

AGRONOMIC EVALUATION TEST OF LEAF SPOT RESISTANT VARIETIES  
COLLEGE FARM, FORT COLLINS, COLORADO  
1938

**Location:**

North center of the center third of the Mantz tract on the College Farm.

**Plant of Test:**

The test was a Latin Square with plots eight rows wide, and the rows thirty feet long and twenty inches between. The test was mechanically blocked with a Dixie Cotton Chopper, set for 10 inch spacing in the row. The spacing actually attained was approximately 9.5 inches and this was the spacing used in calculating the competitive beet yields.

**Culture:**

Machine planted April 14. Emergence approximately April 28. Blocked May 18 and thinned May 23; thinning delayed about three days by heavy shower following blocking. Cultivation, irrigation and hoeing conformed to good practice and appearance of the crop at all times indicated that these operations were adequate.

**Harvest:**

The test was harvested on two successive days in mid October. Plan of harvest was as follows: All of six inside rows of each plot hand dug. First all competitive beets were taken and two twenty beet samples picked at random for analysis; the remaining competitive beets were then sacked and washed weights obtained. Then all remaining (non-competitive) beets were harvested and washed weights obtained. Percent sucrose and apparent coefficient of purity values obtained from the above mentioned analysis samples were used in the calculation of both competitive beet and actual yields of sugar per acre. Each replication was completely harvested before the next replication was started.

**Diseases and Pests:**

A negligible amount of black root was present at the time the test was thinned. A moderately severe attack of leaf spot developed in September. No appreciable amount of damage by any other disease or pest was observed with the exception of a light infestation of alfalfa web worm in June for which one spraying with Paris Green was given.

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PLOT SUMMARIES

Var. No.	Plot No.	Competitive						Actual			
		No. of Beets	T. Beets Per A.	% Sucr.	App. Coef of Pur.	Lb. Sug. per A. Gross	Ind Av.	Stand **	T. Beets Per A.	Lb. Sug. per A. Gross	Ind. Avail
1	50	160	19.49	15.15	19.25	5905	5388	219	19.65	5953	5432
	68	79	18.10	13.95	91.80	5049	4635	195	17.85	4981	4573
	75	113	19.34	14.65	91.60	5667	5191	191	17.67	5178	4743
	79	140	20.28	14.95	92.00	6064	5579	211	19.45	5815	5350
	94	125	18.91	15.50	91.35	5862	5355	203	17.86	5536	5057
	102	170	17.35	15.35	93.40	5327	4975	214	17.46	5360	5006
	116	150	20.50	14.65	91.00	6007	5466	197	19.15	5611	5106
	127	150	18.33	14.70	91.55	5390	4935	208	18.32	5387	4932
	131	146	19.29	14.85	92.20	5729	5282	204	18.45	5479	5052
	*143	131	17.14	14.15	91.15	4850	4421	210	17.91	5067	4619
	Mean			18.87	14.79	91.73	5585	5123	205	18.38	5437
2	55	72	17.88	13.95	89.55	4989	4468	173	16.80	4687	4197
	63	95	20.21	13.80	90.45	5577	5044	184	18.32	5055	4572
	71	135	19.75	15.65	92.00	6181	5687	211	19.47	6093	5607
	86	99	21.91	14.55	89.70	6376	5719	193	20.67	6015	5395
	89	125	18.86	13.55	90.55	5110	4627	214	18.38	4980	4509
	100	130	20.13	15.45	91.90	6219	5715	201	19.53	6035	5546
	112	112	20.41	14.85	91.45	6063	5545	190	18.85	5598	5119
	128	91	19.81	14.00	90.65	5546	5027	187	19.14	5360	4859
	134	122	20.50	14.90	92.00	6109	5620	196	20.02	5965	5488
	*147	124	19.06	14.35	91.35	5471	4998	206	19.54	5608	5123
	Mean			19.85	14.50	90.96	5764	5245	196	19.07	5540
3	57	84	17.41	15.45	92.00	5380	4950	191	17.20	5314	4889
	61	96	17.04	15.00	91.05	5112	4654	185	16.13	4840	4407
	76	79	18.53	15.30	91.20	5671	5172	190	16.88	5165	4710
	80	111	19.50	16.80	91.65	6551	6004	209	18.46	6203	5685
	92	77	19.17	16.80	93.20	6440	6002	185	18.04	6062	5650
	108	90	19.59	15.35	92.10	6014	5539	193	17.95	5510	5075
	109	79	19.93	14.50	91.20	5781	5272	177	17.26	5007	4566
	124	111	19.57	16.25	93.30	6360	5934	192	17.48	5682	5301
	133	111	18.96	15.70	92.70	5954	5519	201	17.78	5583	5175
	*145	79	19.20	15.40	91.55	5914	5414	197	18.14	5587	5115
	Mean			18.89	15.66	92.00	5918	5446	192	17.53	5495



