

GENERAL MACHINERY SYMPOSIUM

The Need For Mechanization and a Brief Review of Accomplishments

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Ordinarily it is considered that sugar beets require slightly less than 100 man-hours per acre during the season. About one-half of this requirement, is hand labor to thin, weed, and top the beets. Machinery and chemistry can well eliminate a large share of the hand labor required as well as the need for extra weeding cultivations. By eliminating hand loading and harvesting, a material amount of manpower may also be saved. According to time studies, the raising of an acre of corn requires 34 man-hours. It is quite possible that sugar beets, if completely mechanized, will require but little more. When this is achieved no other crop, including wheat, will have as much food energy produced per man hour of effort. The elimination of "stoop" labor is at the present time of the utmost importance to the industry. Not only has it been the object of much political criticism but also it has cost processors large sums of money and resulted in considerable grower dissatisfaction.

The domestic beet industry is quite varied over the 18 states in which sugar beets are grown. The average size of beet contracts varies from 6¹/₂ acres in Wisconsin to 87 acres in Southern California. Naturally it is easier to mechanize where the farm size units permit adequate power equipment. There is a general lack of standardized practices in the various sugar beet areas, not only in the width of rows but in the matters of planting, irrigating, and harvesting. Row widths vary from 18 inches in Minnesota to as much as 42 inches in California. Needs for irrigation furrows affect mechanical operations. Lack of smooth, level fields greatly affects mechanical thinning in non-irrigated sections. All this lack of universal methods makes for rather complicated summer labor elimination as well as harvest labor elimination.

Considerable progress has already been made in recent years in reducing hand labor requirements by introduction of segmented seed, seed treatments, mechanical blocking, field beet loaders, and complete harvesters. The industry needs a single-germ beet seed. Present indications are that even this problem seems to have some assurance of being whipped by plant breeders. In the meantime, before the single-germ seed might be available, the industry needs improved seed processing to eliminate damage to germs and to standardize quality as well as size of seed. It is very difficult for implement manufacturers to

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understand the variance in opinion in the industry as to the size of segmented seed to be issued to growers. The University of California has been doing some excellent work along seed processing development.

Stress is going to have to be put on precision beet planters and preparation of seed beds if we are to eliminate thinning labor. In order to make the seed come through the ground with assurance of growing healthily we need further studies with fungicides and fertilizers. In many sections, because of crust problems, work needs to be done on chemicals such as gypsum, lime, and others to make the ground more friable, thereby eliminating crust and associated seedling troubles that are caused by it. In order to plant light rates of single-germ seed or uniform double-germ seed, a drill which does not damage the seed and which can be counted on to distribute the seed fairly accurately is badly needed. In some areas stress should be put on drills that prepare the soil as well as kill weeds in the drilling operation. Studies should continue also on improved press wheel design and furrow openers. It seems quite possible that, planting rates of two seeds per foot of row may be achieved in the future when better emergences are secured from high germinating seed that will have increased chances of growing because of previous seed treatments. The selective elimination of weeds by chemical means seems to be on the way to solution. When this is achieved agronomic practices are going to have to step up in order to keep pace with the mechanical phases of producing beets. The use of commercial fertilizers is going to become more and more popular and the use of micro-organisms in the soil to improve its fertility as well as its condition will naturally come along with demands for increased production.

The development of planting equipment and subsequent methods to eliminate hand binning is further from ultimate solution than are the mechanical harvesters. The use of mechanical blockers, such as the "Dixie", "Soucci", "Blackwelder" and other down-the-row blockers, as well as cross blockers, is dependent upon the uniformity of the spacing of the plants down the row. Single plants are important up to a reasonable degree in order that the blocking will not leave bunches of plants which would interfere with yields. When farmers get accustomed to mechanical blockers there is very little question that yields can be increased. The final blocked stand depends in a large measure upon the successful emergence of uniformly distributed seed. This has not yet been too well accomplished with present equipment. Part of this failure probably is due to too rapid planting with present drills, to lack of seed bed preparation, and to weeds, crust, and other factors. Timeliness is very important in all mechanical operations.

There are many harvesters, both experimental and in production, that give promise of satisfying the need for harvesting the crop. A

survey of the industry indicates that the harvesters wanted by farmers should be capable of handling clods on about 60 percent of the total acreage in the country. Opinion of farmers is about equally divided between a machine that might in a single operation handle both tops and roots and a machine which might harvest the tops separately from the roots—a two-unit machine. This survey indicated that the ultimate harvest equipment should satisfactorily salvage the tops on 86 percent of the land growing beets. This fact indicates quite clearly that eventually the beet industry will be responsible for much more livestock feeding than it is today. The importance of properly taking care of the tops should be more seriously considered in harvest operations.

About one-tenth of the acreage planted to beets in 1945 was harvested mechanically. It would appear that in 1946 perhaps one-fourth might be mechanically harvested if sufficient machines can be produced. The average beet contract in the United States is 20 acres and on about 34,000 farms the average is less than that; it would seem that a one-row harvest operation would be adequate on these farms. There are about 15,000 farms that usually grow in excess of 20 acres, with 2,200 growing more than 60 acres. The latter probably will be adapted for two row or larger machines. The topping accomplished by most of the harvesters today is superior to that done by hand workers. This part of the operation is pretty well solved but much work needs to be done to handle machines in muddy ground, in rocky fields, and under extremely dry conditions before it can be said that a universally acceptable machine is produced. It is very doubtful that a single type of harvester can be devised that will adequately harvest beets in all areas of the United States because of the peculiar problems in each area. In the next few years great improvements will be made on present equipment in improving the quality of work, particularly in caring for the tops properly and in the elimination of trash, clods, rocks, and other things that interfere with the operation of sugar factories and in the storage of beets. With the mechanical developments now under way, combined with the work being done by chemists, electrical engineers, and others, it would seem that the elimination of much of our hand labor will have been accomplished within the next 5-years.

The Beet Sugar Development Foundation is concentrating its program on the development of devices to eliminate the need for hand labor. Specifically this will be divided into four parts:

- (1) A thorough study of drills and seed processing in a nationwide series of tests. A great many inventors have designed planters which will be tested at Fort Collins.

- (2) A thorough study at a great many locations of mechanical

thinning of beets as well as a further investigation of wide and narrow row possibilities.

(3) A thorough study of harvesters next fall in various parts of the country. About 28 different kinds of harvesters have been investigated. Assistance is being given to improve production models as well as experimental models of these machines.

(4) Extension facilities for promoting the more widely adaptable practices for elimination of labor. These will be prepared and loaned to sugar companies.

Through the cooperation of all research and other agencies the Foundation hopes in this year to make a great stride for increasing the mechanization of the crop of 1947 when materials and machinery will be probably available to fill the demand by sugar beet farmers more adequately.