

Evaluation of Fresh Market Tomato Nitrogen and Potassium fertigation ratios, grafted plants and variety selection on physiological disorder, yield and fruit quality attributes of fresh market tomato “Interim report” 2014

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OBJECTIVES:

1. To determine if incidence of physiological fruit disorders such as yellow shoulder disorder, gray wall, blossom end rot and green core in fresh market tomatoes are influenced by different fertigation rates and nitrogen and potassium ratios.
2. To determine the influence of different nitrogen and potassium ratios on tomato yield and quality.
3. To determine if tomato physiological disorders can be reduced through the use of grafted plants.
3. To evaluate new and promising fresh market tomato cultivars for physiological fruit disorder susceptibility, fruit quality attributes, appearance and yield.

MATERIALS and METHODS:

This trial was established at the OSU Piketon Research & Extension Center research farm located at Piketon, Ohio. At each harvest yield data and fruit quality attributes were observed and recorded. Plant growth characteristics, insect and disease susceptibility and tolerance were monitored and recorded. Plant tissue analysis was conducted on a weekly schedule to monitor plant nitrogen and potassium levels throughout the season at various plant growth stages. Treatments consisted of the pre-plant fertilizer treatment alone and nitrogen and potassium ratio treatments of 1:1, 1:2, 1:3 and 1:4. Treatments were applied on a weekly per acre basis through the fertigation system. Two fresh market tomato cultivars Primo Red and Mountain Spring were separately evaluated for their production suitability, performance and quality attributes. The trial was located in southern Ohio, at the Ohio State University South Centers in Piketon, Ohio. Seeds were hand planted April 1st into 98 cell Pro Trays filled with soilless mix and placed in a germination chamber. Trays were removed from the germination chamber on April 4 and grown out in the greenhouse. Grafted treatments were grafted onto Maxifort rootstock on April 22nd. Plants were transplanted onto 10 inch tall raised beds covered with black plastic mulch on May 30 using a waterwheel transplanter. Trickle irrigation was installed under the plastic mulch. Bed spacing was 6 foot apart on center. Plants were trellised using the Florida weave staking method. 70 pounds of N, P₂O₅ and K₂O per acre were applied to all treatments before forming beds and laying plastic mulch. A standard commercial fungicide and insecticide program was implemented, following recommendations from the Ohio Vegetable Production Guide, OSU Bulletin #672. Weeds were controlled with cultivation and hand hoeing.

INTERIM RESULTS and DISCUSSION:

Physiological tomato fruit disorders such as yellow shoulder have resulted in severe economic losses to Ohio fresh market tomato growers in past seasons due to poor ripening fruit that are unmarketable. Results of this research indicate nitrogen to potassium fertility ratios that provided the best quality tomato fruit, yield and enhanced fruit quality characteristics in the 2014 season. Tomato fruit characteristics including yield, color, cull fruit and physiological disorder were monitored.

Table1: Nitrogen and Potassium fertigation (Piketon), 2014

Treatment	Marketable lbs. per plant	Marketable lbs. per acre	Yellow Shoulder lbs. per plant	Yellow Shoulder lbs. per acre
Primo Red Control	3.670833	17766.83	0.4275	2069.1
Mt. Spring Control	7.88	38139.2	0.170833	826.8333
Primo Red 1:1	4.525833	21905.03	0.156667	758.2667
Mt. Spring 1:1	7.0425	34085.7	0.191667	927.6667
Primo Red 1:2	3.085833	14935.43	0.083333	403.3333
Mt. Spring 1:2	5.3925	26099.7	0.085833	415.4333
Primo Red 1:3	6.078333	29419.13	0	0
Mt. Spring 1:3	6.081667	29435.27	0.0625	302.5
Primo Red 1:4	17.27083	83590.83	0.164167	794.5667
Mt. Spring 1:4	14.0825	68159.3	0.041667	201.6667
Primo Red Grafted Control	5.148333	24917.93	1.156667	5598.267
Mt. Spring Grafted Control	9.175833	44411.03	0.104167	504.1667
Primo Red Grafted 1:1	8.025833	38845.03	0.201667	976.0667
Mt. Spring Grafted 1:1	11.87833	57491.13	0.124167	600.9667
Primo Red Grafted 1:2	10.31333	49916.53	0.095	459.8
Mt. Spring Grafted 1:2	9.308333	45052.33	0.040833	197.6333
Primo Red Grafted 1:3	12.17667	58935.07	0.085	411.4
Mt. Spring Grafted 1:3	3.565833	17258.63	0	0
Primo Red Grafted 1:4	12.13583	58737.43	0	0
Mt. Spring Grafted 1:4	12.72167	61572.87	0.146667	709.8667