FORTIER: MECHANICAL BEAN PICKER

Percentage of consumer’s dollar received as margins by 230 stores of various types in Syracuse, N. Y., July to September 1949.

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Corporate Chain</th>
<th>Owner Operated</th>
<th>Fruit and Vegetables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn, sweet</td>
<td>29</td>
<td>31</td>
<td>42</td>
</tr>
<tr>
<td>Lettuce</td>
<td>26</td>
<td>31</td>
<td>23</td>
</tr>
<tr>
<td>Potatoes</td>
<td>25</td>
<td>23</td>
<td>31</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>40</td>
<td>47</td>
<td>37</td>
</tr>
</tbody>
</table>

Table 1. Farmers’ share of retail price for selected vegetables and certain groups of food products, 1935-39 average, February 1951 and February 1952.

<table>
<thead>
<tr>
<th>Commodity &amp; Origin</th>
<th>Destination</th>
<th>June 1, 1946</th>
<th>May 2, 1952</th>
<th>Increase</th>
<th>Increase Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potatoes, Hastings, Fla</td>
<td>N. Y. City</td>
<td>$0.65</td>
<td>$1.15</td>
<td>.50</td>
<td>75.9</td>
</tr>
<tr>
<td>Grapefruit, Lake Wales, Fla</td>
<td>Chicago</td>
<td>.83</td>
<td>1.37</td>
<td>.54</td>
<td>65.1</td>
</tr>
<tr>
<td>Celery, Sanford, Fla</td>
<td>N. Y. City</td>
<td>.91</td>
<td>1.45</td>
<td>.54</td>
<td>59.3</td>
</tr>
<tr>
<td>All Citrus — all shipments</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All fresh vegetables — all shipments</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All products of agriculture — all shipments</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


NOTE: Regulated motor carriers in virtually all territories have raised or are raising rates by about same percent as railroads.

RAILROAD FREIGHT RATES PER 100 LBS. FOR SELECTED AGRICULTURAL COMMODITIES, JUNE 1, 1946 AS COMPARED WITH MAY 2, 1952

STATUS OF THE MECHANICAL BEAN PICKER

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The increasing agricultural labor problem of the past decade has been rapidly forcing a trend toward mechanization. The development of the mechanical Snap Bean Harvester is an example of this tendency.

The present model is a result of twenty years of development with various types of Snap Bean harvesters. A picker developed by Mr. William Urschel, which made its first appearance in 1942, became the most popular of the early attempts to develop a Mechanical Snap Bean Harvester. The machine was impractical for many reasons. It pulled plowed plants out of the ground before picking, making dirt removal a problem. The machine weight was double that of the present picker, also, it was pulled behind a tractor which made it difficult to keep on the row and cumbersome to turn at the headlands. Power was derived from a 10 h.p. motor in addition to the tractor power take-off. Breakdowns were common, manufacturing costs high, and consequently, interest in its development waned.

The most successful type of Snap Bean picker developed to date is the Chisholm-Ryder model, developed by the Chisholm-Ryder Company of Niagara Falls, New York.

The basic pattern of this picker was devised by a New York State Canner and development was commenced by Chisholm-Ryder Company early in 1950. This new machine, which weighs about 3000 pounds, is a two row picker, mounted on a four wheeled tractor. Its sole source of power is the tractor’s power take-off. The picker, which is mounted similar to a corn picker, is most adaptable to a Farmall C tractor by reason of its narrow
width. A few minor modifications are necessary before mounting.

Two sets of shoes are located between the front wheels, one set per row. Gathering chains with lugs are located in these shoes, which guide the plants, while remaining in the soil, along to the picking reels located one on each side of the tractor, beside and below the engine. The reels are comprised of eight bars arranged horizontally in a circle, each bar containing 15 stainless steel fingers. Topper knives are located in front of the picking reels to cut off excess foliage. A central conveyor belt runs underneath the tractor and leads to a blower at the rear. Two men stand on a platform at the rear of the tractor and load the beans into bags. This makes a total of three men on the picker, including the tractor operator. An anticipated improvement is direct truck loading by elevator, which will eliminate the use of one man and bag loading.

