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University of California
Agriculture and Natural Resources
Making a Difference for California

Down the Vegetable Row

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Evaluation of grafted tomato plants

UC vegetable advisors have been conducting local field trials to evaluate grafted plants for fresh market tomato production (2017 is the third season of trials conducted by Scott Stoddard and Brenna Aegerter in the northern San Joaquin Valley) as well as for cannery tomatoes (2017 is the second season of trials conducted by Gene Miyao in the southern Sacramento Valley). Below we share the results of two 2016 trials in fresh market tomatoes.

Studies from Europe, Asia and the US East Coast have generated a lot of buzz about the potential of grafted tomatoes to reduce the impacts of soil pathogens and to increase yields and profits for growers. Like the more familiar grafted fruit and nut trees, grafted tomato plants consist of two different horticultural varieties that are physically spliced together. One variety serves as the rootstock, while the "top part" of the plant is called the scion. Ideally, grafted plants allow the grower to benefit from the best characteristics of the two different varieties. Many tomato rootstocks confer higher vigor and yield to the scion variety. In addition, if they include either pathogen-resistant or salinity-tolerant rootstocks, grafted tomatoes can allow production in fields infested with soilborne pathogens without the need for fumigation, or in fields with elevated soil salinity.

There is very little publically available data on the performance of grafted tomatoes under California conditions, or using our unique CA varieties. To test the performance of CA "mature green" tomato varieties in grafted systems, we conducted trials using twelve different rootstock/scion variety combinations in commercial fields in both San Joaquin County (near Vernalis) and Merced County (Le Grand) in 2016. We used a standard "clip grafting" method to produce the grafted tomato plants at Growers Transplanting Inc. in Salinas, CA. For comparison, we also planted the four scion varieties without grafting.

The grafted tomato plants for our field trials were produced using a standard "clip grafting" method.

Table 1. Yields of grafted and non-grafted tomatoes in the 2016 San Joaquin and Merced County trials

	San Joaquin County trial						Merced County trial				Combined	
SCION	Total yield[v]			Market yield[v]				Total	Market yield		**Market yield**	
ROOTSTOCK	Boxes/A		%	Boxes/A		%	N	Boxes/A	Boxes/A	%	**yield**	**%**
BOBCAT												
MAXIFORT	2,820	abc	51%	2,240	a	60	3	3,469	2,512	-7%	2,376	**16%**
DR0138TX	2,488	abcd	33%	1,902	abc	36	4	3,858	2,655	-1%	2,279	**12%**
BS01543756	2,344	abcd	25%	1,697	abc	21	4	4,202	3,206	19%	2,452	**20%**
NON-GRAFTED	1,870	cd		1,402	bc		4	3,689	2,687		2,045	
HM1794												
MAXIFORT	3,276	a	31%	2,224	ab	17	3	3,766	2,893	-	2,559	**-4%**
DR0138TX	2,720	abc	8%	2,124	ab	12	4	3,629	2,615	-	2,370	**-11%**
NON-GRAFTED	2,509	abcd		1,904	abc		4	4,666	3,428		2,666	
BS01543756	2,728	abc	9%	1,766	abc	-7%	4	4,843	3,671	7%	2,781	**2%**
DIXIE RED												
DR0138TX	3,036	ab	40%	2,002	abc	31	3	5,016	3,569	-8%	2,786	**3%**
MAXIFORT	2,778	abc	28%	1,967	abc	28	3	3,948	2,158	-	2,063	**-24%**
BS01543756	3,055	ab	41%	1,944	abc	27	4	4,819	3,675	-5%	2,810	**4%**
NON-GRAFTED	2,166			1,533	abc		4	5,313	3,864		2,699	
GALILEA												
MAXIFORT	2,062	bcd	24%	1,715	abc	23	4	3,725	2,281	-9%	2,000	**2%**
DR0138TX	1,573	d	-5%	1,414	abc	1%	4	3,268	2,099	-	1,757	**-10%**
NON-GRAFTED	1,663	d		1,399	bc		4	3,469	2,516		1,958	
BS01543756	1,541	d	-7%	1,282	c	-8%	4	3,873	2,525	0%	1,904	**-3%**

Values represent the means of 4 observations in San Joaquin and either 3 or 4 in Merced as indicated. Means in the same column followed by the same letter are not significantly different according to Tukey's HSD test.

[v] Yields are expressed as the number of 25 lb-boxes/A. Total yield includes culls and undersize fruit, while marketable yield excludes these two categories.

[w] Percentage difference in yield of grafted plants compared to the non-grafted controls.

For several of the grafted combinations, the marketable yields obtained in the San Joaquin trial were dramatically higher than the yields for the corresponding non-grafted varieties. For example, the Bobcat/Maxifort combination gave a 60% higher marketable yield than the non-grafted Bobcat plants. Overall, yields were much higher in the Merced trial than in the San Joaquin trial; though there was not a clear marketable yield advantage for the grafted combinations in the Merced trial.

The potential economic benefits of using grafted tomatoes depend on two factors—the cost of the grafted plants, which are more expensive than non-grafted plants, and the market value of the fruit. Our economic analysis found that with the standard value of $6-$8 per 25-lb box of tomatoes that is typical for California, grafted tomatoes will only be economically viable when they provide yield increases of about 20% or more, and when the cost of the grafted plants can be kept to about $0.40 each.

The production of grafted tomato plants in California has not yet ramped up to the commercial scale, and we won't know where the grafted plant price will settle until that happens. Automation of the grafting process has the potential to reduce transplant production costs, but that technology has been adopted at only one California greenhouse to date.

We will carry out additional field trials this season and in 2018 to determine how consistently the grafted tomato varieties we have chosen perform in our California production systems across multiple growing seasons, and will provide more data as they become available.

For more information:

ucanr.edu/sites/veg_crop_sjc/Grafted_tomatoes/

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