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Abstract

The successful application by farmers of minimum tillage (plowing followed immediately with a leveling and firming tool and planting within 24 hours) to sugar beets has reduced the weed problem, reduced production costs and produced satisfactory yields. Tests were initiated in 1958 to combine the operations of plowing and planting sugar beets and thus minimize the labor requirement.

Disciplines

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Ridge-Planted and Plow-Planted Sugar Beets

W. F. Buchele and C. T. Morton

MEMBER ASAE

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THE successful application by farmers of minimum tillage (plowing followed immediately with a leveling and firming tool and planting within 24 hours) to sugar beets has reduced the weed problem, reduced production costs and produced satisfactory yields (2)^o. Tests were initiated in 1958 to combine the operations of plowing and planting sugar beets and thus minimize the labor requirement.

Other tests were conducted by planting sugar beets on ridges in order to use the favorable root environment created in the seedbed. Equipment was built for forming, planting and cultivating the ridges.

Minimum tillage studies began in Michigan in 1945. Cook et al (2) discussed equipment needed to perform minimum tillage operations in Michigan. The minimum tillage operations varied according to the crop planted. Hansen et al (3) presented data which showed the feasibility of plowing and planting corn in one operation using the plow-plant method.

Buchele (1) studied the root bed environment in a ridged seedbed. He found the ridge was 2 to 4 degrees warmer than flat seedbeds and that corn seedlings emerged earlier from the ridge.

McColly (4) successfully grew sugar beets on ridges in Chippewa County. Nixon (5) discussed the planting of sugar beets on beds in Colorado and Nebraska.

Two tillage experiments were conducted during 1958. Commercial machinery parts were used as much as possible in the construction of the experimental machines. A number of new parts were fabricated in the machine shop.

Plow-Planted Sugar Beets

Using plow-plant equipment developed by Hansen et al (3), Fig. 1, sugar beets were planted in an unrandomized tillage experiment on the Ferden Farm, Chesaning, Mich., on May 1,

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^o Numbers in parentheses refer to the appended references.

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FIG. 1 Plow-plant equipment developed by C. M. Hansen and used to plant both corn and sugar beets.

1958. The land has been under minimum tillage management for the past eight years and was in good physical condition. The previous crop was field beans.

Two tillage treatments, one with a variation in planting equipment, were applied to the soil and it was planted on May 1, 1958.

In treatment 1 (check) a moldboard plow was followed by a clod buster during the morning. It was planted with a conventional John Deere four-row planter during the afternoon.

In treatment 2 (plow-plant) a moldboard plow was followed by a clod buster. It was planted immediately with equipment attached to the plowing tractor. The compacting wheel was used.

Treatment 3 (plow-plant) was the same as treatment 2, except that the compacting wheel was removed.

At the time of planting, the soil was somewhat dry and remained in that condition until a rain on May 24. A rather uneven stand of sugar beets had emerged by May 27 when the stand counts were made. (See notes in Table 1.) The plant spacing is shown in the "initial count" column of Table 1. Other plants emerged after this date and the crop was hand-thinned during June.

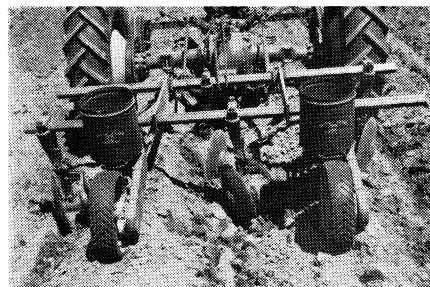


FIG. 2 Disk ridger used to form ridges and plant sugar beets in one operation.

Equipment

The plow-plant equipment consisted of conventional plowing and planting equipment attached to a specially built cultivator frame. A moldboard plow with two 14-inch bottoms was used to plow the land. This provided a 28-in. row spacing. A compacting wheel was used ahead of the fertilizer disk opener in treatment 2. This wheel firmed the seedbed by placing approximately 40 psi on the soil.

The starter fertilizer was placed in a band 2 in. to the side of the row and 4 in. deep. A John Deere "flexiplanter" was mounted in the cultivator frame and set to plant one inch deep with a seed spacing of one inch.

Discussion of Results

The results of the plow-planted experiment are shown in Table 1. Pertinent planting and environmental data are also given in the tables. The rate of emergence of the check treatment and the plow-plant treatment were nearly equal. A reduced rate of emergence resulted from the unconsolidated seedbed (treatment 3). Satisfactory final stands were, however, obtained in all treatments. The yield data show that the looser the seedbed, the higher were the yields produced with higher sugar content.

