Mechanical Cross Blocking

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The information contained in this paper reports the findings from a series of mechanically cross-blocked plots handled under the supervision of the Utah-Idaho Sugar Company. These plots were all situated in the Uipper Snake River Valley of Idaho and were well distributed throughout the 5 factory districts. Each plot was 1 acre in size and was planted with the sack-run seed through standard drills. Five'cross-blocking studies were selected which had formerly been given trials in California. These studies are are follows:

Code	Plot acreage	Block {inches)	Centers (inches)	Procedure
A	1	4	20	To be thinned with long-handled hoe
B	1	$2^1/_2$	10	To be thinned with long-handled hoe
C	1	$2^1/_2$	10	No hand work
D>	1	$1^1/_2$	8	No hand work
E	1	$1^1/_2$	5	To be thinned with long-handled hoe

The fields on which 1hese studies were conducted were selected prior to thinning. One acre of each of these fields was measured off and mechanically cross blocked, using an adjacent acre as well as the entire field as a check. The greater part of the cross blocking was done with knives; however, flat duck feet were also used and proved to be more effective. Each of these studies was replicated 8 times, and the information contained in the tables at the end of this paper deals with average of the 8 replications.

Two weeks prior to the harvest season very extensive counts were made on all of these plots in order to obtain accurate harvest data. The weights of beets as well as the total weights per block were determined by actually pulling the beets in each block and weighing them on hand scales. As will be noticed, these beets were also checked for sugar content and purity in an effort to see what, if any, influence the population of beets had on the sugar content.

On code A the sugar content as well as purity rose successively higher as the population per block increased. This, however, was not borne out: in any of the other studies. In a good many cases the average did not always show the true picture.

For example: Under code A we will note that the average tons per acre of the 8 replications was 14.393 tons per acre. This tonnage was not a fair example of the possibilities of this study. Four of the replications, through misunderstanding, were hoed practically to singles with an average of 62 beets per TOO feet of row. These 4 showed an average tonnage per acre of 11.533. The otlier 4 which

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were hoed to doubles with a small percentage of triples had an average population of 96 beets per 100 feet of row. The average tonnage of these 4 replications was 17.253. Thus, we can readily see with this wide spacing it is imperative that doubles are left with enough triples to make up the mortality rate in machine blocking. Of the 5 studies code A showed the best results. Due to the small amount of blocks that are left there is much less work for hand labor than in the other studies. No trouble arose at topping time as these beets were all good-sized beets. The losses in non-marketable beets were negligible and the tonnage, in spite of the low population on 4 of the replications, was better than the district average. It is imperative with this study that the germination stand be quite thick as the cuts are large and any blanks that are left leave wide gaps in the beet row.

Code B also gave us a good tonnage. The populations on individual replications varied from 167 beets per 100 feet of row to 80 beets per 100 feet of row. The labor involved in thinning these with a long-handled hoe was slightly greater than that in code A. This was due mainly to the fact that there were considerably more blocks to be thinned than in code A. A rather high-mortality loss was experienced in the cross blocking, the loss being about 36 percent of a perfect stand. The majority of the blocks contained only 1 or 2 beets with only about 12 percent of total blocks containing 3 or more beets. Those blocks containing 3 or 4 or more beets resulted in an average loss in non-marketable beets of .41 of a ton. It was estimated that another .65 of a ton of small marketable beets was lost in the field.

Both code C and code D showed rather poor performances. Extremely high populations were experienced, due mainly to the fact that practically 75 percent of the blocks contained 3 or more beets, and as a result there was a very high loss in beets at harvest time. Weeding costs were higher than normal due to the extremely heavy foliage. Topping cost would in these studies prove to be prohibitive. With average populations being in the neighborhood of 225 beets per 100 feet of row and individual replications having populations as high as 330, labor would have to top 2 and 3 times the number of beets and still get a lower tonnage than they would with standard thinning. In the case of code C, 1.41 tons were lost in non-marketable beets and additional beets lost in topping, and in the case of code D, 1.93 tons were lost. In both cases 80 percent of the total loss came from those blocks containing 3 and 4 or more beets.

Code E showed a fair tonnage but here again losses were quite high in non-marketable beets and additional beets lost in topping. The large number of blocks left in cross blocking on 5-inch centers resulted in a high population (176 per 100 feet of row) in spite of the fact that these plots were thinned with a long-handled hoe. This study would, undoubtedly, show better results on fields where the germination stand was not too thick. The tables are self-explanatory.

