

Tomato Breeding: Progress Report for OTRI, November 2000
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1. Milestones: In 2001, we established approximately 3 ha. of breeding nurseries; field evaluated the material; made intra- and inter-specifics hybrids; made plant and bulk selections; conducted disease evaluation for the resistance to anthracnose; and will release selected lines to UG-RCAT and private sector tomato breeders in Canada.

2. Disease Resistance: In 2001, we grew 15 separate tests to evaluate breeding materials, at various stages of development, for agronomic performance and resistance to early blight, septoria leaf spot, anthracnose, powdery mildew, bacterial canker, blossom end rot and viruses. Since anthracnose is one of the major field diseases, we evaluated lines and early generation populations in four tests for anthracnose resistance. For each plant in these tests, three fully ripe, visually sound and disease free fruit were selected, brought into the greenhouse for controlled environment inoculation, and inoculated on the fruit's shoulder with a spore suspension culture (concentration of ca. 9.5×10^5 spores/ml) of *Colletotrichum coccodes*, the causal organism for anthracnose fruit rot, using the skin puncture inoculation technique. In 2001, as compared with 2000, we used a more severe test of resistance, as shown by the higher disease ratings of the control cultivars common to both years (mean increased rating of 0.26 on a 1-3 scale), due to a higher spore concentration and possibly a more virulent strain of the pathogen. Fruit were maintained at temperatures of approximately 18/24C day/night for 10 days. After 10 days the size of the disease lesion was visually evaluated.

Among the early generation populations, results were mixed; the F2 populations derived from crosses with resistant plants identified in 2000, had ratings ranging from 1.56 to 2.06 (mean = 1.74), while the best F3 population had a rating of 1.93. Among the F4 and advanced breeding lines, the lines TD970053 and TD940465 were the most resistant populations. These resistant lines have resistance derived from 83B237 and 76B49, two anthracnose resistant lines from USDA, Beltsville. In this evaluation, they had much higher frequency of plants manifesting resistance compared to the control commercial cultivars (average rating of 2.52). Seeds of these lines will be distributed to UG-RCAT and private breeders.

3. Interspecific lines: In 2001 we grew 16 separate tests to evaluate interspecific breeding material, at various stages of development, derived from *L. pimpinellifolium*, *L. cheesmanii*, *L. chmielewskii*, *L. parviflorum*, *L. hirsutum*, *L. peruvianum*, and *Solanum pennellii* for agronomic performance and fruit quality. From these approximately 600 populations, we selected some 350 plants for further evaluation, using about a 4% selection intensity.

4. Hybridization: In 2001, we made about 80 successful crosses to transfer a range of traits (anthracnose resistance, bacterial canker tolerance, high solids, as well as several interspecific crosses to broaden the genetic base of adapted tomatoes) to tomato backgrounds well adapted to Southwestern Ontario.



RIDGETOWN COLLEGE

Report to the Ontario Tomato Research Institute

Project: Germplasm Enhancement and Cultivar Development for Ontario's Processing Tomato Industry 1998 to 2002

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Date: 21 November 2001

Project activities for the period: 15 March 2001 to 21 November 2001

1. Tomato breeding plots were established at Ridgetown. There were 929 entries in F_2 to F_3 generations and 650 F_1 hybrids planted out for generation advancement. Over 670 selections were made from the breeding program. Selection continued to focus strongly on larger fruit size and fruit firmness, in addition to other yield and quality traits.
2. The cultivar trial included 36 entries at 4 locations. No major difficulties were encountered during evaluation. Data were collected on incidence of blossom end rot at harvest.
3. New F_1 hybrids for further inbreeding were developed in the greenhouse during the summer. Recent releases from GPCRC were crossed with commercial lines. Crosses were also made with new material from an Italian source. Seed was collected on 684 new hybrid combinations.
4. Disease screening trials were established in early November to screen selections for resistance to fusarium, verticillium and bacterial speck.
5. Parent lines have been selected and are established in the greenhouse for production of additional F_1 hybrid seed during the winter. This crossing will focus on developing combinations among some of the better performing lines within the breeding population.