Ridge-Planted Sugar Beets

An experimental plot located on the Michigan State University farm at East Lansing was plow-planted to sugar beets on April 10 (3 rows). The previous crop was alfalfa. Due to the extended dry period, the sugar beets did not emerge and the land was disked on May 10 to kill the growth of weeds that had developed since plowing. Ridges were formed and planted with the disk-ridging equipment shown in Fig. 2. Two tillage treatments were applied to the soil and planted on May 15, 1959, as follows:

Treatment A: Ridge plant. Ridges formed with a disk ridge and planted with equipment attached to the ridger toolbar.

Treatment B: Flat plant. Planted with equipment used in treatment A except that the disks were removed.

Pressure settings of minimum, medium, and maximum were applied to the press wheels in various plots of the above treatments.

TABLE 1. PLOW-PLANT SUGAR BEETS

		Ferden Farm, Chesaning, Mich.			
Place		May 1, 1958			
Date of planting		60 F			
Soil temperature at 0-inch depth		54 F			
Soil temperature at 6-inch depth		1 inch			
Planting depth		1 inch			
Seed spacing		300 lb per acre			
Fertilizer		soy beans			
Previous crop		28 inches			
Row width		Beet spacing			
Treatment		Initial count	Final count	Sugar content	Yield
		Inches		Percent	
1	Check	4.29	7.96	17.6	17.78
2	Plow-plant with compacting wheel	4.62	8.15	18.3	18.65
3	Plow-plant without compacting wheel	8.20	9.05	18.3	21.90

Notes made on May 27, 1958, after sugar beet emerged:
 1 Treatment 2 emerged first.
 2 Treatment 3 was slow and plants were smallest in size.
 3 Plants emerged 24 days after planting.

TABLE 2. RIDGE PLANT SUGAR BEETS

		Michigan State University campus				
Place		May 15, 1958				
Date of planting		1 inch deep				
Planting depth		1 inch				
Seed spacing		Alfalfa				
Previous crop		40 inches				
Row width		Beet spacing				
No.	Treatment	Press-wheel setting	Initial count	Final count	Sugar content	Yield
			Inches		Percent	
A 1	Ridge planted	Minimum	1.26	11.1	15.3	20.2
A 2		Medium	2.76	11.2	14.3
A 3		Maximum	2.58	12.9	16.7
		Average				17.1
B 1	Flat planted	Minimum	1.47	12.2	15.3	12.3
B 2		Medium	5.15	13.1	17.1
B 3		Maximum	3.68	22.4	11.05
		Average				13.5

The sugar beets were hand thinned after the initial stand count (shown in Table 2) was made.

Description of Disk Ridger

The disk-ridging equipment was fabricated for the ridge-planted corn experiments which have been conducted

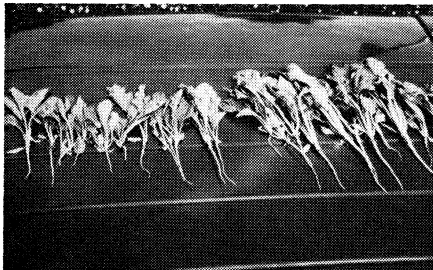


FIG. 3 Size of sugar beets from flat planted (left) and ridge planted (right) plots.

for the past several years. The disk ridger formed an approximately 10-in. ridge on 40-in. row spacing. The John Deere flexiplanter (also shown in Fig. 1) was mounted on the second toolbar frame and the ridges were planted as they were made. The disk being ahead of the planter tended to hold it on the center of the ridge.

Discussion of Results

The results of the ridge-planted sugar beets experiment are shown in Table 2. Pertinent planting and environmental data are given in the table.

The ridge-planted beets were observed to emerge approximately one day ahead of the flat-planted beets. The minimum press-wheel setting provided the conditions for the highest total emergence in both tillage treatments.

The average yield of the ridge beet

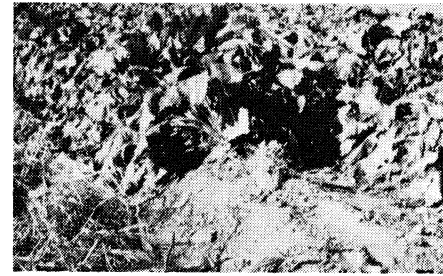


FIG. 4 View of ridge-planted sugar beets (leaves were stripped from front beet).

was higher than the flat beets while the sugar content was the same.

Fig. 3 shows flat-planted (left) and ridge-planted (right) sugar beets pulled from the soil July 2, 1958. The ridged beets grew faster and were larger in size than the flat-planted beets. Fig. 4 shows ridge-planted sugar beets at harvest time.

Conclusions

1 Sugar beets can be successfully planted with plow-plant equipment.

2 Ridged sugar beets have a higher rate of emergence, total emergence and yield than flat-planted seedbeds.

Summary

Sugar beets were planted under three tillage systems in two different experiments. The plow-planted sugar beets produced higher yields with higher sugar content than the check.

The ridge-planted sugar beets had a higher rate of emergence and produced higher yields but did not show an increase in sugar content over flat-planted beets.

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