Fla. 7771, a Medium-large, Heat-tolerant, Jointless-pedicel Tomato

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Fla. 7771 is a medium- to large-fruited, jointless-pedicel, fresh-market tomato (Lycopersicon esculentum Mill.) breeding line that sets fruit well under the high temperature (>32°C day/>21°C night), high humidity conditions prevalent in Florida during the summer and fall. Combining heat tolerance, jointless pedicels, and large fruit size without numerous fruit defects has been difficult to achieve. Fla. 7771 should be useful to tomato breeders as a parent to produce jointless, heat-tolerant hybrid cultivars (Scott et al., 1997) and in developing improved heat-tolerant inbreds.

Origin

Fla. 7771 is the first release from a breeding project, spanning 18 years, designed to develop large-fruited, heat-tolerant, jointless breeding lines. The pedigree is complex and involves numerous crosses (Fig. 1). Seed was increased in the F7 generation after a cross between Fla. 7546B and an F5 derived from a cross between Fla. 7340 and Fla. 7319. Both parents in the final cross were jointless and heat-tolerant, with most of the heat tolerance coming from Fla. 7340 in both cases. Fla. 7340 was derived from a jointless F5 with heat tolerance tracing back to CI 123 (VC8-1-2-1), a breeding line from the Asian Vegetable Research and Development Center (AVRDC) in Taiwan. ‘Burgis’ (Augustine et al., 1981c) was the source of jointlessness. The F5 parent of Fla. 7340 was a jointed, heat-tolerant line with heat tolerance tracing to C-28 (Campbell 28), a major source of heat tolerance in the Univ. of Florida breeding program. Fla. 7182 is a heat-sensitive, jointless inbred derived from the cross of F5 and F7 parents. The jointed F5 parent was derived from ‘Suncoast’ (Scott et al., 1985b), ‘Hayslip’ (Augustine et al., 1981a), and EO3. EO3 is a jointless inbred with a complex pedigree involving cold-tolerant European breeding lines and greenhouse inbreds from Ohio and Ontario, Canada, including ‘Vendor’. The F7 parent of Fla. 7182 is a heat-sensitive, jointless inbred derived from the cross of F5 and F7 parents. The jointed F5 parent was derived from ‘Suncoast’ (Scott et al., 1985b), ‘Hayslip’ (Augustine et al., 1981a), and EO3. EO3 is a jointless inbred with a complex pedigree involving cold-tolerant European breeding lines and greenhouse inbreds from Ohio and Ontario, Canada, including ‘Vendor’. The F7 parent of Fla. 7319 carries the jointless trait, which was derived from ‘Horizon’.

Description

Fla. 7771 has a determinate (sp) vine that provides adequate fruit cover. The leaves are somewhat erect rather than being pendant as in most cultivars. The jointless pedicel is conferred by the j-2 gene. Fruit shoulders are light green (ug). In recent trials, the medium-to-large fruit were similar in size to those of the Florida-grown cultivars Equinox, Agriset 761, Colonial, and Sanibel (Tables 1, 2). ‘Sanibel’ and ‘Colonial’ are jointless cultivars. Maturity in the fall is early under high temperature conditions and early to mid-season in the spring. In the summers of 1997 and 1998, early yields of Fla. 7771 were similar to those of the earliest cultigens evaluated and significantly higher than those of the heat-sensitive controls (Table 1). In Spring 1998, Fla. 7771 was not as

Fig. 1. Pedigree of Fla. 7771. All 7000 numbers should have the prefix Fla.
Table 1. Marketable yield, fruit weight, and percentage of culls for tomato cultigens grown under high temperature conditions at Bradenton, Fla., in 1997 and 1998.

