

Methods For Reduction of Hand Labor In Spring and Summer Work

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I feel we are on the march to bright horizons and it is indeed inspiring to me to note the efforts of so many men dedicated to the single objective of reducing the need for hard human efforts in producing the sugar beet crop. We are each of us attacking the problem from different angles: seed breeding, perfecting the segmenting process, developing more accurate drilling machines, perfecting harvesting machines, using better fertilizers and better soil handling, to name only a few. Surely these efforts cannot help but revolutionize the industry and bring it into its proper relation with other crops and remove from it the slurs and innuendoes that have been hurled at it, perhaps with some justification.

I wish to discuss briefly the cross cultivation method for reduction and possible elimination of hand labor in blocking, thinning, and hoeing as practiced in standard sugar beet culture (and referred to in this paper as old method), and results attained in the Valley of the Red River of the North in northwestern Minnesota and northeastern North Dakota. In this area crops depend entirely on rainfall (about 19 inches yearly average), there being no irrigation water available for general utilization. This cross cultivation method is by no means experimental but has been applied since 1929 in our area as standard field practice each year on acreages as high as 36,000 acres of beets in recent years. More than 300,000 acres of beets have been cross cultivated in this area alone since the start of this practice, which now is extending rapidly into other beet-producing areas.

We have found that acres worked per laborer have been increased, thus reducing labor demand, that soil tilth has been improved, that moisture has been conserved by the heavy mulch placed around each plant in the row, and of very great importance that if weather interferes thinning can be delayed with but little resultant tangling of the roots left in the blocks. Furthermore, the entire acreage on any one contract can be planted in one planting instead of two or three, as is customary in standard beet-growing operations. This utilizes the growing season to fullest advantage and results in increased beet yields.

Yields have not been decreased because of the lessened number of beets per acre; on the contrary they have been increased to around 10.25 tons yearly average (including drought years) with many grow-

ers producing year after year yields of 12 to 15 tons per acre. The cross cultivation method consists merely of crossing the beet rows at right angles with disks and knives or duckfeet with slight suction. The disks are used mainly to establish the blocks, and the knives and duckfeet are used to kill all growth between the rows or between the blocks. As narrow a block should be left with the disks as possible, preferably from 2 inches to 4 inches wide, with the same center-to-center spacing as the drill rows. This method was started with drill rows initially ranging from 20 to 24 inches apart. Within a very short time drill rows were reduced to a standard of 18 inches apart so that after crossing we now leave blocks 18 inches center to center. This 18 by 18 square pattern gives a plant population of 19,360 beets per acre on a 100 percent calculated stand. At least two cross cultivations are made, disks being used to establish the blocks, with suitable knives or duckfeet set at slight suction to eliminate all growth between the blocks. First cross cultivation is done just before thinning when the blocks are established and again just before hoeing. This is in addition to the cultivations down the row. It is most important that loose dirt be forced back into the disk cut to prevent undue moisture loss. We have found that early cultivation work down the rows and across is advantageous, because aeration resulting from this operation does a great deal to stimulate the growth of the seedling plants. The experience of our growers has been that once the tools are properly adjusted to leave the desired width block and to cultivate the field efficiently and destroy weed growth, it is best to cross the field when the beets are in the two-leaf stage, not looking backward until the job is done and then only after 2 or 3 days.

To avoid moving the beet-containing block (which is likely to happen when narrow blocks are left), it may be necessary to place one disk on the front of the front cultivator bar and the other on the rear of the front cultivator bar. This stagger effect has worked out quite satisfactorily for our conditions. For irrigated areas, where beet stands are irrigated up, it might be desirable to cultivate, in the irrigation furrows before starting to cross-block the field.

This cross cultivation eradicates all weeds in about 75 percent of the drill row, and the only hoeing left to do is immediately around the blocks of beets remaining in the row. The direct result is an increased efficiency on the part of labor. In table 1 results are given of time studies made in man-hours required per acre.

Where whole seed was planted and cross, cultivating of beets was done, a reduction in man-hours required in blocking, thinning, and hoeing beets resulted, the reduction being from 41.9 hours per acre to 20.97 hours per acre, or 50.04 percent. With the advent and general

Table 1.—Savings made in man-hour requirements per acre in thinning whole and segmented seed, Cross-Cultivated and old method practice.

	Whole seed		Segmented seed
	Old method, 1939 data from Fort Collins, Colo.	Cross cultivation, 1939 data, 14 growers Red River Valley	Cross cultivation, 1943 data, 40 growers Rod River Valley
	hours	hours	hours
Thinning	32.30	16.47	10.37
Floeing	9.60	4.50	5.74
	41.90	20.97	16.11
Percent	100%	50.04%	38.45%

usage of segmented seed, the man hour requirements have been still further reduced to where it now takes 16.11 hours labor per acre, or only 38.45 percent of the time required for these operations by the old method of beet handling.

We used check-row drills for a number of years until segmented seed came into the picture when growers again began drilling seed in continuous rows. We, like everyone else, used the special plates developed by the drill manufacturers which reduced the amount of seed per acre but **did not** place the seed balls in the row evenly spaced; this even spacing in the row is essential in cross cultivation work. (Smooth tubes were not used.)

Our agricultural staff began working in 1942 with H. C. Rasmann of the Diamond Iron Works of Minneapolis in developing a drill that would space beet seed evenly in the row. These efforts were successful enough to get these drills into sizable production and we will have about 100 of them in operation in 1946.

Extensive field trials on commercial-sized fields varying from 5 to 15 acres each will be conducted in 1946 using various seed spacings in the row, narrowing the blocks left after cross blocking to as small as 2 inches wide if stands permit. No hand thinning and only such long-handle hoeing as seems to be necessary around the blocks will be done. Critical studies will be made on each field, such as stand counts before and after crossing; data on man-hours required in hoeing, together with at-harvest yields, will be obtained.

Out of these studies should evolve a practical plan that will enable that area to reduce still further the labor demand for spring and early summer operations.