcing is a pink tomato adapted for either fall or spring production. The fruits are somewhat small but very solid and excellent for salad purposes. The variety matures about 10 percent more of its crop than Marglobe during the first month of picking in the fall and 20 percent more in the spring.
SURESET FORCING
FOR GREENHOUSE
(Resistant to Fusarium wilt)

*Origin.* A cross between Urbana Forcing and Blair Forcing now in the tenth generation from the cross.

*Vine type.* Intermediate between the two parents in habit of growth and in foliage. Vines a trifle slower growing than Blair Forcing and leaves somewhat finer cut and darker in color. Blooms very freely and sets fruit at the same rate as Blair Forcing.

*Fruits.* Pink, and in outward appearance closely resemble Blair Forcing. The interior is different, as shown by comparing the illustrations on pages 10 and 12. Sureset Forcing has a thicker rind than Blair Forcing and larger and fewer cells. Continued observations show that Sureset Forcing often has a larger sized fruit than Blair Forcing but is not so heavy. Sureset Forcing also tends to be more deeply oblate.

*Yields.* Sureset Forcing yields a little heavier than Blair Forcing as a rule. In a test in the fall of 1934 on a commercial scale Sureset Forcing showed an increased yield over Blair Forcing of 12.6 percent.

*Use.* Sureset Forcing is a pink tomato which may be grown either in the fall or in the spring. It may be substituted for Blair Forcing by growers who prefer somewhat larger, but not heavier, fruits. The quality of the fruit is not so good as that of Blair Forcing.
URBANA FORCING
URBANA FORCING
FOR GREENHOUSE
(Resistant to Fusarium wilt)

*Origin.* A cross between Grand Rapids Forcing and Marglobe, now in the fourteenth generation from the cross. Mentioned in Illinois Station Bulletin 361 under its cross number 1001.

*Vine type.* Takes about 5 to 7 days longer than Blair Forcing or Lloyd Forcing to reach the topping stage. The leaves are more finely cut than Blair Forcing or Lloyd Forcing and are dark green. The set is lighter than Blair Forcing or Sureset Forcing, averaging three fruits per cluster in the fall and four in the spring. Marglobe averages one plus and 2 per cluster, respectively.

*Fruits.* Pink, practically globe-shaped, and resemble the Globe variety. Very thick rind; seed cells vary from four to six. Under adverse conditions the fruits are inclined to be angular and air pockets appear, a tendency observable in all globe-shaped types. The uniform color and the smoothness of the fruit give Urbana Forcing an exceptionally attractive appearance.

*Yields.* Tho Urbana Forcing usually produces fewer fruits than the four other new greenhouse varieties, these fruits are generally heavier, so that Urbana Forcing is by no means the lowest yielder in the group.

*Use.* Urbana Forcing is suitable for the grower who prefers a globe-shaped pink fruit. It is not recommended for spring forcing because of the tendency for the fruits to crack. Cracking can be controlled to a considerable extent by mulching and withholding water as much as possible. Trouble from this source does not occur in the fall and winter, and this variety should therefore be so grown that the fruits will ripen not later than May 15. Urbana Forcing matures about 10 percent more of its crop in the first month of picking than does Marglobe.
**LLOYD FORCING**

*FOR GREENHOUSE*

*(Resistant to *Fusarium* wilt)*

**Origin.** A cross between Louisiana Pink and Grand Rapids Forcing, now in the sixteenth generation from the cross. Described at length in Illinois Station Bulletin 361.

**Vine type.** Blair Forcing and Lloyd Forcing vines are so strikingly similar that it is difficult to distinguish them. This might be expected, as they originated from the same cross. The set averages about 3.3 mature fruits per cluster in the fall and 5.7 in the spring.

**Fruits.** Red, smooth, oblate, resembling Blair Forcing very closely except for color. The seed cavities are small and vary from three to seven or more. Like Blair Forcing, the fruits are exceptionally solid, with a small core and a medium-thick rind. Lloyd Forcing is a free seeder. The fruits rarely become puffy. They were pleasantly acid under all the conditions of these tests. Under adverse conditions, such as low temperatures, insufficient light, or improper fertilization, the fruits tend to become a little rougher than in the globe-shaped varieties. However, owing to the good set these may be thinned out profitably. In the spring, under certain conditions which are not yet understood, Lloyd Forcing has a tendency to grow projections like horns at the stem end. This tendency, which has been noted in several greenhouse varieties, seems to be infrequent in the globe-shaped types and to be associated with a heavy yield. However, even after all such imperfect fruits are sorted out, the yields of Lloyd Forcing are still very superior to those of other varieties (see table, page 20).

**Yields.** Lloyd Forcing is unquestionably the most consistently productive variety ever grown at the Illinois Station. It is so superior that it is usually used at the Station as the standard for measuring the yields of other types and varieties (see table). Quite a number of greenhouse growers are now growing it commercially. In weight per fruit it equals Marglobe and Bonny Best.

**Use.** Lloyd Forcing is suitable for both fall and spring crops. Its rapid growth and unusual vigor are important factors in cutting down costs of pruning, pollinating, etc. It will mature about 10 percent more of its crop than Marglobe during the first month of picking in the fall and about 20 percent more in the spring.
LONG CALYX FORCING
LONG CALYX FORCING
FOR GREENHOUSE
(Resistant to Fusarium wilt)

*Origin.* A ninth generation selection out of a cross between Lloyd Forcing and Marglobe.