Var. No.	Plot No.	No. of Beets	Competitive					Actual				
			T. Beets Per A.	% Sucr.	App. Coef of Pur.	Lb. Sug. per A. Gross	Ind Av.	Stand **	T. Beets Per A.	Lb. Sug. Per A. Gross	Ind. Av.	
4	54	81	18.22	15.10	91.75	5502	5048	191	17.34	5236	4804	
	60	141	20.07	15.25	89.30	6120	5465	213	19.83	6049	5402	
	78	59	23.59	14.60	91.10	6887	6274	171	19.88	5804	5287	
	85	94	20.04	15.15	91.50	6071	5555	186	18.76	5684	5201	
	91	120	19.18	16.05	91.90	6155	5656	202	19.17	6155	5656	
	107	104	18.40	14.75	91.85	5427	4985	209	18.55	5472	5026	
	113	112	23.71	15.05	91.20	7138	6510	195	21.17	6372	5811	
	122	119	21.63	15.45	92.10	6682	6154	197	20.76	6416	5909	
	136	103	20.87	14.65	92.45	6114	5652	191	19.68	5767	5332	
	*139	109	119.90	13.10	89.55	5214	4669	197	19.26	5046	4519	
Mean			20.56	14.92	91.27	6131	5597	195	19.44	5800	5295	
5	53	130	17.90	15.70	92.95	5622	5226	202	17.03	5348	4971	
	67	96	18.48	13.90	90.30	5139	4641	192	17.76	4937	4458	
	70	126	18.72	15.60	92.65	5841	5412	209	17.58	5484	5081	
	88	41	22.10	14.35	91.30	6344	5792	176	19.58	5620	5131	
	95	55	18.58	15.30	92.75	5685	5273	177	16.79	5138	4765	
	99	113	18.54	13.95	90.80	5172	4696	195	18.61	5191	4713	
	114	101	21.49	15.65	91.90	6727	6182	198	18.85	5901	5423	
	121	92	22.25	15.45	92.75	6875	6377	193	19.92	6156	5710	
	132	88	17.61	14.90	91.65	5249	4811	188	17.97	5355	4908	
	*146	72	18.66	14.55	91.65	5431	4978	191	19.24	5600	5132	
Mean			19.43	14.94	91.87	5808	5339	192	18.33	5473	5029	
6.	58	71	18.58	14.95	92.00	5554	5110	179	17.23	5151	4739	
	64	98	18.75	14.75	90.75	5530	5018	195	17.86	5269	4782	
	69	119	20.78	14.05	91.10	5839	5319	195	18.70	5255	4787	
	87	53	21.80	15.60	92.45	6802	6288	167	19.20	5989	5537	
	96	81	21.19	15.10	90.95	6401	5822	181	18.44	5569	5065	
	101	73	22.63	15.40	92.30	6972	6435	181	19.49	6002	5540	
	115	59	21.12	15.10	91.50	6379	5837	171	18.50	5587	5112	
	123	68	20.93	16.05	92.50	6717	6213	174	19.08	6124	5665	
	130	80	21.67	15.95	90.80	6911	6275	186	20.12	6420	5829	
	*142	73	21.26	15.00	91.45	6377	5832	189	19.41	5822	5324	
Mean			20.87	15.20	91.58	6348	5815	182	18.80	5719	5238	

