

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 report 2014

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OBJECTIVES:

1. To determine if incidence of physiological 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 disorder susceptibility, fruit quality attributes, appearance and yield.

MATERIALS and METHODS:

This trial was established at the OSU South Centers 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. Some of the transplants 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. At bloom nitrogen and potassium treatments were injected into the trickle tape at a 1:1, 1:2, 1:3 and 1:4 ratio. Weekly leaf samples were taken and the fertilizer rate was adjusted over the growing season according to results.

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.

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.

Treatment	Plant Type	Marketable lbs./plant	Marketable Fruit/plant	Marketable lbs./acre
1:1	*MSG	12.21	23.33	59123.29
1:1	*MSNG	7.35	13.55	35579.38
1:1	*PRG	8.64	16.88	41828.36
1:1	*PRNG	4.85	9.22	23479.38
1:2	*MSG	9.87	18.22	47776.18
1:2	*MSNG	5.44	10.44	26372.62
1:2	*PRG	11.88	18.88	57509.96
1:2	*PRNG	3.90	6.77	18908.27
1:3	*MSG	9.23	13.77	44694.71
1:3	*MSNG	7.93	14.88	38391.96
1:3	*PRG	13.61	20.33	65904.67
1:3	*PRNG	7.23	12.0	34993.2
1:4	*MSG	12.70	22.11	61500.27
1:4	*MSNG	16.30	29.11	78897.38
1:4	*PRG	12.13	21.77	58741.47
1:4	*PRNG	19.90	33.55	96337.51
CONTROL	*MSG	9.55	16.55	46248.89
CONTROL	*MSNG	8.61	15.66	41710.04
CONTROL	*PRG	6.86	10.77	33223.91
CONTROL	*PRNG	4.07	6.66	19720.31

*MSG = Mt. Spring Grafted *MSNG = Mt. Spring Non Grafted

*PRG = Primo Red Grafted *PRNG = Primo Red Non Grafted

Treatment	Plant Type	Yellow Shoulder lbs./plant	Yellow Shoulder fruit/plant	Yellow Shoulder lbs./acre	Catface lbs./plant	Catface fruit/plant	Catface lbs./acre
11	*MSG	0.16	0.33	801.28	0.90	1.77	4372.13
11	*MSNG	0.25	0.55	1236.88	0.42	0.88	2059.68
11	*PRG	0.26	0.66	1301.42	0.47	0.77	2307.06
11	*PRNG	0.20	0.44	1011.02	0.31	0.44	1538.04
12	*MSG	0.054	0.11	263.51	0.22	0.66	1075.55
12	*MSNG	0.11	0.22	553.91	0.40	0.88	1973.64
12	*PRG	0.07	0.11	344.17	0.20	0.44	1011.02
12	*PRNG	0.11	0.22	537.77	0.07	0.33	338.8
13	*MSG	0	0	0	0.44	0.77	2145.73
13	*MSNG	0.05	0.11	247.37	0.57	1.11	2791.06
13	*PRG	0.11	0.22	548.53	0.05	0.22	268.88
13	*PRNG	0	0	0	0.49	0.77	2387.73
14	*MSG	0	0	0	1.08	2	5254.08
14	*MSNG	0	0	0	0.89	1.66	4345.24
14	*PRG	0	0	0	0.83	1.33	4044.08
14	*PRNG	0.14	0.22	677.6	0.79	1.11	3845.11
CONTROL	*MSG	0.08	0.11	419.46	1.07	1.55	5211.06
CONTROL	*MSNG	0.16	0.33	806.66	0.94	1.44	4587.24
CONTROL	*PRG	1.54	2.66	7464.35	0.63	1.11	3049.2
CONTROL	*PRNG	0.57	1.11	2758.8	0.16	0.44	790.5333

*MSG = Mt. Spring Grafted *MSNG = Mt. Spring Non Grafted

*PRG = Primo Red Grafted *PRNG = Primo Red Non Grafted

Treatment	Marketable fruit/plant	Marketable lbs./plant	Marketable lbs./acre	Yellow Shoulder/plant	Yellow Shoulder lbs./plant	Yellow Shoulder lbs./acre	Catface fruit/plant	Catface lbs./plant	Catface lbs./acre
1:1	15.75 B	8.26 B	40003 B	0.5 AB	0.22 AB	1088 AB	0.97 AB	0.53 ABC	2569.2 ABC
1:2	13.58 B	7.77 B	37642 B	0.16 B	0.08 B	425 B	0.58 B	0.22 C	1099.8 C
1:3	15.25 B	9.50 B	45996 B	0.08 B	0.01 B	199 B	0.72 B	0.39 BC	1898.4 BC
1:4	26.63 A	15.26 A	73869 A	0.05 B	0.03 B	169 B	1.52 A	0.90 A	4372.1 A
CONTROL	12.41 B	7.27 B	35226 B	1.05 A	0.59 A	2862 A	1.13 AB	0.70 AB	3409.5 AB
LSD	3.74	2.36	11448	0.82	0.47	2311	0.64	0.39	1913.1

Treatment	Marketable fruit/plant	Marketable lbs./plant	Marketable lbs./acre	Yellow Shoulder/ plant	Yellow Shoulder lbs./plant	Yellow Shoulder lbs./acre	Catface fruit/plant	Catface lbs./plant	Catface lbs./acre
Mt. Spring Grafted	18.80 A	10.71 A	51869 A	0.11 A	0.06 A	297 A	1.35 A	0.74 A	3611 A
Mt. Spring	16.73 AB	9.13 AB	44190 AB	0.24 A	0.11 A	569 A	1.20 AB	0.65 AB	3151 AB
Primo Red Grafted	17.73 A	10.62 A	51442 A	0.73 A	0.39 A	1932 A	0.77 BC	0.44 AB	2136 AB
Primo Red	13.64 B	7.99 B	38688 B	0.40 A	0.20 A	997 A	0.62 C	0.36 A	1780 B
LSD	3.3541	2.1156	10239	0.7373	0.4271	2067.3	0.5743	0.3535	1711.1