| Cultigen  | Marketable yield\(^a\) (kg/plant) | Fruit size \(^b\) (g/fruit) | Culls (%) | Summer 1997 | Summer 1998 |
|-----------|-----------------------------------|-----------------------------|-----------|-------------|-------------|
|           | Early                             | Total                       |           |             |             |
| Fla. 7771 | 1.41 a-c                          | 2.36 ab                      | 31        | 1.28 a      | 2.35 a      | 139 ab      | 23 b       |
| Equinox   | 0.81 cd                           | 1.43 ab                      | 40        | 1.35 a      | 2.18 a      | 147 a       | 28 b       |
| Fla. 7718 | 1.83 ab                           | 2.72 a                       | 20        | 1.16 a      | 1.93 a      | 130 cd      | 23 b       |
| Fla. 7324 | 1.31 bc                           | 1.83 ab                      | 36        | 1.02 a      | 1.82 a      | 119 d       | 32 b       |
| Fla. 7719 | 2.21 a                            | 2.91 a                       | 24        | 0.92 ab     | 1.64 a      | 125 cd      | 30 b       |
| Agriset 761| ---                               | ---                          | ---       | 0.24 b      | 0.42 b      | 133 bc      | 73 a       |
| Sanibel   | ---                               | ---                          | ---       | 0.12 b      | 0.51 b      | 133 bc      | 60 a       |
| Colonial  | 0.20 d                            | 0.87 b                       | 41        |             |             |             |            |

\(^a\)Fruit harvested atbreaker stage or beyond three times at weekly intervals; early harvest indicates first harvest.
\(^b\)A scale of 1 to 5, where 1 is poor, 3 is acceptable, and 5 is excellent. The acidity of the fruit was determined by a technician who rated flavor of Fla. 7771 a 3 on a scale of 1 to 5, where 1 is poor, 3 is acceptable, and 5 is excellent. The acidity of the fruit is stronger than the sweetness.

Table 2. Marketable yield, fruit firmness, and fruit color for tomato cultigens grown at Bradenton, Fla., in Spring 1998.

| Cultigen  | Marketable yield\(^a\) (kg/plant) | Fruit size \(^b\) (g/fruit) | Culls (%) | L a b | Fruit color\(^c\) |
|-----------|-----------------------------------|-----------------------------|-----------|------|------------------|
|           | Early                             | Total                       |           |      |                  |
| Fla. 7771 | 2.48 b                          | 7.90 a                      | 164 ab    | 14.5 | 5.3 bc           |
| Equinox   | 3.47 a                           | 7.45 ab                      | 160 ab    | 16.1 | 1.6 bc           |
| Fla. 7775 | 1.65 cd                         | 6.84 bc                      | 155 b     | 15.4 | 3.5 d            |
| Fla. 7718 | 2.26 bc                         | 6.73 bc                      | 154 b     | 21.9 | a-c              |
| Agriset 761| 1.40 d                          | 6.31 cd                      | 159 b     | 25.9 | 5.7 ab           |
| Sanibel   | 0.59 c                           | 6.19 ab                      | 179 a     | 23.5 | a-c              |
| Fla. 7781 | 1.85 b-d                       | 5.93 cd                      | 160 ab    | 28.3 | 4.6 a            |
| Fla. 7324 | 3.91 a                          | 5.72 d                      | 128 c     | 21.1 | 6.0 a            |
|           | 4.56 a                           | 9.66 b                      | 19.5 a    | 37.5 | 32.4 a           |

\(^a\)Fruit harvested atbreaker stage or beyond three times at weekly intervals; early harvest indicates first harvest.
\(^b\)A scale of 1 to 5, where 1 is poor, 3 is acceptable, and 5 is excellent. The acidity of the fruit was determined by a technician who rated flavor of Fla. 7771 a 3 on a scale of 1 to 5, where 1 is poor, 3 is acceptable, and 5 is excellent. The acidity of the fruit is stronger than the sweetness.
\(^c\)A scale of 1 to 5, where 1 is poor, 3 is acceptable, and 5 is excellent. The acidity of the fruit was determined by a technician who rated flavor of Fla. 7771 a 3 on a scale of 1 to 5, where 1 is poor, 3 is acceptable, and 5 is excellent. The acidity of the fruit is stronger than the sweetness.