

12-13-2021

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Recommended Citation

Phillips, Ben and Good, Jessica, "2021 Seedless Pickling Cucumber Variety Trial" (2021). *Midwest Vegetable Trial Reports*. Paper 229.

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2021 Seedless Pickling Cucumber Variety Trial

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A pickling cucumber variety trial was planted at the Saginaw Valley Research and Extension Center (43.399097, -83.694497, Frankenmuth, Michigan). Bejo (BJ), Nunhems (NU), Rijk Zwaan (RZ), and Sakata (SK) seed companies donated parthenocarpic (seedless) varieties for mechanical once-over harvest.

Materials and Methods

On 27 May 2021, 28 parthenocarpic pickling cucumber varieties were planted in a completely randomized block design with four replications. Seeds were pre-counted and distributed into four rows by a cone planter. Rows were 20 ft long, 20 inches on-center, with 10 inch in-row spacing targeting 40,000 seeds per acre. The soil type was a Tappan-Londo loam with a poor-moderate drainage class, typical of the pickling cucumber-growing region of Michigan's Saginaw Valley.

On 25 May 170 pounds 46-0-0 was preplant incorporated, resulting in ~152 lb N per acre. On 27 May, Curbit (ethalfluralin) and Command (clomazone) preemergent herbicides were applied at 4 pints per acre and 1 pint per acre, respectively. On 16 June, all plots were thinned to approximately 40,000 plants per acre. On 10 July, Zampro (ametoctradin + dimethomorph) and Bravo (chlorothalonil) were applied at 14 fl. oz. per acre and 1 pint per acre, respectively.

Four reps of all cultivars were harvested and measured between 19-25 July (days 53-59). We harvested 22 plants from the middle two rows of the four-row plots when the fruits began reaching advanced sizes consistently across all replications. All fruit were removed from the plants and sent through a sorter that separated and weighed them by the following sizes: 2As (1 1/16" - 1 1/4"), 2Bs (1 1/4" - 1 1/2"), 3As (1 1/2" - 1 3/4"), 3Bs (1 3/4" - 2"), and 4s (> 2" in diameter).

Length:diameter (L:D) ratios, hollow center and monkeyface percentages were measured from ten cucumbers in the 3B size class only, subsampled from a combination of all replications of a variety. Hollow centers were counted if a hole larger than 1/16" could be seen in the center of the seed cavity. A monkeyface was counted if holes larger than 1/16" could be seen along the outside of the seed cavity. Fruit per plant, bushels per acre of each size class, and combined total bushel per acre yield calculations do not include culls. We determined bushels per acre by multiplying marketable fruit per plant, plants per acre, and pounds per fruit and dividing that product by 48.

$$\frac{x \text{ fruit}}{\text{plant}} * \frac{y \text{ plants}}{\text{acre}} * \frac{z \text{ lb}}{\text{fruit}} * \frac{1 \text{ bu}}{48 \text{ lb}} = \frac{\text{bu}}{\text{ac}}$$

Brinestock evaluations took place November 9. Percent recovery was calculated for each variety by longitudinally cutting 10 brined 3B pickles and tallying the number of individual fruit that were 100% usable, 90% usable, 70% usable, 50% usable, and 0% usable after running two fingers back and forth 10 times with medium pressure upon the inside seed cavity. The percent recovery is a calculation that divides the total percentage of usable pickle by the total number of pickles that were evaluated. The table below shows the datasheet format used to calculate percent recovery for each variety.

Scale	Fraction Recoverable (A)	No. of Pickles (B)	Usable Pickle (A x B)
No Defects	1.0	_____	_____
	0.9	_____	_____
	0.7	_____	_____
	0.5	_____	_____
	0.0	_____	_____
Unusable	0.0	_____	_____
	Totals	_____	_____
Total Percent Recovery (Total A x B) / Total B			_____

Results and Discussion

The season was characterized by a late freeze event on May 31 that hampered seedlings and delayed overall maturity by about 10 days despite subsequent favorable temperatures, regular light rain events, and delayed downy mildew pressure (Table 1). Half of the Rijk Zwaan varieties, and all but one of the Nunhems varieties, were harvested by day 54. But the latest varieties – including BJ Aristan, RZ Gershwin, and NU V5031 – were harvested on day 59.

Total clean yield (4 + 3B + 3A + 2B + 2A) averaged 699 bu/a. The top five varieties with the highest combined clean yields of the most profitable fruit sizes (3B + 3A + 2B) were NU V5025, NU 2102, RZ 79, NU V5031, and RZ Lennon (Table 2). Of those, most had length:diameter (L:D) ratios within 1/16” of a perfect 3.0 in the 3B size class, while RZ Lennon was slightly shorter at 2.75. The five lowest yielders were BJ Absolut, SK CUZ333, BJ Aristan, SK CUCZ332, and SK CUCZ334.

