Effect of Variety, Population (Stand) and Nitrogen on Sugarbeet Quality in

Teresa M. Crook*, Tomas H. Rader and James F. Stewart, Michigan Sugar Company, P.O. Box 107, Caro, MI 48723.

Have varieties changed over time in how they respond to production practices of increased stand or nitrogen application rates? To address this question, the following objective of the impact of nitrogen and stand (B/100) on three varieties' yield and quality in Michigan was determined. To address this objective the following research was conducted over three location-years in Michigan with two locations in 1998 at Weber location in Ruth and Stoutenburg location in Sandusky (Stout) and one location in 1999 at the Fogg location in Saginaw. The experimental design was a RCBD with 4 replications with 3 factorial of split plot design. The factorial consisted of three commercially grown varieties, US H20 (1970's), Hilleshog E4 (1982 to present –limited) and Hilleshog E17 (1996 to present); (intended and thinned) population of 130, 180 and 230 beets per 100 feet of row, and nitrogen rates of 80, 130, 180 and 230 pounds nitrogen per acre (lbs. N/A). Plots were two rows; row width of 28 or 30-inches; and 30-feet long before alleys were cut. Nitrogen and stand were split onto variety. Yield and quality data was collected with only quality data of %S (sucrose content), %CJP (clarified juice purity) and RWST (120-day slice equation) presented.

Results (see tables) and summary will be given in order of RWST, %S and %CJP. The main effect of stand (B/100) combined over nitrogen and variety showed increasing RWST and % S as stand increased from 130 to 180 B/100, but no change from 180 to 230 B/100. With an interaction of nitrogen by location, the Weber location's RWST decreased with additional nitrogen applications from 80 through 180 lbs. N/A. Stoutenburg and Fogg locations had no decrease in RWST from 80 to 130; but decreased RWST from 130 to 180 lbs. N/A. The Fogg location decreased RWST from 180 to 230 lbs. N/A. Main effect of nitrogen decreased RWST and % S with all nitrogen applications. With improved genetics, varieties have increased RWST and %S at the Weber and Stoutenburg locations for all three varieties. The Fogg location E17 had higher RWST and %S compared to either E4 or H20. Weber location's %CJP decreased at 80 to 130 lbs. N/A; %CJP at Stoutenburg and Fogg location decreased 130 to 180 lbs N/A; and %CJP at Fogg location decreased 180 to 230 lbs N/A. Variety H20's %CJP decreased with all additional nitrogen applications. Variety improvement has maintained %CJP with nitrogen rates 80 to 130 lbs N/A for E4 and E17. Variety improvement has maintained %CJP with nitrogen rates 130 to 180 lbs N/A for E17.

In conclusion, varieties have changed over time, but they all responded the same way to increasing stand of 130 to 180 B/100 improving RWST, %S and %CJP for H20, E4 and E17. However, variety E17 maintained %CJP at higher nitrogen applications. Future research locations will be conducted at least one more year in Michigan.

Table 1: Main effect of stand (B/100) on RWST, %S and %CJP.

Stand (B/100)	RWST	<u>%S</u>	%CJP	
130	253.4	18.1	92.3	preside M. Croscht, Troncos
180	256.7	18.3	92.5	
230	257.6	18.3	92.7	
LSD (0.05)	2.7	0.1	0.2	taru sallonev even Ipatin je britan besentini

Table 2: Interaction of nitrogen rate and location for RWST.

Nitrogen (lbs N/A)	Weber RWST	Stout RWST	Fogg RWST	AVG RWST
80	280.9	266.3	251.2	266.2
130	274.3	262.0	248.6	261.6
180	264.4	253.3	234.2	250.6
230	259.3	250.5	225.5	245.1
LSD (0.05)		5.4		3.1

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Table 3: Interaction of variety and location for RWST.

Variety	Weber RWST	Stout RWST	Fogg RWST	AVG RWST
H20	252.5	241.5	230.1	241.4
E4	272.6	258.6	232.7	254.6
E17	284.1	273.9	256.9	271.7
LSD (0.05)		5.4		3.1

Table 4: Main effect of nitrogen rate for %S.

Nitrogen (lbs N/A)	<u>%S</u>	2 to 130 los. NA. 15/13P at Soutenburg and Folgo and 15/13P at Fogo location docressed 160 to
80	18.7	without with aid additional nitrogen applications. Vo
130	10 E	IP with nitrogen rates 2016 130 lbs NIA for E4 is
180	121	dained 16.1.1P with min own page 130 to 130 to the National State of the conduction variables have changed over the
230		culcoding 181 of 0.130 pure business of
LSD (0.05)	0.2	and E17 however, valuely E17 marrained % L1 regeneral localisms will be conducted at least w

Table 5: Interaction of variety and location for %S.

Variety	Weber <u>%S</u>	Stout %S	Fogg <u>%S</u>	AVG %S	gmraczanii Prytos ring
H20	17.7	17.6	16.9	17.4	nt responds
E4	19.0	18.8	17.1	18.3	No. 16-12
E17	19.5	19.5	18.3	19.0	Service (Provin)
LSD (0.05)		0.2	ges, the rounning researched execut	0.1	erre Litto

Table 6: Interaction of nitrogen rate and location for %CJP.

Nitrogen (lbs N/A)	Weber %CJP	Stout %CJP	Fogg %CJP	AVG %CJP
80	94.2	92.4	92.6	93.1
130	93.7	92.2	92.5	92.8
180	93.6	91.7	91.5	92.3
230	93.2	91.6	91.0	91.9
LSD (0.05)		0.4	automion Indus	0.2

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Table 7: Main effect of variety for %CJP. terf a control is a personal procession. The knowledge

Variety	AVG <u>%CJP</u>	The knowledge of the production of little areas
H20 E4 E17	92.2 92.2 93.1	Lote per some were not infloended by amount of res
LSD (0.05)	0.3	d sugar bent banking cost) was influenced by marages cates influence and marages at 0.2 feet but the least influ

Table 8: Interaction of nitrogen rate and variety for %CJP.

Nitrogen	H20	E4	E17	AVG	23 (13)-(1)
(lbs N/A)	%CJP	%CJP	%CJP	%CJP	minstrati
80	93.1	92.6	93.4	93.1	did ness
130	92.4	92.6	93.4	92.8	nointer:
180	92.0	91.9	93.0	92.3	forms of
230	91.5	91.6	92.6	91.9	
LSD (0.05)		0.4 d oals		0.2	an used