The picking is done by a series of fingers combing through the plants as the machine moves along the rows. After the plants are topped above the upper pods, the picking reel commences to strip them. The reel turns so that the fingers, combing against a concave under the tractor, strip the plants upward. The reel turns two to three times faster than the speed of the tractor and is variable. The picker bars are practically stationary, allowing only slight movement under strong spring tension if a firm object is struck. The reel is sloped downward to the rear so that picking commences at the top of the plant and works down as the machine progresses. Only one picking is practical, since after the fingers have combed a plant, it is not capable of further practical growth. The picked beans are thrown onto a single belt conveyor under the belt and in the center of the tractor, which elevates them through a blower, and removes most of the extraneous plant parts and soil. After cleaning, the beans are fed by a double conveyor into two discharge hoppers, to which the field bags are attached.

When the beans arrive at the factory, they are passed through a special cleaner which thoroughly removes all extraneous materials. The blowers on the picker are not capable of removing all leaves and foreign material, particularly rocks. This special separate cleaner has been designed for this purpose, and also to break up bean clusters.

A tractor speed of 1.9 m.p.h. or 3/4 throttle in first gear is presently recommended for most efficient picking. At this speed, the picker is capable of handling one acre per hour under average conditions. A 36 inch row spacing, with a seeding rate of 60 lbs. per acre has been found most satisfactory.

It is not practical to dismount the picker from the tractor, although it only requires about 1½ hours to dismantle the machine properly, in order to avoid complications, the operation is not recommended. The manufacturer is tentatively planning to supply tractors with the pickers and, in this way, all modifications will be completed before delivery.

Bean fields that are to be machine picked should be cultivated with a minimum of ridging. Plants on very light soil or muck are liable to be pulled up by the picker, however, Tendergreen has been picked satisfactorily, even on light soil. Care should be taken during planting to have the rows as straight as possible, otherwise the picker is liable to skip or run over a row.

One third of the beans are snipped on the stem end when harvested. Damage is very slight, averaging only about two percent, being mostly broken beans. An important feature of the machine is that it will pick all sizes. This is a definite economic advantage when the small sizes demand a premium.

Yield comparisons of varieties picked with the harvester are shown in Table I. Top Crop appears to be a very adaptable variety, considering total yield. However, picker effici-
ency as shown in Table II points out that only 61.2 percent of the crop was picked. This may be explained by the high potential yield of Top Crop in this trial. From a standpoint of both yield and picking efficiency, the Tendergreen types have proven to be best adapted. Data from other trials show the variety Wade to be next to Tendergreen in adaptability with Top Crop next.

The use of defoliants to speed up picking and reduce cleaning time has been experimented with recently. It has been found possible to remove sufficient moisture from the leaves to materially increase the capacity of the cleaner blower on the machine. It is anticipated that a procedure for defoliant application can be worked out which will increase the machine efficiency and capacity.

The efficiency of the machine is dependent upon certain specific characteristics of the bean plant. Since varieties differ widely in this respect, only certain ones are adaptable to the practical use of the mechanical picker. One of the most important characteristics of the plant is that it must produce the bulk of its beans for one picking. Tendergreen, Asgrow Stringless Green Pod, and Tenderlong 15, were the three varieties best adapted to mechanical picking from a standpoint of efficiency in the 1951 New York State Canners Association trials. The upright structure and spacing of the branches and pods on the plants, along with concentrated maturity are the principal reasons why these varieties lend themselves to efficient picking.

