

2018 Mole Pepper Variety Trial

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This project was undertaken with a client who wanted to make mole (pronounced “moh-lay”) sauces from Michigan-grown and Michigan-dried poblano (dried ancho), chilaca (dried pasilla), mirasol (dried guajillo) peppers. The peppers must be fully ripened before drying for the right flavor. Therefore, the main interest of this study was to determine which varieties would yield the most ripe colored fruit before the first frost. A secondary objective of this project was to dry the peppers, covered in a separate report.

Materials and Methods

The mole pepper variety trial was planted at the Saginaw Valley Research and Extension Center (43.399097, -83.694497, Frankenmuth, Michigan). The soil type was a Tappan-Londo loam with a poor-moderate drainage class. On 30 May 180 pounds 46-0-0 was preplant incorporated, resulting in ~80 lb N per acre. The same day, 13 varieties were transplanted in a completely randomized block design with four replications. Sakata (SK), PanAmerican (PAN), Siegers and Harris seed companies and private Wisconsin breeder, James Nienhuis (JN), donated seeds to the trial. Varieties donated by Siegers are owned by Seminis (SG) and US Agriseed (UA). The variety donated by Harris is owned by Seminis. Transplants were started by a local greenhouse on 7 April in 72-cell trays and were eight inches tall at transplanting. Plots consisted of a single row 20 ft long. Rows were 40 inches on-center, with a 16 inch in-row spacing, targeting 7,800 plants per acre. After transplanting, on 30 May, Dual Magnum (s-metolachlor) and Command (clomazone) preemergent herbicide was applied between the rows, each at 1 pint per acre rates. On 10 July, the plots were broadcasted with 90 pounds 46-0-0, resulting in an additional 40 lb N per acre. Plots were hoed three times.

Weather at transplant was hot and dry at transplanting, and supplemental water was manually applied with a water truck and garden hose, two days after transplanting. Disease pressure was nonexistent, weed control was excellent, and hornworms occurred in low quantities.

Starting 12 September, red peppers were harvested from all plants in each 20-foot row (between 11 and 16 plants) and total red fruit weights were recorded for each plot. A second harvest occurred on 26 September, and on the final harvest on 11 October breaker fruit were also counted and weighed. Fruit with spots and rots were counted and factored into the cull rate of all fruits, including breakers. Two attempts were made to dry the fruits, and that is covered in a separate report.

Results and Discussion

All pepper varieties tended to lean over as they grew, and many fruits touched the ground with their tips or were sunburned on the western side of the rows as the plant leaned and exposed fruit from under their leaves. The longer, thinner fruits of SHP9018, Holy Mole and Durango were straighter on more upright plants.

All poblanos had ripe fruits by 26 Sept, but Capitan and Vencedor were the earliest to reach maturity on 12 Sept (Figure 1). Don Matias was the only entry to yield more ripe fruit

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with each successive harvest. Masivo had a high incidence of stip disorder resulting in a cull rate at 57% (Table 1). Both Don Matias and Hidalgo ripened to a dark chocolate color that was hard to differentiate from the dark green immature fruit, and also made it harder to grade out culls from stip disorder that were easy to spot on red fruit.

The yields of chilaca peppers are found in Table 2. Overall, Holy Mole and SHP9018 performed statistically identical in all respects. Ripe fruit were first picked on 26 September, and this is the date when the most ripe fruit were picked (Figure 1). Both chilaca peppers ripened to a dark chocolate and tended to curve as plants leaned over.

The yields of the one guajillo pepper (Durango), the roasting pepper (Wisconsin Wroaster), and the aji pepper (Aji Rico) are in Table 3. These were not statistically compared with each other, chilacas or poblanos because they are not similar peppers.

- Wisconsin Wroaster yielded the most red fruit at the earliest picking date on 12 September. The wall thickness of this pepper was similar to the poblanos, but the fruits were generally smaller and with an inverted calyx allowing water to shed instead of collecting in the top of the fruit (Figure 1).
- Durango yielded more ripe fruit with each successive harvest (Figure 1). The wall thickness of Durango was the thinnest in the trial, which is a good drying quality. But, it is worth noting that this variety exhibited high incidence of blossom end rot, resulting in 44% of the red peppers to be culled.
- Aji Rico yielded an enormous amount of small fruit that peaked on 26 September. This pepper is the only *Capsicum baccatum* in the trial, and was more stunted by the preemergent herbicides than other varieties. They grew in a more compact shape that resulted in fewer fruit touching the ground from the plant leaning over.