*Vine type.* Resembles Sureset Forcing in vine character and rate of growth. The leaves, however, are a little more finely cut than Sureset Forcing. The set averages about 2.5 marketable mature fruits per cluster in the fall and 5.0 in the spring.

*Fruits.* Red, globe-shaped, thick rind, four to five seed cells, and not many seeds. Fruits are fleshy, only slightly acid in flavor, and not very juicy. The core is small and the appearance of the fruits is outstanding when in the market package. Like many globe-shaped varieties, air pockets form under certain conditions and give the fruits a slightly more angular appearance than normal. The flesh is rather soft in texture, but the skin seems to be so tough that an unusual amount of pressure is required to crack the fruits, as proved by actual tests. The fruits are very attractive because of the unusually long calyces which, in contrast to other varieties, adhere very firmly to the fruits and are not readily broken off in picking and handling.

*Yields.* Long Calyx Forcing yields more than Bonny Best and Marglobe in the fall (see table), but it is inferior to Urbana Forcing, Sureset Forcing, Blair Forcing, and Lloyd Forcing. In the spring, however, Long Calyx Forcing is among the best yielders. Its fruits averaged about 4 ounces each in four successive spring crops. This is a large size for a greenhouse tomato.

*Use.* Long Calyx Forcing should be used only for late winter and spring forcing. It should be of value to the grower who wants an exceptionally attractive pack. It matures about 25 percent more of its crop during the first month of picking than Marglobe, which places it slightly earlier in maturity than Lloyd Forcing.
Yields per Plant of Sorted Marketable Fruits From New Greenhouse Tomato Varieties

<table>
<thead>
<tr>
<th>Forcing strain tested</th>
<th>Yield from strain tested</th>
<th>Yield from check</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Pounds</td>
</tr>
<tr>
<td>Fall crop 1931 (Bonny Best used as a check)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urbana ................</td>
<td>16</td>
<td>3.36</td>
</tr>
<tr>
<td>Lloyd ..................</td>
<td>24</td>
<td>4.72</td>
</tr>
<tr>
<td>Blair ..................</td>
<td>24</td>
<td>4.30</td>
</tr>
<tr>
<td>Sureset ..............</td>
<td>20</td>
<td>3.51</td>
</tr>
<tr>
<td>Long Calyx ............</td>
<td>16</td>
<td>3.03</td>
</tr>
<tr>
<td>Spring crop 1932 (Lloyd Forcing used as a check)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urbana ................</td>
<td>30</td>
<td>7.62</td>
</tr>
<tr>
<td>Blair ..................</td>
<td>39</td>
<td>6.78</td>
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<tr>
<td>Sureset ..............</td>
<td>43</td>
<td>8.08</td>
</tr>
<tr>
<td>Long Calyx ............</td>
<td>37</td>
<td>8.89</td>
</tr>
<tr>
<td>Fall crop 1932 (Lloyd Forcing used as a check)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urbana ................</td>
<td>15</td>
<td>2.82</td>
</tr>
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<td>18</td>
<td>2.71</td>
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<td>21</td>
<td>3.15</td>
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<td>14</td>
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<tr>
<td>Spring crop 1933 (Lloyd Forcing used as a check)</td>
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</tr>
<tr>
<td>Urbana ................</td>
<td>25</td>
<td>6.22</td>
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<tr>
<td>Blair ..................</td>
<td>39</td>
<td>8.42</td>
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<tr>
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<td>36</td>
<td>8.00</td>
</tr>
<tr>
<td>Long Calyx ............</td>
<td>35</td>
<td>8.64</td>
</tr>
<tr>
<td>Fall crop 1933 (Marglobe used as a check)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urbana ................</td>
<td>14</td>
<td>2.76</td>
</tr>
<tr>
<td>Lloyd ..................</td>
<td>18</td>
<td>3.48</td>
</tr>
<tr>
<td>Blair ..................</td>
<td>20</td>
<td>3.22</td>
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<td>Sureset ..............</td>
<td>23</td>
<td>3.57</td>
</tr>
<tr>
<td>Long Calyx ............</td>
<td>18</td>
<td>2.96</td>
</tr>
<tr>
<td>Spring crop 1934 (Marglobe used as a check)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urbana ................</td>
<td>27</td>
<td>7.82</td>
</tr>
<tr>
<td>Lloyd ..................</td>
<td>38</td>
<td>10.37</td>
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<tr>
<td>Blair ..................</td>
<td>39</td>
<td>7.98</td>
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<tr>
<td>Sureset ..............</td>
<td>42</td>
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<tr>
<td>Long Calyx ............</td>
<td>34</td>
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<tr>
<td>Fall crop 1934 (Lloyd Forcing used as a check)</td>
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<tr>
<td>Sureset ..............</td>
<td>18</td>
<td>2.90</td>
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<tr>
<td>Long Calyx ............</td>
<td>14</td>
<td>2.37</td>
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<tr>
<td>Spring crop 1935 (Lloyd Forcing used as a check)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sureset ..............</td>
<td>46</td>
<td>8.23</td>
</tr>
<tr>
<td>Long Calyx ............</td>
<td>33</td>
<td>7.85</td>
</tr>
</tbody>
</table>

Note. All crops except that of the fall of 1931 were grown in ground beds, with a planting distance of 16 x 30 inches, trained to a single stem, and topped at 9 feet with 7 clusters. The fall crop of 1933 was grown in benches, with a planting distance of 18 x 20 inches, trained to a single stem, and topped at 72 inches with 5 clusters.