Varieties of the Refugee type, for example, with drooping branches and low hanging pods, do not pick well mechanically. The optimum plant structure, which will lend itself to mechanical picking, requires a plant that develops a strong root system to anchor the plant firmly in the soil. Also, one that has short internodes, commences branching six inches above the soil line and does not concentrate its branches at the bottom. The branches should not intertwine, nor exceed a 45 degree angle away from the vertical and they should be evenly spaced on the main stem. The pods should be moderately easy to detach and not concentrated in one section of the plant. Leaf size, preferably should be small. The stem should be stout, yet elastic enough to prevent breaking when bent over the concave. An ideal plant would be about 14 inches high and have a spread of 12 to 14 inches, very erect, and resistant to root rot. A plant with Top Crop's yielding ability and Tendergreen structure would be a very satisfactory type.

The future of the mechanical picker is dependent upon the economic aspect of a single picking. The current trend in the major bush snap bean growing areas is toward a one picking deal. It is gradually being realized, that especially with transient labor, as the number of pickings increases, the cost per unit increases and quality decreases. Unless later pickings are carefully supervised, they are reasonably certain to include overmature beans. This trend is influenced mainly by labor and quality considerations, and secondly by the tendency of the popular varieties to be reasonably well concentrated in set of pod.

Considerable breeding will be necessary before the ideal bean plant is developed, however, the fact that our popular Tendergreen types are quite well adapted to mechanical
harvesting, should stimulate sufficient interest to encourage the development of a wider range of still more adaptable varieties.

The mechanical picker, as it stands today, is not considered to be perfect. There are still certain anticipated modifications that will improve its efficiency and capacity. However, it is generally agreed that the long sought principle has been found and when certain modifications are incorporated, the picker will be another answer to our serious farm labor problem.

EFFECT OF COLD STORAGE ON SOME FLORIDA AVOCADOS

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The increased emphasis on precooling and refrigerated shipment of fruits and vegetables has stressed the need for additional information regarding the proper storage temperatures for Florida-grown avocados. A survey of the available literature of the past forty years shows that different varieties produced in different areas vary widely in their tolerance to refrigerated storage.

Internal browning has frequently been observed in avocados following refrigeration and occasionally following extreme chilling of fruit prior to harvesting (2). This disorder is characterized by a brownish discoloration of areas of the flesh which may be confined to localized areas in the seed cavity; may extend outward from the seed cavity into the surrounding flesh; may be confined chiefly to the vascular bundles; or may be manifested by a combination of the above (Fig. 1). The factors responsible for its development are not fully understood.

As early as 1911, Higgins, Hunn, and Holt (1) noted the occurrence of blackening in the interior of Hawaiian-grown avocados after prolonged storage at temperatures recommended for the storage of Temperate Zone fruits. They found that avocados could endure these temperatures for three to four weeks but recommended that the temperature should not be allowed to fall below 40 degrees F. A few years later, Wilcox and Hunn (9) tested some miscellaneous Hawaiian varieties and found no discoloration of the pulp or loss of flavor after two months storage at 32 or 36 degrees F.

California-grown avocados were found by Overholser (5) to vary both with regard to the temperature and duration of refrigerated storage which they could endure without the occurrence of cold injury. He found, for instance, that the Royal variety could be successfully stored for sixty days at 32 degrees F.; whereas, the Fuerte could be stored for but thirty days at 45 degrees F.

Considerable research has been done by Wardlaw and his associates (6), (7), and (8) in Trinidad on the storage of this fruit. They found only a few West Indian seedlings that could be held at 40 degrees F. for twenty to twenty-five days without the occurrence of cold injury. These investigators have attributed the chilling of avocados, including both skin necrosis and internal browning, to a combination of factors including variety of fruit, temperature of storage, duration of storage, maturity of fruit at time of storage, and the water content of the fruit.

Joachim and Parsons (3) found that the best storage temperature for a Ceylon-grown variety of avocado was 40-45 degrees F. but that its commercial storage life at this temperature was only one week.

Lynch and Stahl (4) working with Florida-grown avocados likewise found that different varieties vary with regard to their optimum storage temperatures. For example, these investigators found that the Waldin variety