Cull rates averaged 23% and were between 0% and 63.8% (Table 3). The culls were largely due to crooked and nubbed fruit. The five varieties with the lowest cull percentages were RZ 30, RZ Lennon, NU 2102, NU V5025, and RZ Liszt. The five varieties with the highest cull percentages were BJ Aristan, NU V5031, SK CUZ334, SK CUZ333, and SK CUZ332.

Total recovery rates averaged 71% (Table 3). The top five varieties each had Total Percent Recovery scores of 100%. When arranged in order of their highest combined clean yields of the most profitable fruit sizes (2B + 3A + 3B), they were NU 2106 (711 bu/a), NU 2105 (699 bu/a), RZ 16 (639 bu/a), RZ 11 (446 bu/a), and BJ Aristan (303 bu/a). Of these top briners, all achieved the average breakeven yield of 250 bu/a. When arranged in order of L:D ratio, they were NU 2106 (3.2), NU 2105 (3.0), RZ 16 (2.8), RZ 11 and BJ Aristan (2.6, but RZ 11 yielded higher). However, in a group evaluation setting with several briners and seed company reps that occurred after I gathered my data, I was made aware that my method was too aggressive, resulting in very low ratings for several varieties that the participants rated highly, namely RZ 79 and NU 2104.

Acknowledgements

Thanks to Kristin Oomen, Ken McCammon, Chris Dyk, Robert Grohs, George Pape, and Dennis Thomé at the seed companies; Paul Horny, and Dennis Fleischmann at the farm; Dave Brewer, Aaron, Joel, Tony, Todd, Mike, and others at Hausbeck’s Pickle Company; and Pickle Packers International.

Table 1. Weather data summarized by weeks between 25 May and 25 July at the Saginaw Valley Research and Extension Center in 2021. Temperatures were averaged by week, and precipitation is total number of inches received for that week. *Week is reported as week of the year (week of the trial).

Week*	Max Air Temp (F)	Min Air Temp (F)	Max Soil Temp (F)	Min Soil Temp (F)	Precipitation (inches)
21 (1)	69.5	45.8	62.9	58.1	0.5
22 (2)	84.5	61.5	67.6	63.6	0.0
23 (3)	84.8	62.8	74.1	69.0	1.2
24 (4)	78.6	57.0	72.8	67.6	0.4
25 (5)	77.1	59.5	69.9	65.7	2.9
26 (6)	83.3	61.5	76.7	71.2	0.5
27 (7)	76.5	59.6	75.7	70.5	0.8
28 (8)	81.4	61.0	75.4	70.6	0.1
29 (9)	81.5	59.8	75.6	71.3	1.5
Mean	79.7	58.7	72.3	67.4	0.9
CV	10.1	15.4	6.8	7.1	101.9
Std.Error	1.0	1.1	0.6	0.6	0.3

Table 2. Yield data of 28 seedless picking cucumber varieties at the Saginaw Valley Research and Extension Center in 2021. Values in bold indicate the variety performed statistically like the variety with the highest value for that column. Data in this table are arranged in order of largest total yield in clean bushels per acre (4 + 3B + 3A + 2B + 2A).

Company and Variety	Clean Total bu/a	Clean 4 bu/a	Clean 3B bu/a	Clean 3A bu/a	Clean 2B bu/a	Clean 2A bu/a	Cull bu/a	Fruit per plant
NU 2102	986.1	45.6	360.2	442.3	121.2	16.8	69.8	3.0
NU V5025	977.3	26.5	311.7	497.1	117.4	24.6	84.6	3.9
RZ 20	907.7	171.1	293.4	314.6	116.9	11.6	123.0	3.7
RZ 79	840.9	19.8	421.1	289.4	102.9	7.7	129.3	3.4
NU V5031	832.0	104.8	532.8	175.7	17.8	1.0	479.7	2.7
RZ 2	817.9	329.2	356.7	75.3	36.4	20.2	287.5	2.7
RZ Lennon	800.9	49.1	410.1	210.9	104.2	26.6	43.1	2.9
RZ 30	800.0	236.7	330.0	164.8	49.2	19.2	25.1	2.6
NU 2104	768.3	15.6	272.4	334.9	111.4	33.9	152.0	3.1
RZ Bowie	750.5	25.8	195.9	347.8	169.2	11.8	113.1	2.8
SK XCU306	746.0	331.2	246.8	91.7	68.5	7.8	203.7	2.5
NU 2106	737.7	14.8	297.6	335.3	78.5	11.5	122.9	2.6
RZ Liszt	730.1	113.2	294.7	230.2	81.5	10.6	80.8	2.5
BJ 3486	696.8	141.1	293.5	206.4	55.8	0.0	131.6	2.1
NU 2105	694.9	0.0	100.7	353.2	222.5	18.5	99.2	3.2
RZ 16	690.9	0.0	105.8	298.4	234.6	52.0	77.7	3.5
NU 2101	673.0	0.0	62.3	283.6	252.2	74.9	93.7	3.0
RZ Gershwin	660.6	235.8	319.0	95.9	9.9	0.0	161.8	2.1
RZ 11	645.8	193.8	389.8	42.8	13.1	6.2	274.4	2.6
NU 2103	637.3	42.5	294.9	193.1	98.0	8.8	91.4	2.4
BJ Aristan	637.1	326.1	249.0	36.8	17.4	7.9	406.7	2.6
RZ 4	618.4	20.7	233.6	190.5	145.3	28.3	118.2	2.5
BJ Amarok	608.3	36.5	256.9	211.2	96.1	7.6	73.3	2.9
BJ Absolut	534.2	155.5	177.5	173.5	25.3	2.4	77.4	2.1
RZ Rubinstein	502.8	18.1	189.6	244.8	49.5	0.8	95.2	2.2
SK CUZ334	469.6	241.4	150.1	43.7	25.9	8.5	240.5	1.8
SK CUZ333	427.2	117.2	191.7	85.1	30.2	3.0	193.1	1.2
SK CUZ332	367.3	90.5	94.6	44.7	103.6	33.9	162.9	1.7
MS Error	33531.4	16087.8	13155.5	6450.6	1710.5	129.5	5680.0	0.1
Residual Df	81	81	81	81	81	81	81	81
Mean	698.5	110.8	265.4	214.8	91.2	16.3	150.4	2.7
CV	26.2	114.5	43.2	37.4	45.3	69.9	50.1	13.0
t.value	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990
LSD	257.6	178.5	161.4	113.0	58.2	16.0	106.0	0.5
Std.Error	91.6	63.4	57.3	40.2	20.7	5.7	37.7	0.2