Table 1.—Data on population counts.

Code letter	Blocks containing single beets				Blocks containing double beets				Blocks containing 3 beets				Blocks containing 4 beets			
	Blocks per 100 feet	Percentage of total blocks	Beets per 100 feet	Percentage of total beets	Blocks per 100 feet	Percentage of total blocks	Beets per 100 feet	Percentage of total beets	Blocks per 100 feet	Percentage of total blocks	Beets per 100 feet	Percentage of total beets	Blocks per 100 feet	Percentage of total blocks	Beets per 100 feet	Percentage of total beets
(A)	34.50	62.44	34.50	42.33	16.00	28.96	32.00	39.26	4.00	7.24	12.00	14.73	.75	1.36	4.00	3.68
(B)	42.63	55.72	42.63	35.12	24.25	31.70	48.50	39.96	8.25	10.78	24.75	20.39	1.38	1.80	5.50	4.53
(C)	25.88	29.98	25.88	12.60	23.00	27.18	46.00	22.84	15.00	17.73	45.00	22.35	21.25	25.11	85.00	42.21
(D)	27.13	28.74	27.13	11.98	25.88	27.42	51.75	22.86	18.00	19.07	54.00	23.86	23.38	24.77	93.50	41.30
(E)	41.25	43.36	41.25	23.41	33.50	35.22	67.00	38.01	13.50	14.19	40.50	22.08	6.88	7.23	27.50	15.00

Code	Pounds seed per acre	Spacing of seed (inches)	No. of blanks per 100 feet of row	Percentage of total stand	No. of beets per block	No. of blocks per 100 feet of row	No. of beets per 100 feet of row	Average weight per beet (lb.)	Average weight per block (lb.)	No. of marketable beets 100 feet	No. non-marketable beets 100 feet	Approx. beets per acre	Tons per acre	Sugar in the beet	Purity percentage
(A)	14.38	.96	6.75	10.89	1	34.50	34.50	2.347	2.347	34.50	—	9,017	14.393	15.962	85.975
					2	16.00	32.00	1.363	2.065	30.87	1.13	8,370		16.437	86.662
					3	4.00	12.00	1.125	2.805	5.88	8.50	3,142		17.067	87.600
					4	.75	3.00	1.041	.679	.50	2.50	784		17.100	88.267
(B)	15.12	.91	43.50	36.25	1	42.63	42.03	1.713	1.713	42.03	—	11,120	13.501	17.187	88.362
					2	24.25	48.50	1.192	2.263	46.37	2.12	12,676		17.150	88.200
					3	8.25	24.75	.858	1.966	18.38	6.38	6,446		16.742	87.885
					4	1.37	5.50	.875	.670	.38	5.12	1,442		17.025	88.000
(C)	14.75	.94	35.37	29.47	1	25.37	25.37	1.555	1.547	25.25	.12	6,559	11.688	17.325	88.362
					2	23.00	46.00	1.011	1.924	43.12	2.87	11,337		17.625	88.312
					3	15.00	45.00	.860	2.084	37.00	8.00	11,631		17.600	89.712
					4	21.25	85.00	.831	2.892	60.13	15.88	21,968		17.237	88.050
(D)	16.13	.86	55.63	37.09	1	27.12	27.12	1.276	1.274	27.00	.12	7,287	11.732	17.112	87.912
					2	25.87	51.75	1.000	2.010	48.62	3.13	13,792		17.025	87.200
					3	18.00	54.00	.815	2.050	45.25	8.75	14,410		17.150	87.312
					4	23.38	93.50	.758	2.461	78.00	17.25	24,461		16.987	87.075
(E)	16.50	.84	24.87	20.72	1	41.25	41.25	1.564	1.564	41.25	—	10,735	12.351	17.200	88.062
					2	33.50	67.50	.905	1.721	64.37	3.50	17,457		17.537	89.550
					3	13.50	40.50	.798	1.913	32.25	8.25	10,695		17.525	88.875
					4	6.88	27.25	.507	1.481	16.00	15.57	7,057		17.485	89.514

