

B. J. Ruffing and W. H. Heinemann

SUGAR beet companies, state experiment stations, and the USDA Agricultural Research Service use replicated plots to evaluate sugar beet yields as influenced by varieties, fertilizers, water-management practices, etc. As a result, many people need some type of sugar-beet, plot-harvesting equipment. Plots frequently are up to 50 ft in length from which two to eight rows may be harvested. Harvesting sugar-beet plots by hand involves a great deal of manual labor. Beets are first undercut, then pulled and topped by hand, piled in the center of the plot, counted as they are placed in a wire basket, and lifted by hand to a scale for weighing. This method is slow and expensive.

Early Models

The first mechanical plot harvester used in southern Idaho was developed about 1947 by the Amalgamated Sugar Co. Several years later another model was developed by the USDA crops research division. Both of these have been improved several times since their first development and are still being used.

New Design

An improved design has been developed at the Snake River conservation research center. It is all metal and adaptable to all bin-styled sugar-beet harvesters. This design permits rapid and efficient harvesting of sugar-beet plots, and the equipment is simple and easy to make.

All the plot-sampling equipment is attached to the bin of the harvester. It can be installed or removed in a few minutes (Figs. 1 to 5). When removed, the harvester is again converted for conventional use. The harvester itself can be a one-row or a multiple-row model.

The sampling equipment consists of a catch screen (Fig. 3) which is placed over the opening of the harvester bin on which beets fall within easy reach of workmen. The screen is held in place by four slip-in mounts (Fig. 4), one placed at each corner. The slip-in



Fig. 1 Scale framework and basket with securing lever in lock position and scale arrested

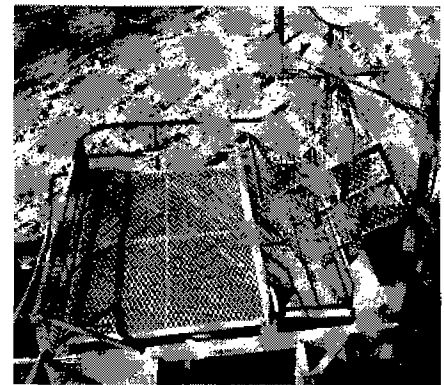


Fig. 3 Closeup of catch screen and relation of weighing basket. (Forward tipping position is maintained by basket)



Fig. 2 Securing lever in released position for weighing and splash screen at rear of catch screen. Adjustable hook bolt above scale for linkage adjustment, and seat over elevator for person taking notes

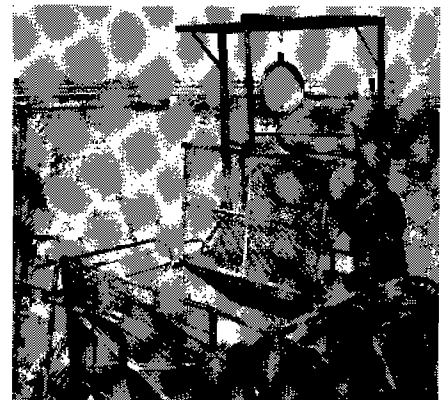


Fig. 4 Catch screen in raised position for harvesting border or buffer strips. The workman has left hand on handle for raising or lowering screen. Right hand is on trip lever for releasing to a lower screen. (Slip-in-mounts on bottom of each side of screen holds screen in place regardless of position)

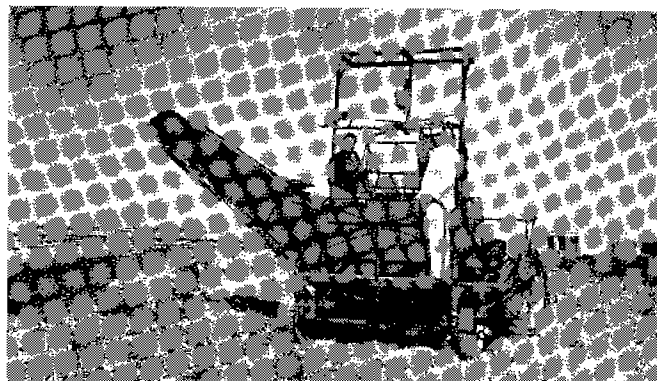


Fig. 5 A view of the adequate platform with guardrail which surrounds the bin on three sides

The paper was submitted expressly for publication in the TRANSACTIONS of the ASAE. Paper was approved as a contribution from the Northwest Branch, Soil and Water Conservation Research Division, Agricultural Research Service, U. S. Department of Agriculture (Idaho Agricultural Experiment Station cooperating).

The authors are: B. J. RUFFING, agricultural research technician and W. H. HEINEMANN, machinist lead foreman, Snake River Conservation Research Center, Kimberly, Idaho.

mounts are secured to the inside of the harvester bin. The catch screen has an upright splash screen mounted on the back side, a basket in which to place the sample beets, a framework (Fig. 1) to support the scale and basket (Figs. 2 and 4) for weighing beets, a seat (Fig. 2) for a person recording number of beets and weights, and a platform (Fig. 5) for workmen and for transporting samples to the end of the plot area. The screen has a handle on each side toward the front for rapidly raising the screen when harvesting border rows or buffer strips between plots. In the raised position, it is held in place by a catch latch (Fig. 4) mounted on the scale frame, which allows the beets to fall directly into the bin.

For fast, efficient plot work two men are needed to count the sugar beets and take samples of them. One man operates the scale securing lever and dumps sample beets from the basket after weighing, and another man reads the scale and records the weights.

How It Operates

As the beets come off the harvester elevator, they bounce on an all-metal catch screen which removes most of the dirt, thereby reducing the tare. As the beets come to rest on the screen, work-

men can collect beet samples for laboratory analysis and quickly and easily count the beets, if desired, and toss them into the basket for weighing. The basket is balanced to remain in a slightly forward tipping position (Fig. 3) to facilitate this operation and is conveniently located immediately behind the screen in easy reach of the workmen. The scale, which is a heavy-duty type highly resistant to shock, is mounted from the framework that is secured to the harvester bin. Three different springs (Fig. 1) fastened in a three-point hookup arrangement at the bottom side of the scale and secured to the scale framework protect it from lashing against the framework while the harvester is in operation. The scale is mounted so that it faces the proper direction at all times for rapid and easy reading by the recorder.

The linkage between the scale and the basket is adjustable and controlled by a lever which is in a locked position and holds the scale at rest while beets are being tossed into the basket for weighing, as during this time the harvesting machine is in motion lifting beets from the plot. When the end of the plot is reached and the sample beets are ready for weighing, a man quickly releases the scale-securing lever (Figs. 1 and 2).

The beets are then weighed and the

weight recorded. After the beets have been weighed the scale-securing lever is again quickly locked. The scale is again at rest in a locked position after which the beets are dumped from the tipping basket into the bin of the harvester. The weighing basket is a balanced tipping type which, after emptying, quickly returns to its upright position and is ready for the next plot. A platform with ample room for workmen to stand and a guardrail for their protection (Fig. 5) surrounds the harvester bin on three sides. The platform allows room for storing sugar-beet samples until the end of the plot area is reached.

This plot-harvesting equipment could also be adapted to potato and corn harvesters or any type of harvester that uses a trail bin for the harvested product where the weighing of individual plot or individual row is desired.

Summary

A time and money-saving method for extensive sugar-beet plot harvesting is described. To completely harvest one 50-ft row takes less than one minute. To do this same amount of work by hand would take one man more than 20 minutes. Total cost of labor and materials for the plot-harvesting attachment is approximately \$390. (This price does not include the scale.)