Var. No.	Plot No.	Competitive						Actual				
		No. of Beets	T. Beets Per A.	% Sucr.	App. Coef of Pur.	Lb. Sug. per A. Gross	Lb. Sug. per A. Ind Av.	Stand **	T. Beets Per A.	Lbs. Sug. per A. Gross	Lbs. Sug. per A. Ind Av.	
7	51	129	18.30	15.95	92.85	5837	5420	210	18.48	5894	5473	
	65	96	19.15	14.30	89.85	5478	4922	188	17.92	5127	4607	
	73	83	18.30	15.45	91.40	5654	5168	187	18.20	5624	5140	
	82	130	19.33	16.50	93.45	6378	5960	206	19.30	6370	5953	
	90	111	20.49	16.70	92.15	6844	6307	203	19.94	6661	6138	
	104	123	20.09	15.65	91.30	6288	5741	202	19.30	6042	5516	
	117	113	20.25	15.15	90.50	6135	5552	204	18.53	5614	5081	
	126	118	21.01	14.90	92.45	6261	5788	196	19.59	5837	5396	
	129	86	19.44	14.20	91.05	5522	5028	195	18.56	5270	4798	
	*148	86	20.75	14.50	91.05	6017	5478	175	17.99	5218	4751	
Mean			19.71	15.33	91.60	6041	5536	197	18.78	5766	5285	
8	52	89	17.58	16.55	93.45	5820	5439	189	16.74	5541	5178	
	59	130	21.38	14.70	90.40	6287	5683	197	19.08	5609	5071	
	77	56	19.25	16.50	92.25	6352	5860	168	16.44	5424	5004	
	84	71	18.39	16.70	91.95	6142	5648	181	16.76	5599	5148	
	93	92	17.21	16.60	92.10	5713	5262	192	17.11	5681	5232	
	106	103	18.27	16.05	91.55	5865	5369	190	16.77	5383	4928	
	110	84	18.98	16.45	92.75	6245	5792	204	18.16	5976	5543	
	125	69	19.81	16.35	91.85	6477	5949	175	16.98	5553	5100	
	138	65	19.33	15.50	91.10	5991	5458	176	18.14	5622	5122	
	*141	85	18.45	15.95	92.35	5885	5435	188	18.03	5752	5312	
Mean			18.86	16.14	91.98	6078	5590	186	17.42	5614	5164	
9	56	76	18.96	14.45	91.20	5480	4998	185	17.87	5166	4711	
	62	100	20.39	13.35	90.75	5443	4940	191	18.27	4877	4426	
	74	99	19.62	13.90	87.65	5456	4782	203	18.22	5066	4440	
	83	82	19.75	14.85	91.80	5865	5384	184	18.76	5572	5115	
	98	90	19.57	14.30	91.55	5597	5124	188	17.13	4900	4486	
	105	89	20.48	14.70	93.20	6020	5611	182	17.94	5274	4915	
	111	114	20.62	14.65	92.30	6041	5576	198	19.02	5573	5144	
	119	112	21.55	12.65	87.85	5452	4790	214	21.11	5341	4692	
	137	77	20.99	14.30	92.15	6002	5531	180	18.12	5183	4776	
	*140	116	20.80	14.55	90.90	6054	5503	210	20.61	5996	5450	
Mean			20.27	14.17	90.94	5741	5224	194	18.70	5295	4816	



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			T. Beets Per A.	% Sucr.	App. Coef of Pur.	Lb. Sug. per A. Gross	Lb. Sug. per A. Ind. Av.	Stand **	T. Beets Per A.	Lb. Sug. per A. Gross	Lb. Sug. per A. Ind. Av.
10	49	89	20.22	13.60	91.50	5499	5032	194	18.53	5039	4611
	66	91	22.18	13.50	90.15	5990	5400	189	19.44	5247	4730
	72	116	20.09	15.60	91.50	6269	5736	203	19.83	6188	5662
	81	100	21.16	15.20	92.25	6433	5934	199	20.63	6272	5786
	97	57	20.62	14.20	91.85	5856	5379	168	18.98	5390	4951
	103	103	21.07	14.55	92.15	6133	5652	184	19.36	5634	5192
	118	60	21.24	13.75	90.15	5841	5266	175	20.08	5522	4978
	120	111	22.59	14.65	90.60	6619	5997	196	21.74	6369	5770
	135	82	22.89	14.50	92.35	6638	6130	183	20.85	6047	5584
	*144	117	20.42	14.35	91.95	5859	5387	211	22.04	6327	5818
Mean			21.25	14.39	91.44	6114	5591	190	20.14	5804	5308

\* Short plot (168' of Row)

\*\* No. beets harvested. Calculated to full plot basis for plots 139 - 148.

