

Department of Agriculture, Trade and Consumer Protection
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Grant Project Final Report

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Grant Project Title: Early Maturing Tomato Varieties for Wisconsin Fresh Market Producers

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Project Summary

Opportunity: Tomato traditionally has been marketed fresh picked from the field and is the best selling fresh market vegetable crop. The shortness of the Wisconsin growing season limits the availability of fresh picked tomatoes. An opportunity exists for vegetable growers in Wisconsin with regard to direct and wholesale marketing of tomatoes. This opportunity has emerged through consumer demand for locally grown produce. In general the view of locally grown produce is one of better quality, healthier crop, and benefiting small family farmers. Increasingly consumers desire a connection with who is growing their crop and an understanding of how that crop is being grown. In response to consumer demands, farmer's markets have increased in scale and grocery store chains commonly promote and sell locally grown produce. Have Wisconsin farmers taken full advantage of the opportunities that exist with regard to fresh market vegetables in particular locally grown tomatoes?.

As with all fresh market fruit and vegetables, high premiums exist for having the earliest ripening crop. Tomatoes that ripen 1 to 2 weeks earlier than any other crop receive 4 fold increases in price. In specific wholesale example, tomatoes that ripened 1 to 2 weeks early received a 10 fold increase in price because grocers want to be the first to stock shelves with locally grown tomatoes. Having the first fruit or vegetables are used to attract customers to other products at both grocery stores and direct market stands (farmers market or roadside markets).

Flavor and general appearance are key quality characteristics for tomatoes, but difficult to quantify in breeding and cultural management research. In the past 10 years, the availability of hot house, flavor savor, or other "fresh" or vine ripened tomatoes has increased. Many feel tomatoes grown out of season and shipped into Wisconsin don't contain the same texture or flavor as locally grown tomatoes. The tomato industry has been unable to consistently reproduce the flavor and quality of fresh market locally grown tomatoes.

In order for Wisconsin fresh market vegetable growers to fully take advantage of local tomato marketing opportunities improved varieties are needed. Key characteristics include:

- early ripening,
- flavor
- firmness
- size
- general appearance
- shelf life
- tolerate local shipping
- insect tolerant
- disease tolerant.

The Horticulture Department at the University of Wisconsin-Madison has the plant breeding expertise necessary to select for improved tomato varieties. However, space and labor are limited with regard to building a tomato breeding program without outside funding. We initiated a tomato breeding program in cooperation with fresh market tomato growers. The collaborative arrangement with the Wisconsin Fresh Market Vegetable Growers and the Central Wisconsin Produce Auction will incorporate growers into the selection and evaluation process.

GOAL: Develop early ripening tomato varieties with good flavor that meets the needs of WI fresh market tomato growers

Project objectives and expected results

OBJECTIVE: Evaluate tomato breeding lines for early ripening, flavor, storability/shelf life, and meeting the needs of WI growers and production systems targeting wholesale and direct markets.

Breeding Work to Date

Jim Nienhuis created a parent population from wild relatives and early cultivars of tomato. The **parent population** was screened for lines with increased solids, early ripening, firmness, and size (large enough to harvest). From the entire population 3 lines were identified with all 4 of these characters. These three parent lines lacked flavor characteristics and are susceptible to insect and disease. These 3 lines were evaluated by 5 fresh market vegetable growers during 2002.

The parent lines were crossed with a commercially available breeding line from Ohio. The commercial line was selected because of its resistance/tolerance to late blight. This cross generated a population which was screened by Master Gardeners. The screening resulted in selection of 8 lines with superior quality, earliness, and disease resistance. During the summer of 2003, 15 lines are being evaluated in trials at the Arlington Agricultural Research Station and in collaboration with 3 fresh market vegetable growers. One of the lines may be released as a UW-Madison/Master Gardener line. The tomato lines lack size desired for table stock but makes superior salsa and has potential as a dried product.

Outcomes to date

- 1) Grower evaluation: A number of fresh market growers grew the 3 lines from the initial parent population during 2002. Two of the three lines were roma type tomatoes and the third lacked the size desired by most fresh market growers. However, one of the parental lines ripened 10 to 20 days before "Early Girl", a commercially available early maturing line. This line was viewed as extremely positive by one of the grower cooperators who was able to market the tomatoes though special packaging and received a premium relative to other tomatoes.

Grower evaluations are continuing during the 2003 growing season. Early indications suggest most fresh market growers do not view roma types positively so excitement over current lines is limited. However, one of the growers actually markets roma tomatoes and is quite pleased with the performance of the current lines.

Communications with growers indicates the desire for tomatoes with large diameter, good flavor, good visual appearance, and storability. Surprisingly, view varieties have high quality with regard to all these characteristics. Tomato varieties with good storability seldom have good flavor, or tomato lines with good flavor and visual appearance often do not last long in storage. Future research may include evaluations of commercially available lines to help growers identify tomato lines that will meet specific market needs.

- 2) Breeder evaluation: The eight lines selected by the master gardeners were grown in greenhouses to increase seed. In addition, these lines were crossed with “Shasta” tomato resulting in a number of new hybrids for further evaluation. Shasta has an exquisite flavor, but is a processing line and late maturing. The hope is this cross will result in a superior tomato.
- 3) Outreach: Results of current research efforts were presented at several meetings and workshops. Presentations were made during the Wisconsin Fresh Market Vegetable Growers Association Annual Conference in Oconomowoc. Summer field days were held in association with the Central WI produce Auction (40 growers) in Clark County and the Wisconsin Fresh Market Vegetable Growers Association in Columbia County (20 growers). In addition, Jim Nienhuis demonstrated potential uses of the lines with the cooperation of Madison Area Chefs at the West Madison Field tour (1,100 residents).

Future work: The selection process for variety development takes 7 to 10 generations. Early indications suggest early ripening can be selected for, but additional information on quality characters related to taste and appearance is essential for true success in this program. In addition, upon selection of improved lines new crosses can be identified and allow for further varietal improvement.

In addition, production systems research may allow for even earlier ripening of field grown tomatoes. Specific practices that may be modified to allow for an earlier harvest include mulches or ground covers, bedding plant growing systems, or early season vegetative production in the greenhouse with field ripening of fruit.

Economic Impact

Short term: Short term impact is limited within the scope of this research. However, several growers have taken advantage of new tomato lines identified through this research. The economic return for these growers was several hundred to several thousand dollars.

Long term: The greatest impact through this research will be seen as this research program progresses. Growers are currently evaluating 14 lines with potential for new markets within their production systems – namely a high solid tomato that has superior canning qualities. With development of new highly flavored lines, fresh market potential will increase.

Long-term benefits will also be realized as season extension systems such as low or high tunnel production are developed in collaboration with breeding and evaluation efforts and in farmer operated systems. Preliminary results from the next phase of this research suggest high tunnels may increase the value of tomato production by several thousand dollars for each grower cooperator. A key component of this research is to develop season extension systems with minimal reliance on gas powered heat or electricity for lights. Early indications are tomato ripening may be achieved by July 1 under high tunnel systems with similar taste and quality as field grown tomato.