

# POTATO HARVESTING, HANDLING AND STORAGE

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This paper is not a research report. Its purpose is to acquaint those of you who are not intimately associated with this work with changes that have taken place in the handling of the potato crop and the many problems still to be solved.

As do other branches of agriculture, the potato industry faces special problems in the fields of cost of production, quality control and merchandising. It is believed that further mechanization of potato harvesting and handling if combined with the provision of properly designed storage can assist in solving many of the problems now faced by the industry.

It is a large field and it can not be expected that all details will be covered in the time that has been allotted.

## *Harvesting*

In considering harvesting operations all related factors must be taken into consideration. In the past the potato harvesting operation has consisted of lifting with a potato digger, hand picking into baskets, emptying baskets into barrels or bags, loading barrels or bags onto trucks or wagons, transporting to storage and placing into storage by dumping the field containers.

In an operation designed to harvest 1000 barrels per day the following labor force would be required:

- 1 Tractor Driver—operating digger.
- 15-20 Pickers.
- 1 Truck Driver.
- 1 Loader for a total labor force of approximately 20 persons.

Such a sizable labor force presents special problems—not only in securing the necessary personnel but also in its supervision.

A machine that would reduce the harvesting crew from 15 or 20 persons to 4 or 5 would result not only in a saving in labor costs and at the same time reduce the human element that frequently causes so much injury.

## *Potato Harvester Development*

Idaho potato growers pioneered in the field of harvester development and bulk handling and by 1951 approximately 70% of the potato crop was harvested mechanically.

At the same time farmers in the Red River Valley were carrying on a development program and it is significant that the development of the

potato harvester brought many new names into the farm machinery industry.

Basically all modern harvesters operate on the same principles. They consist of an elongated digger bed, a sorting area and a bulk loading elevator. Most of the machines new on the market depend almost entirely on hand removal of tops, clods and stones. The size of the crew necessary to carry out this operation is largely dependent upon soil conditions in the field where the machine is used but varies from 2 to 8 persons. Various vine separation devices have been used including chains with open mesh that allowed the tubers to fall through while the vines were carried over or counter rotating rollers that pulled the vines down through. Stone removal devices have consisted of inclined belts that allowed the round and lighter tubers to roll to one side while the heavier stones stayed where deposited. These have been only moderately successful and in stony land large crews were still necessary.

As late as 1954 farmers in the potato growing areas of Maine and New Brunswick were still saying that the harvester had not been built that could be used in their area. Forced by labor shortages they started to buy machines in 1955 and by the fall of 1956 over 50 machines were being used in Aroostook County in Maine. Practically all of the major manufactures were represented with Dalhman, Bean and Lockwood machines predominating.

In 1957 the number of machines in use declined slightly. Overenthusiased by the way potatoes came out of the ground, many users had operated their machines at too high a speed and their entire crop was suitable only for starch production.

One solution to the problem of stone removal is being tried by many Maine and New Brunswick farmers. It is a concentrated stone removal program using a mechanical stone picker. The machines most in favor are being manufactured in the area.

Progress to date clearly indicates that harvester development has reached a point where rapid progress is possible. The entrance of one or more of the full line machinery companies into this field is anticipated. A proto-

type of one machine was observed under test in 1958 and appeared to have a refinement of engineering design that was lacking in most other machines.

## *Potato Handling*

With harvesters beginning to take over it is apparent that some form of bulk handling will follow rapidly with the gradual elimination of the bag and barrel as field containers. There are apparently two methods finding popular acceptance.

The first of these consists of loading the potatoes directly into large bulk handling trucks equipped with unloading conveyors. There are only slight differences between the different makes. All consist of a hopper shaped box with a drapper chain or belt conveyor running between the sills. The potatoes are supported above this conveyor by slats that telescope so that potatoes may be deposited on the conveyor at a uniform rate. The boxes work very well and the transfer from the harvester to the box to the bin loader can be achieved with a minimum of injury.

The second method consists of using pallet boxes which hold approximately 12 barrels. Three of these boxes are placed on a flat bed truck and taken to the field where they are filled by the harvester. At the storage they are stacked using a fork lift truck. This method has many advantages. Since they eliminate movement of the individual tubers at the storage it is possible to eliminate up to one-third of the chances for mechanical injury. In the storage they separate the potatoes into individual lots surrounded by air spaces and in most cases the provision of special air circulation fans and ducts can be eliminated. The separation also prevents heating and the spread of rot where potatoes are placed in storage in poor condition.

Cost appears to be the one deterrent to the wide acceptance of this type of handling. The boxes must be strong and a cost of \$1.00 per barrel of capacity appears to be a minimum. A good fork lift truck will cost \$3000-\$4000 and a storage using clear span trusses is necessary for maximum efficiency. It is extremely unlikely that the method will be adopted by the smaller growers of under 50 acres.

