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2019

## URI 2019 Carrot Variety Trials – Yellow and White Carrots

Rebecca Brown  
[brownreb@uri.edu](mailto:brownreb@uri.edu)

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### Recommended Citation

Brown, Rebecca, "URI 2019 Carrot Variety Trials – Yellow and White Carrots" (2019). *University of Rhode Island Vegetable Production Research Reports*. Paper 33.

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# URI 2019 Carrot Variety Trials – Yellow and White Carrots



Dr. Rebecca Nelson Brown [brownreb@uri.edu](mailto:brownreb@uri.edu) or 401-874-2755 for more information

## Entries

The 2019 trial included four yellow carrots: 'Gold Nugget', 'Yellowbunch', 'Yellowstone', and 'Mello Yello'. The varieties 'Rainbow' and 'White Satin' were grouped with the yellow varieties for analysis. 'Rainbow' segregates for root color, producing a range of yellow and orange shades. 'White Satin' is truly white, with no yellow tint. All seeds were provided by Johnny's Selected Seeds except for 'Mello Yello' which was supplied by Osbourne Seeds. Pelleted seed was used for all entries except 'Mello Yello' and 'White Satin'.

## Trial Conditions

The 2019 carrot trial was seeded May 26 and 27 using a Jang J-1 push seeder set to 1 inch spacing within row. Each 10 foot long plot contained 3 rows spaced 12 inches apart; plots were on 5 foot centers. Trial design was a randomized complete block with three replications. Prior to seeding the field was amended with Nature's Turf 8-1-9 organic fertilizer to provide 50 lbs N/acre and lime at 435 lbs per acre to ensure adequate calcium levels. Treflan herbicide was incorporated into the top 3 inches of soil for weed control. Overhead irrigation was provided as needed. The herbicide provided only partial control of weeds, and weed pressure was considerable, with significant differences between blocks, despite repeated cultivation and hand weeding. Five weeks after seeding carrots were side-dressed with 12-0-12 to provide an additional 50 lbs N/acre. Damage from *Alternaria daucii* was rate on August 22nd; bolting, canopy height and shoulder protrusion were also measured at this time. The center 5 feet of each plot was harvested beginning on August 22nd, 90 days after planting.

After harvest carrots were graded into marketable and cull, with marketable carrots sub-divided into US #1 and US #2 grades based on length and straightness. Counts and weights were recorded for each category. Five carrots randomly selected from those meeting US #1 standards were used to measure root length and width and then juiced to determine sugar content. Data were analyzed using mixed models ANOVA and post-hoc comparison of least squares means.

## Results

### Canopy Characteristics

'Gold Nugget' developed significantly more *Alternaria* leafspot than any of the other entries except 'White Satin'. 'White Satin' had significantly more disease than 'Yellowstone' and 'Mello Yello', which had the least disease. 'Yellowstone' had the tallest canopy at 22.6 inches, significantly taller than all others except 'Yellowbunch' which was a close second at 19.7 inches. 'White Satin' had the shortest canopy at 15.2 inches. 'White Satin' also had the most shoulder protrusion, with crown position averaging 1.3 inches above the soil level. This was significantly higher than the other entries, and when combined with the small canopy resulted in green shoulders on most roots. The other entries had

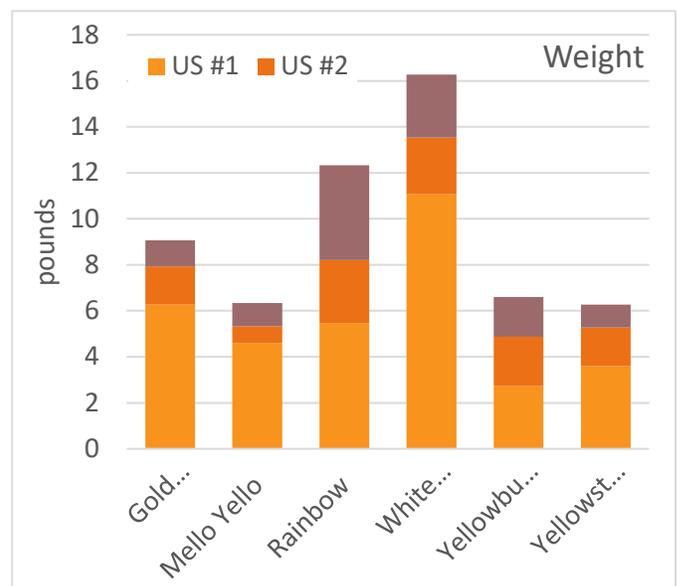
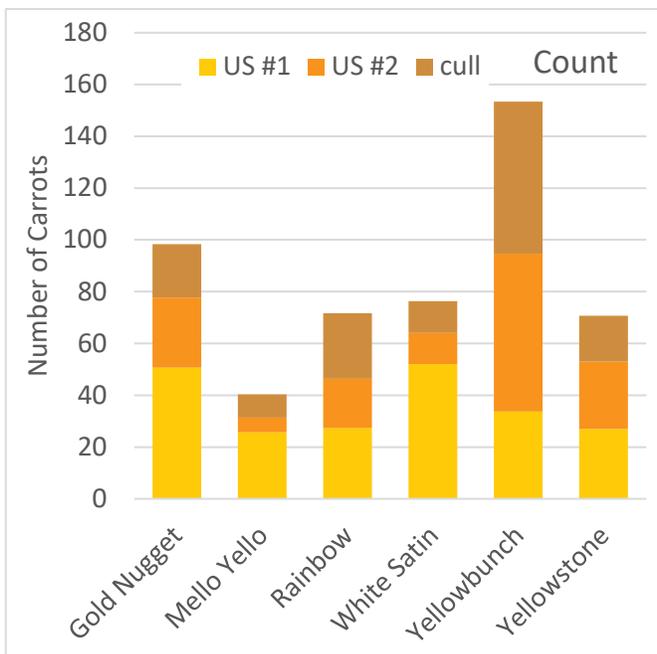
shoulders at or just under the soil surface, except for ‘Yellow bunch’ which was buried at least 0.5 inches below the surface. ‘Rainbow’ and ‘White Satin’ each had one plot with some bolted plants; none of the other entries bolted under the conditions in this trial.

