

Some Aspects of Commercial Scale Sugar Beet Harvesting

AUSTIN ARMER¹

The agricultural labor shortage in California during the war years was keenly felt by sugar beet growers, particularly during the harvests of 1943 to 1945. Labor demands for spring work were fairly well met, but an acute shortage of harvest labor was encountered.

The demand for harvest mechanization was pressing and was instrumental in accelerating the development and utilization of the Marbeet sugar beet harvester. In 1943 there were used in California 35 Marbeet single-row beet harvesters, and in 1944 the number was increased by 50 two-row machines. Twelve of the two-row harvesters were made available to growers by the Spreckels Sugar Company in 1944. Whereas these 12 machines covered 1,932 acres (an average of 161 acres per machine), this accomplishment was viewed as a large-scale experiment, valuable primarily because of the experience gained with the machine's weaknesses and the problems of field management.

In order to insure a maximum of mechanically harvested acreage in 1945, the Spreckels Sugar Company purchased 25 additional two-row Marbeet harvesters and modernized the 12 machines used in 1944. The 1944 experience proved that harvesters alone do not constitute a functioning harvest organization. Consequently a plan of operation was drawn up and implemented with personnel and equipment. The plan is herewith outlined:

1. The Company will rent Marbeet harvesters to its beet growers for \$10 per acre.
2. The grower may apply this rental (less cost of service parts) toward the purchase of the harvester.
3. Contractors equipped with suitable tractors may rent harvesters on the same terms as growers.
4. The Company will maintain the machines in operating condition, and will transport harvesters to and from growers' fields.

The \$10 per acre rental figure was calculated to defray only mechanical service cost and amortization over a 2-year period.

¹Agricultural Engineer, Spreckels Sugar Company.



Figure 1.—Heavy service trucks were equipped to make major repairs in the field.

Permitting growers to apply their rental against the purchase of harvesters provided an incentive toward eventual ownership of harvesters.

By encouraging contract harvesting, mechanization was provided for growers having small acreages or inadequate tractor equipment.

Mechanical service and transportation of harvesters was an essential Company function. Harvesters operated in areas separated by as much as 370 miles and frequently remote from adequately equipped service shops.

Administrative Organization

The Company's Agricultural Department was the framework upon which the harvesting organization was built.

Field superintendents were responsible for:

1. Assigning harvesters to growers whose tractor equipment and field conditions warranted mechanical harvest.
2. Scheduling harvest dates.
3. Measuring and reporting weekly acreage mechanically harvested.
4. Advising weighmasters at receiving stations to mark scale-beam tickets applying to machine harvested beets.



Figure 2.—Harvesters were transported on rubber tired dollies, drawn by trucks designed for harvester towing.

Mechanical Service Organization

Two district harvesting units were established. Each consisted substantially of the following units:

18 two-row Marbeet harvesters.

1 heavy service truck, carrying arc welder, acetylene equipment, hand tools, and complete parts supply (figure 1).

1 light service truck, carrying hand tools and selected parts supply.

2 trucks with rubber tired dollies for transporting harvesters (figure 2).

1 district maintenance shop.

The operating personnel for each harvesting unit included:

1 machinery supervisor.

2 mechanics.

2 truck drivers and mechanics' helpers.

Clerical Organization

Each district agricultural office was charged with the responsibility of:

1. Tabulating weekly acreage, tonnage, sugar percentage, tare, and operating time for each harvester. (A specimen report is shown in figure 3.)
2. Plotting a seasonal performance chart for each machine. (A specimen chart is shown in figure 4.)
3. Preparing a weekly financial report on harvester operation.
4. Charging harvester rentals to growers' accounts.

Harvester Performance

The Company's 1945 mechanical harvest, is summarized here-with :

	Spreckels Sugar Company	State of California
Total acres harvested.....	38,223	90,000
Acres mechanically harvested.....	10,715	27,000
Percentage of mechanically harvested acreage..	28.1 percent	30.0 percent
Average tare of mechanically harvested beets....	5.48 percent	
Average tare of all beets harvested.....	4.80 percent	
Average acreage per two row Marbeet harvester	281.2	225.

In 1944 the average acreage covered by Company-owned Mar-beet harvesters was 161 acres per machine. This performance was analyzed on the basis of three factors: mechanical breakdown, field management, and adverse weather. This analysis is here tabulated and extended to include the predicted and actual acreages for 1945:

	1944 actual	1945 predicted	1945 actual
Mechanical breakdown factor .			
Field management factor			
Adverse weather factor...			
Overall factor (product of above).			
Acres per harvester*.			

*Obtained by multiplying the theoretical maximum of 560 acres by the overall factor.

It is evident that the field management factor is the greatest deterrent to high load factor, and that emphasis must be placed upon maximum grower utilization, minimum delay in scheduling harvest movements, selection of fields suitable for mechanical harvest, and uninterrupted operation of receiving stations.

It is noteworthy that the harvesters covering the greatest acreage were those operated by contractors rather than by growers. Such contractors, owning their own tractors and renting Company-owned machines, offer the grower a most desirable harvesting system. In all cases the contract cost per ton of beets mechanically harvested was

PRODUCTION BY MAKBEET HARVESTERS, WEEK ENDING NOVEMBER 3, 1945 SPRECKELS SUGAR COMPANY, SPRECKELS, CALIF.