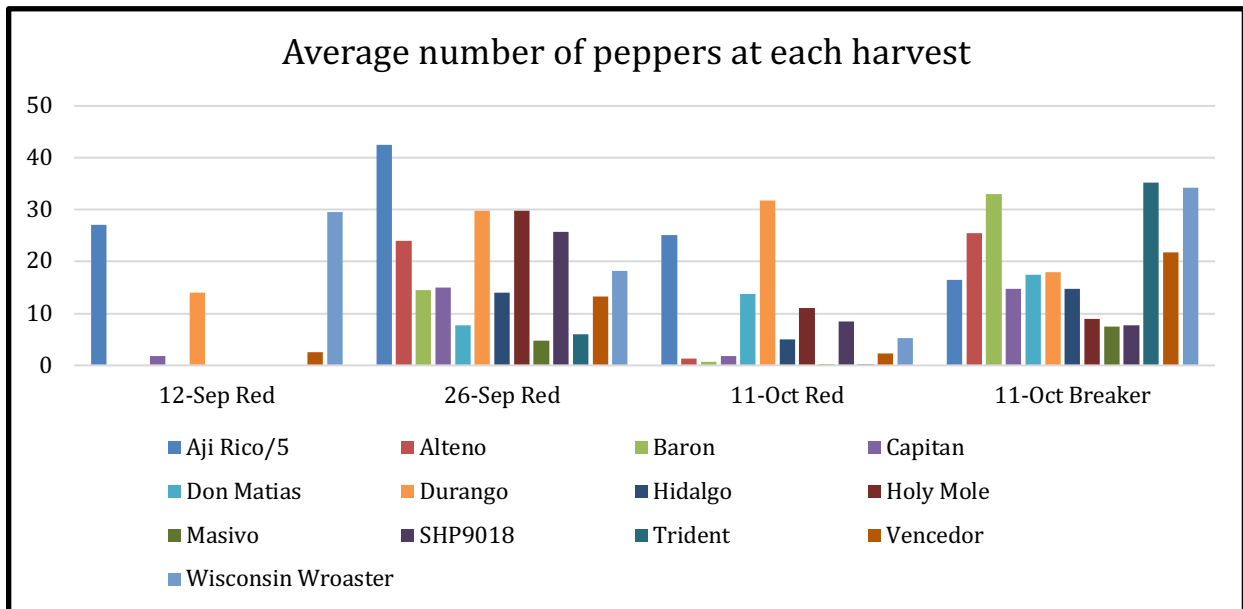


Figure 1. Average number of peppers at each harvest. Aji Rico numbers were divided by five to maintain readability. Both ripe and breaker peppers harvested on 11 October and counted separately.

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Table 1. Yield and cull data on nine poblano pepper varieties planted at the Saginaw Valley Research and Extension Center in 2018. Values are averaged across four replicates. Values in **bold** indicate that the variety performed statistically similar to the variety with the highest value for that column, as determined through a Least Significant Difference test at alpha = 5% and a two-tailed t-statistic ($_{21,0.05}$). NS indicates that there were no significant differences between varieties. Plots consisted of a single row 20 ft long. Rows were 40 inches on-center, with a 16 inch in-row spacing, targeting 7,800 plants per acre.

