Experience and Progress with International Sugar Beet Harvester

J. L. Hipple

During the season of 1947, International Harvester built and sold 600 sugar beet harvesters. In addition, the improvements which were embodied in the 1947 design were furnished to the owners of the three-hundred 1946 machines, so all International machines now in the hands of users are of the latest design.

One of the 1947 design machines was placed in operation at Calexico about the first of May and was in constant use, except for time lost in transporting from one location to another, until about the middle of November under many crop and soil conditions. This machine harvested approximately 5,000 tons of beets and averaged 6½ tons of beets per hour and 1 acre harvested for every 2½ hours of operation. Experience gained on this machine pointed to the desirability of some improvements which are included in the 1948 machines. In the heavy top growth and large beets found in the Imperial Valley some trouble was experienced in handling this heavy growth and large crowns with the receding finger top flinger unit. This flinger drum was mounted in a fixed position with relation to the topping disc. Excessive material passing through would sometimes clog and cause stoppages. The design of the mounting for the flinger drum was changed from a rigid construction to a floating arm which is held down to its normal working position under spring pressure but is allowed to move upward within certain limits to allow large amounts of material to pass through.

It was also found that in heavy growth some crowns would get by the flinger drum, so a cone was added to the topping disc shaft which keeps all material in the path of the flinger drum and prevents wrapping around the shaft.

A top conveyor unit was tested on this machine which takes the tops from the flinger and conveys them out beyond the tractor wheel where they are deposited on the ground. This unit consists of a potato link elevator driven from the tractor axle and the cleaning action of this unit leaves the tops in a loose windrow free from dirt and outside of the tractor wheel where they will lie undisturbed and in a condition to be windrowed by a side-delivery rake.

Several of these units were tested in different sections where they proved effective and will be listed as an attachment for the 1948 season.

Consideration is being given to means for windrowing several rows of tops in one windrow. There seems to be two lines of thought on the disposition of the beet top. Recently the idea of flailing or shredding the

tops from the beets with some type of beater previous to harvesting and leaving them on the ground to be plowed under to improve the fertility of the soil has been promoted in some sections. The original and so far most prevalent procedure is to recover them for feed by either pasturing them off in the fields or by storage for later feeding. We are not concerned with which method is followed but plan to devote our efforts to leaving the tops in the field, either scattered for field feeding or in condition to be raked off and stored.

Our harvester lends itself very well to this method since it is not necessary to go over the field behind or with the harvester with a tractor or field loader as the beets harvested are transported by the harvester. The harvester works equally as well in beets where the tops have been removed.

The International machine employs a revolving disc as a topping unit. Its use was old in the art of beet harvester design before we selected it as the most universally successful method of topping due to its ability to cut its way through heavy growth of tops as well as any obnoxious vegetation growing in the crop. It is not quite as easy to recover the tops from but its other advantages offset this. With the tendency toward closer spacing of beets in the row due to precision planting, and elimination of mechanical thinning as well as higher operating speeds, we recognize the necessity of a very active topping unit to efficiently top closely spaced beets of uneven height from the ground.

We have been testing a topper unit made from aluminum alloy having better bearings for the floating linkage which eliminates considerable dead weight without impairing the strength of the unit. This, of course, would greatly reduce the inertia of the unit and make its vertical movement much more active with less effort required of the finder unit. This will also improve its operation in beets grown in loose soils.

As we all know, the most difficult problem of mechanical beet harvesting is clod separation. For years many types and designs of beet harvesters were built, most of them successful under certain conditions. The use of spikes in some form or other has been tried for over 25 years and have been successful in certain conditions. Many means of agitation have been employed but were not successful in hard ground and mud. In adopting the hand-sorting means for our harvester we did not admit or accept defeat on this problem but accepted it as a compromise between the ideal and the practical for the purpose of providing the sugar beet industry with a harvester that would work in any and all types of soil and weather conditions instead of withholding it from the market until a successful mechanical clod separating or eliminating device was perfected. The idea of hand separation of foreign material from crops was not new and its application to beet harvesting had been tested by the late Professor Mervine at Fort Collins and Austin A. Armor at Davis, California.

We are still working on this problem of clod elimination. Many devices have been tried, some of them our own development and some developed by owners of our machines.

We have tested a spike wheel running directly behind the puller blades. Different types of puller units have been tested. A rotating lifting unit developed by T. H. Jenson of Lovell, Wyoming, has been investigated, also a spike wheel running over the sorting belt, designed by Mr. Walters of the Great Western Sugar Company at Windsor, Colorado. This device shows some merit. It is designed to run over the beets as they pass along the sorting belt and convey them up where they are stripped off the spikes into a chute delivering them into the cart, leaving the clods to go on over the belt onto the ground. We have tested a spike wheel mounted over the sorting belt where the beets were thrown onto the spikes from the harvester elevator. These spikes were sword shaped. This device was not successful. We will continue our efforts to devise some means to make complete mechanical beet harvesting successful under all conditions which is the aim of all those devoting their efforts to this problem.

The daily output of this machine, of course, varies with crop conditions and the efficiency of the operators. Daily averages of 60 to 80 tons was not uncommon. We had one outstanding report of a daily production which we did not accept without confirmation. One harvester working on the S. A. Camp ranch near Bakersfield in beets running 36 tons to the acre and in soil that did not require the use of the sorting belt took out 143 tons of beets in 11 hours. This, of course, we know is very unusual. The quota system applied in many places controls the daily output.

In closing, I wish to say that we know of no effort to mechanize a crop where greater cooperation has been given to all those who are attempting to design machinery to accomplish it than that given by the growers, the processors and agricultural colleges interested in the beet sugar industry.