Table 3. Quality data of 28 seedless picking cucumber varieties planted at the Saginaw Valley Research and Extension Center in 2021. Values are averaged across four replicates. No statistics were performed on quality data. Data in this table are arranged as an extension of Table 1 and are sorted in order of largest total yield in clean bushels per acre (4 + 3B + 3A + 2B + 2A). *The methods used for recovery data were later deemed too aggressive, and actual recovery percentages are likely higher.

Company and Variety	L:D 3B	% Hollow	% Monkey face	% Cull	Days after planting	Harvest population	Total % Recovery*
NU 2102	3.1	0.0	10.0	10.2	53.0	45837.5	7.0
NU V5025	3.0	0.0	0.0	14.4	54.0	40337.0	42.0
RZ 20	3.0	0.0	50.0	15.6	54.0	40337.0	18.2
RZ 79	2.9	0.0	0.0	17.7	53.0	36670.0	5.0
NU V5031	2.9	0.0	0.0	66.6	59.0	42170.5	10.0
RZ 2	2.5	0.0	10.0	30.3	59.0	40337.0	76.0
RZ Lennon	2.8	0.0	0.0	6.0	53.0	42170.5	72.2
RZ 30	2.6	0.0	10.0	17.9	56.0	38503.5	85.0
NU 2104	2.9	0.0	0.0	29.8	53.0	40337.0	0.0
RZ Bowie	2.8	0.0	70.0	25.4	56.0	44004.0	83.0
SK XCU306	2.7	0.0	10.0	24.5	59.0	40337.0	90.0
NU 2106	3.2	0.0	20.0	22.4	54.0	40337.0	100.0
RZ Liszt	2.8	0.0	0.0	10.8	53.0	45837.5	93.0
BJ 3486	2.9	0.0	10.0	30.3	56.0	42170.5	84.0
NU 2105	3.0	0.0	0.0	22.2	54.0	41559.3	100.0
RZ 16	2.8	0.0	90.0	21.8	54.0	42170.5	100.0
NU 2101	3.1	0.0	11.1	19.7	53.0	44004.0	30.0
RZ Gershwin	2.8	0.0	0.0	44.0	59.0	36670.0	95.0
RZ 11	2.6	0.0	0.0	44.9	59.0	38503.5	100.0
NU 2103	2.8	0.0	0.0	17.8	54.0	40337.0	97.0
BJ Aristan	2.6	0.0	0.0	31.2	59.0	34836.5	100.0
RZ 4	2.7	0.0	10.0	6.1	53.0	40337.0	82.0
BJ Amarak	2.5	0.0	70.0	11.6	54.0	40337.0	87.0
BJ Absolut	2.6	0.0	20.0	15.3	56.0	40337.0	74.0
RZ Rubinstein	2.7	0.0	50.0	22.6	56.0	36670.0	84.0
SK CUZ334	2.6	0.0	10.0	49.8	56.0	42170.5	94.0
SK CUZ333	3.0	0.0	20.0	37.0	56.0	49504.5	83.3
SK CUZ332	3.0	0.0	20.0	44.4	59.0	38503.5	93.8
Mean	2.8	0.0	17.5	25.3	55.5	40904.5	70.9
CV	6.8	0.0	139.9	63.8	4.1	14.1	47.2
Std.Error	0.0	0.0	2.3	1.5	0.2	546.8	3.2