Variety	Company	Ripe fruit per acre	Pounds of ripe fruit per acre	Pounds per ripe fruit	Ripe fruit per plant	% red fruit
Altano	SK	16,514.86	4,251.35	0.26	1.86	49.75
Don Matias	SE	14,062.16	3,548.24	0.25	1.50	55.13
Capitan	SK	12,100.00	3,114.93	0.27	1.38	55.64
Hidalgo	SE	12,427.02	2,992.30	0.25	1.33	56.30
Vencedor	SE	11,772.97	2,910.54	0.25	1.28	45.28
Baron	SE	9,974.32	2,477.23	0.25	1.17	31.61
Trident	SK	4,087.84	1,136.42	0.28	0.50	15.06
Masivo	UA	3,270.27	866.62	0.27	0.37	40.00
Mean	-	10,526.18	2,662.20	0.26	1.17	-
CV	-	50.17	59.03	7.16	50.97	-
t-value	-	2.08	2.08	2.08	2.08	-
LSD	-	7,765.30	1,890.42	0.03	0.88	-
p-value	-	0.0213	0.0180	0.0043	0.0310	-
Variety	Total % cull	Breaker fruit per acre	Pounds of breaker fruit per acre	Pounds per breaker fruit	Breaker fruit per plant	% breaker fruit
Altano	11.78	16,678.37	4,889.05	0.30	1.86	50.25
Don Matias	25.75	11,445.94	2,877.84	0.25	1.19	44.87
Capitan	19.70	9,647.30	2,411.82	0.25	1.14	44.36
Hidalgo	19.96	9,647.30	2,918.72	0.30	1.04	43.70
Vencedor	13.72	14,225.67	3,376.55	0.24	1.57	54.72
Baron	13.75	21,583.78	6,466.96	0.30	2.66	68.39
Trident	23.68	23,055.40	7,856.82	0.36	2.31	84.94
Masivo	57.62	4,905.40	1,357.16	0.28	0.55	60.00
Mean	23.25	13,898.65	4,019.37	0.29	1.54	-
CV	44.21	40.60	35.55	13.98	36.47	-
t-value	2.08	2.08	2.08	2.08	2.08	-
LSD	15.11	8,298.24	2,101.13	0.06	0.82	-
p-value	0.0001	0.0021	<0.0001	0.01	0.00	-

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Table 2. Yield and cull data on two chilaca pepper varieties planted at the Saginaw Valley Research and Extension Center in 2018. Values are averaged across four replicates. Values in bold indicate that the variety performed statistically similar to the variety with the highest value for that column, as determined through a Tukey test Minimum Significant Difference (MSD) at alpha = 5%.

Variety	Company	Ripe fruit per acre	Pounds of ripe fruit per acre	Pounds per ripe fruit	Ripe fruit per plant	% red fruit
Holy Mole	SE	26,652.70	3,041.35	0.11	2.67	81.91
SHP9018	SK	22,401.35	2,550.81	0.11	2.32	81.55
Mean	-	24,527.02	2,796.08	0.11	2.49	-
CV	-	27.73	24.62	9.32	26.97	-
MSD	-	15,307.57	1,548.93	0.02	1.51	-
p-value	-	0.4419	0.3878	0.9442	0.5070	-
Variety	Total % cull	Breaker fruit per acre	Pounds of breaker fruit per acre	Pounds per breaker fruit	Breaker fruit per plant	% breaker fruit
Holy Mole	24.43	5,886.49	866.62	0.15	0.59	18.09
SHP9018	21.55	5,068.92	654.05	0.13	0.52	18.45
Mean	22.99	5,477.70	760.34	0.14	0.56	-
CV	13.75	26.14	20.10	11.35	24.84	-
MSD	7.11	3,221.83	343.87	3.18	3.18	-
p-value	0.29	0.48	0.14	0.04	0.31	-

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Table 3. Yield and cull data on a guajillo pepper (Durango), roasting pepper (WI Wroaster), and aji pepper (Aji Rico) planted at the Saginaw Valley Research and Extension Center in 2018. Values are averaged across four replicates. Analyses were not performed on these varieties because they are not directly comparable to each other, or to the poblano peppers in Table 1 or chilaca peppers in Table 2.

Variety	Company	Ripe fruit per acre	Pounds of ripe fruit per acre	Pounds per ripe fruit	Ripe fruit per plant	% red fruit
Durango	SK	49,381.07	4,651.96	0.10	5.66	80.75
CV	-	24.05	16.86	10.26	15.03	-
WI Wroaster	JN	34,664.86	4,799.12	0.14	4.00	60.74
CV	-	14.53	15.46	5.04	11.71	-
Aji Rico	PAN	309,531.00	12,901.21	0.04	36.85	85.19
CV	-	22.43	16.30	17.78	16.35	-
Variety	Total % Cull	Breaker fruit per acre	Pounds of breaker fruit per acre	Pounds per breaker fruit	Breaker fruit per plant	% breaker fruit
Durango	44.44	11,772.97	1,095.54	0.09	1.31	19.25
CV	12.14	58.97	57.96	7.72	50.03	-
WI Wroaster	12.25	22,401.35	3,057.70	0.14	2.57	39.26
CV	46.07	43.20	41.61	3.39	39.05	-
Aji Rico	7.42	53,795.93	2,305.54	0.04	6.53	14.81
CV	51.07	18.23	18.44	2.34	24.26	-