District	Field Supt.	Grower	Msch. No.	No. loads	2d net tons	Lbs. dirt	Percent		Acres		A. hr.	Hrs. oper.	%* oper.	A. to date per mach.
							Tare	Sugar	Week	Date				
1	W.B.M.	Sig Sanchez	41	10	102	10,060	4.98	17.38	14	110	1.17	12	100	314
1	C.E.C.	M. P. Ballet	48	22	117	23,410	4.20	17.40	8	201	.50	16	100	201
1	H.V.	Chas. Sargentl	49	21	128	11,060	5.85	15.81	8	27	.40	20	100	288.3
1	G.M.	H. E. Bailey	52	5	68	5,370	1.98	18.32	6	100	.60	10	100	205
1	W.B.M.	A. S. Nyland	63	7	80	3,820	4.03	26.19	3	215.7	.50	8	100	215.7
1	J.B.L.	M. G. Da Rosa	74	20	105	13,590	4.71	16.76	5	11	.50	10	100	185
1	C.E.C.	Clement & Thayer	84	9	50	15,780	2.10	17.47	16	10	.80	20	100	104
1	G.M.	E. O. Henderson	86	8	86	21,300	6.20	17.20	5	87	.50	9	100	150.0
1	H.V.	Peter Stolleh	87	25	238	26,700	5.70	16.06	10	85	.30	20	100	207.1
1	G.M.	Joe Prieto	88	6	65	8,060	4.72	17.68	4	38				
1	G.M.	T. H. Hoffhouse	88	16	177	25,510	2.80	14.00	9	0	.62	21	100	165
1	R.E.F.	Strobel Bros.	90	20	145	20,730	6.08	16.06	7	12	.35	20	100	171
1	W.B.M.	E. DeWitt	92	7	58	15,260	5.28	18.10	3	96	.50	6	100	300.3
1	H.V.	C. H. Ferrasche	95	28	178	42,900	3.40	15.75	6	24	.40	15	100	276.8
1	G.M.	John Capitanich	96			Not Operated				121				266.6
1	J.B.L.	J. E. Culver	97	70	307	55,670	2.87	19.30	22	80	.78	30	100	206.5
1	W.B.M.	H. Altendorf	98	1	14	750	5.40	16.10	3	290	.50	6	100	290
1	W.B.M.	Fraschetti Bros.	99	5	40	3,820	4.72	15.82	2	10	.67	3	100	407.7
1	G.M.	D. Martin	100	0	85	7,950	4.50	17.06	1	10	.50	2	100	276.4
1	J.B.L.	N. Forden	101	21	113	10,500	4.00	16.73	14	23	.58	24	100	201
TOTALS				329	2,440	327,730	4.58		146		.58	250	100	4,506

o Remarks: Causes of non-operation, etc.

*As influenced by machine breakdown only. All machines stopped a/c rain.

Figure 3.—Specimen of weekly harvester production per

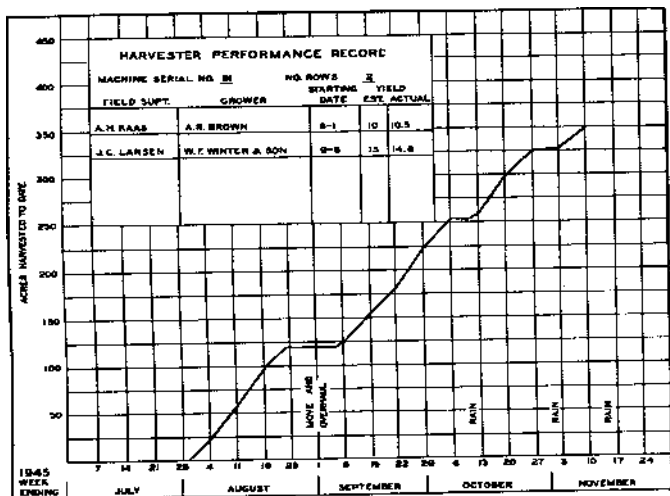


Figure 4.—Specimen of individual harvester performance record.

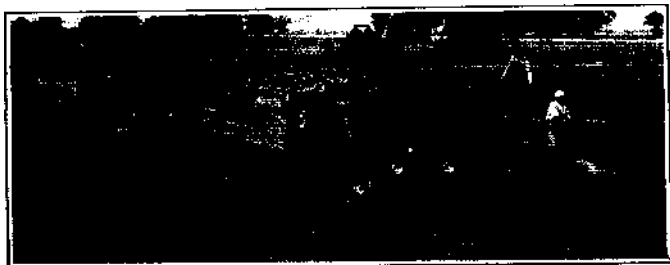


Figure 5.—Good field management is illustrated by this example of truck scheduling, whereby no harvester time is lost for want of trucks.

less than current hand labor rates. The growers had no cares or responsibilities and welcomed the contract harvester. The contractors' costs were low enough to provide good wages plus a considerable profit.

Of the harvesters rented to growers or contractors in 1945, 40.5 percent were sold to their users, who exercised their option to apply rental toward the purchase price.

Conclusions

The Company's experience to date points out certain well defined trends in the mechanization of the sugar beet harvest. These are:

1. Mechanization is accelerated by the owning and servicing of harvesting machinery by the sugar company.
2. Eventual ownership of harvesters comes about naturally to those growers whose acreage is large enough to provide good harvester load factor.
3. The majority of small-acreage growers will eventually avail themselves of the services of harvesting contractors.
4. The sugar company will own and service a constantly decreasing number of harvesting machines.