Entry	Alternaria	Canopy	Protrusion
Gold Nugget	4.3	16.8	-0.13
Mello Yello	1.7	17.7	-0.20
Rainbow	2.0	16.4	0.27
White Satin	3.7	15.2	1.33
Yellowbunch	2.0	19.7	-0.67
Yellowstone	1.3	22.6	-0.20
LSD	1.7	4.7	0.69

Table 1. Alternaria leafspot severity scores, canopy height and shoulder protrusion for yellow and white carrot. Leafspot damage was rated on a 0 to 5 scale where 0 indicates no signs of disease and 5 indicates extensive foliar death. Canopy height and shoulder protrusion are measured in inches. Means differing by less than the LSD value are not statistically different.

### Yields

‘White Satin’ had the highest total yield at 16.3 lbs, significantly greater than all other entries except ‘Rainbow’. ‘White Satin’ also had the highest yield of US#1 roots. ‘Yellowbunch’ produced the most carrots and the most culls, with relatively few US #1 roots. ‘Gold Nugget’ and ‘White Satin’ ranked first and second, respectively, for number of US #1 roots. ‘Mello Yello’ produced the fewest roots but most were large US #1 resulting in the highest percent marketable roots by weight. ‘Rainbow’ and ‘White Satin’ produced the greatest weight of cull roots; culls in these two entries were broken or forked, rather than being unacceptably small.



Distribution of yield across grades by both weight and count. ‘White Satin’ and ‘Rainbow’ produced very large roots, while ‘Yellowbunch’ produced large numbers of small, thin roots.

### Root Characteristics

‘Rainbow’ produced the longest roots, with US #1 roots averaging 8.2 inches ‘White Satin’ roots had the largest diameter. ‘Yellowbunch’ roots were thinnest at 1 inch, and the average marketable root weighed only 0.85 ounces. ‘White Satin’ roots were heaviest at 3.28 ounces on average. ‘White Satin’, ‘Rainbow’ and ‘Mello Yello’ had significantly heavier roots than the other entries. All of the yellow and white carrots had high incidence of green shoulders despite soil cover. ‘Mello Yello’ and ‘Gold Nugget’ had

Alternaria canker in some plots. ‘Rainbow’ and ‘Yellowbunch’ developed brown tints in storage. ‘Yellowbunch’ also had very wide crowns despite the generally narrow roots.

Brix measurements ranged from 6.9 % for ‘Mello Yello’ to 9.1% for ‘Yellowbunch’. ‘Mello Yello’ and ‘White Satin’ had significantly lower sugar levels than the other entries. ‘White Satin’ was blandly sweet with an astringent, plastic flavor typical of reducing sugars. ‘Mello Yello’ was mostly bland and watery. ‘Yellowbunch’ had the best flavor, sweet and fruity. ‘Yellowstone’ was sweet and carrotty, but had a bitter note from the chlorophyll in the shoulders. ‘Rainbow’ was bland and sour despite good sugar levels. ‘Gold Nugget’ had good flavor when sugar levels were high, but sugar levels were more variable than in other entries.

Entry	Length (inches)	Width (inches)	Weight (oz.)	Brix	Flavor
Gold Nugget	6.9	1.17	1.55	9.0	Variable
Mello Yello	7.3	1.41	2.77	6.9	Bland and watery
Rainbow	8.2	1.43	2.81	8.5	Sour
White Satin	7.7	1.52	3.28	7.1	Blandly sweet and astringent
Yellowbunch	7.1	1.00	0.85	9.1	Sweet and fruity
Yellowstone	6.6	1.21	1.71	8.5	Clear carrotty flavor, slightly bitter finish
LSD	0.9	0.23	0.91	0.8	

Table 2. Root characteristics and flavor profiles for yellow and white carrot entries. Length and width measurements are based on five randomly selected full-size roots for each plot.

## Conclusions

‘Gold Nugget’ was the best of the commercially available yellow varieties in terms of yield, but suffers from high susceptibility to Alternaria leafspot and poor flavor at sugar levels below 9% brix. ‘Yellowbunch’ had the best flavor and produced lots of carrots, but appeared to need more than 90 days to reach mature size. ‘Yellowstone’ might be a better choice for short or cool seasons, but does not appear to have as much yield potential. ‘White Satin’ produces large roots, but is susceptible to Alternaria, prone to bolting, and has low sugar and poor flavor. ‘Rainbow’ shares many of these problems, mostly in the white and pale yellow components of the mix.

## Acknowledgements

This trial was funded by the Rhode Island Agricultural Experiment Station and University of Rhode Island Cooperative Extension. Abby MacLeod, Emma Fernandez, Yaqoob Iqbal and Fari Gheshm assisted with field work.



Harvested roots of yellow and white carrot entries.