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1938

GENERAL SUMMARIES

	T. Per Acre			App. Coef of Pur.	Pounds of Sugar per Acre				Stand# (Beets Harv.)
	Compt	Act.	Sucr.		Competitive		Actual		
					Gross	Ind. Av	Gross	Ind. Av.	
1.	18.87	18.38	14.79	91.73	5585	5123	5437	4987	205
2.	19.85	19.07	14.50	90.96	5764	5246	5540	5042	196
3.	18.89	17.53	15.66	92.00	5918	5446	5495	5057	192
4.	20.56	19.44	14.92	91.27	6131	5597	5800	5295	195
5.	19.43	18.33	14.94	91.87	5808	5339	5473	5029	192
6.	20.87	18.80	15.20	91.58	6348	5815	5719	5238	182
7.	19.71	18.78	15.33	91.60	6041	5536	5766	5285	197
8.	18.86	17.42	16.14	91.98	6078	5590	5614	5164	186
9.	20.27	18.70	14.17	90.94	5741	5224	5295	4816	194
10.	21.25	20.15	14.39	91.44	6114	5591	5804	5308	190
Mean	19.86	18.66	15.00	91.54	5953	5450	5594	5122	193
Z	.9089	1.2270	1.7175	.3447	.6766	.6524	.6985	.6689	.8188
5% Point	*	*	*		*	*	*	*	*
1% Point	*	*	*		*	*	*	*	*
Standard Error	1.1013	.7584	.3399	.8616	369.4	353.3	274.1	263.4	8.77
S.E. of Mean (10 replica.)	.348	.2398	.1075	.2725	116.8	111.7	86.68	83.3	2.77
S.E. of Mean in % of Mean	1.75%	1.29%	.72%	.30%	1.96%	2.05%	1.55%	1.63%	1.44%
Dif. nec. for significance	.98T	.68T	.30%	.77%	330 lb.	316 lb.	245 lb.	236 lb	8

\* Z exceeds 5% and 1% point respectively.

# 100% stand 228 beets.



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SUMMARY LEAF SPOT DAMAGE AND BOLTING

	<u>Sept. 9</u>	<u>Oct. 3</u>	<u>Total</u> <u>Bolters</u>
1. U. S. 217 Commercial Seed	2.9	Moderate	7
2. U. S. 215 1937 seed	3.2	Mod. severe	4
3. U. S. 200 1937 Seed	2.0	Light	5
4. 200 x 215 1937 Seed	2.7	Moderate	5
5. 200 x 215 F. 1937 Seed	3.0	Moderate	2
6. 7 - 1324 - 80	2.4	Light *	3
7. 7 - 3002 - 00	2.5	Moderate	7
8. 7 - 1237 - 0 (Inbred)	1.8	Slight	8
9. Synthetic check	4.7	Quite Severe	1
10. Great Western	4.5	Quite Severe	11

\* Slightly more than U. S. 200

\*\* Slightly less than U. S. 217 (No. 1 )

Leaf spot readings made Sept. 9, by John O. Gaskill probably 7 to 10 days prior to peak of burning. Readings are averages of 10 plots.

Leaf spot observations Oct. 3, are estimates of maximum burning. New growth was active at this time.

Bolters are total bolting plants in 2400 feet of row for each variety.

## Discussion:

Analysis of the data indicates that the competitive best yields or the actual yields may either be used with considerable confidence. Standard errors are slightly lower for the actual yields.

Careful hand thinning would have resulted in slightly better stands than those secured. However stands were quite satisfactory and it is thought that the test as a whole is comparable to the better farmer's fields of this district.

Considering the actual yields of gross sugar per acre; the yield of Great Western stands first. While the differences are not great the yield of this variety is probably significantly higher than the yields of Nos. 1, 2, 3, 5, and 9. No. 4, U. S. 200 x 215, appears to be the equal of Great Western. The showing of No. 5, the  $F_2$  of 200 x 215, is somewhat disappointing; particularly in comparison with No. 4 and Great Western. No. 8, the inbred, ranked last in tons beets per acre, but its percent sucrose was probably significantly higher than any other strain in the test and the gross yield of sugar per acre is probably not significantly below that of the highest yielding strains. It was noticed at harvest that many of the roots of this inbred were quite hard and woody.

In considering the actual yields it should be noted that the stands of Nos. 6 and 8 were the lowest and the differences shown between the competitive best and actual yields of these varieties are greater than for most of the other strains. The conclusion appears justified that these two strains are at least as good as indicated by their actual yields.

Leaf spot readings made September 9 and observation on total burning shortly before harvest indicate that Nos. 9 and 10 are quite susceptible to this disease. No. 8 is quite resistant, Nos. 3 and 6 are slightly less resistant than No. 8. Nos. 1, 2, 4, 5 and 7 are moderately susceptible. Of the latter five strains the most resistant appears to be No. 7 and the least resistant No. 2.

A negligible number of bolters were observed in all ten of the strains in this test.