Table 8.—Field and harvest data

Code	Pounds seed per acre	Spacing of seed (inches)	No. of blanks per 100 feet of row	Percentage of total stand	No. of beets per block	No. of blocks per 100 feet of row	No. of beets per 100 feet of row	Average weight per beet (pounds)	Average weight per block (pounds)	No. of marketable beets 100 feet	No. non-marketable beets 100 feet	Approx. beets per acre	Tons per acre	Sugar in the beet	Purity percentage
(A)	14.38	.06	6.75	10.89	Avge.	55.25	81.50	1.733	2.522	74.75	6.75	21,318	14.393	16.316	86.356
(B)	15.12	.91	43.50	86.25	Avge.	76.50	121.38	1.203	1.987	107.76	13.62	31,008	13.501	17.111	88.258
(C)	14.75	.94	35.37	29.47	Avge.	84.62	201.37	.972	2.286	174.50	26.87	52,010	11.688	17.447	88.359
(D)	16.13	.86	55.63	37.00	Avge.	94.27	226.37	.905	2.090	106.87	29.25	50,950	11.732	17.000	87.369
(E)	16.50	.84	24.87	20.72	Avge.	95.13	176.25	.972	1.696	152.87	22.88	45,934	12.361	17.449	89.001

Table 4.—Comparative data on non-marketable beets.

Code letter	No. of beets per block	No. of non-marketable beets per 100 feet	Percentage of total beets per 100 feet	Approximate non-marketable beets per acre	Percentage of total non-marketable beets	Average weight per beet (pounds)	Approximate tons of n.m. beets per acre	Total tons	Additional beets lost in topping (tons)	Total loss in tons per acre
4-inch blocks	2	1.13	1.38	294	15,80	.306	,045			
20-inch centers	3	3.50	4.29	914	40.11	.171	.078			
	4	2.50	3.07	653	35.00	.208	.008	.191	—	.191
2%-inch blocks	2	2,13	1.75	555	14.28	.245	.068			
10=inch centers	3	6.38	5.25	1,666	42.88	.224	.187			
With l.h.h.	4	6.38	5.25	1,666	42.SC	.187	.156	.411	.650	1.061
(C)	1	.13	—	33	.47	.242	.004			
2%-inch blocks	2	2.88	1.43	751	10.62	.232	.087			
10-inch centers	3	8.00	3.97	2,103	29.73	.220	.231			
No work	4	15.88	7.88	4,186	59.18	.162	.339	.661	.750	1.411
1%-inch blocks	1	.13	—	33	.43	.242	.004			
8-inch centers	2	3.13	1.38	817	10.66	.208	.085			
(D)	3	8.75	3.87	2,305	30.08	.202	.233			
No work	4	17.25	7.62	4,509	58.83	.185	.418	.740	1.187	1.927
(E)	r~	-	-	~	_	-	-			
1%-inch blocks	2	2.63	1.49	686	10.63	.280	.096			
5-inch centers	3	8.25	4.68	2,175	33.71	.201	.219			
With l.h.h.	4	13,63	7.73	3,592	55.66	.139	.249	,564	.769	1.333

Table 5.—Comparative cost data.

Code No.	Plot	Machine hours	Work cost ($)	Thinning Hours	Thinning Cost ($)	Hoeings First ($)	Hoeings Second ($)	Topping Per ton ($)	Topping Total cost ($)	Total cost ($)	Tons per acre	Gross returns per acre ($)	Net returns per acre ($)	Difference in net returns per acre ($)
(A)	C. B.	1.37	1.03	11.53	4.01	2.00	1.00	.92	13.26	21.00	14.393	102.01	81.015	
(A)	Check	....	....	....	8.00	2.00	1.00	.89	14.64	25.64	16.372	117.00	91.418	10.403
(B)	C. B.	1.31	.98	12.19	4.86	2.00	.96	.96	12.98	21.78	13.501	96.53	74.750	
(B)	Check	....	..	....	8.00	2.00	1.00	.89	14.28	25.28	15.079	114.25	88.970	14.220
(C)	C. B.	1.28	.96	. . .	....	3.25	1.50	1.21	14.15	19.95	11.088	83.57	63.620	
(C)	Check	....	....	....	8.00	2.00	1.00	.90	13.83	24.83	15.335	100.65	84.820	21.200
(D)	C. B.	1.28	.96	....	....	2.87	1.25	1.40	16.44	21.52	11.732	83.68	62.363	
(D)	Check	....	....	....	8.00	2.00	1.00	.91	13.71	24.71	14.094	107.21	82.500	20.137
(E)	C. B.	1.25	.94	13.18	5.25	2.09	1.00	1.02	12.56	21.64	12.351	88.31	66.470	
(E)	Check	....	....	...	8.00	2.00	1.00	.91	13.28	24.28	14.547	104.01	79.730	13.260