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MECHANIZED GROWING AND HARVESTING OF VEGETABLE CROPS IN THE EASTERN UNITED STATES

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Although there are several ways to discuss mechanization of crop production, I have chosen the evolutionary approach. Mechanization goes through evolutionary stages. As new crops are mechanized, the intermediate steps could be by-passed if the evolutionary pattern is understood. Let us examine some of the steps taken in mechanization with various vegetable crops.

Hand thinning of vegetables was once a tedious and high-labor requiring job. Later, machine thinning was developed for many crops and now precision seeders may eliminate the thinning operation entirely. It would seem then, that instead of devoting out efforts to mechanical thinning equipment, we should go directly to the most advanced step–precision seeding.

Weed control has been one of the highest labor consuming operations in vegetable production. Hand weeding has been supplemented with or partly replaced by mechanical weeding. More recently, herbicides have taken over more and more of the operation. Since chemical weed control is presently the most advanced method, shouldn't we devote more attention to improving this method and to looking for new methods rather than trying to improve cultivators?

Harvest mechanization has brought about drastic changes in crop growing systems. Where late maturing, large-vined varieties were planted in wide-spaced rows and hand harvested several times, early maturing, dwarf varieties in close-spaced rows are grown for a single destructive harvest. Processing peas were the first important vegetable crop to complete this transition. The change took place so long ago that most of us cannot remember seeing tall-vined peas grown in wide rows to be hand harvested for canning. But this evolutionary change seems to be inevitable as we mechanized more and more crops. It is coming rapidly for pickling cucumbers and appears to be the direction we must go for tomatoes in the Eastern U.S. Many years of research and development effort in mechanizing production and harvesting of a crop can be saved if this inevitable evolutionary change is recognized.

Unfortunately our harvesters have sometimes been made to fit only the existing row spacing. In snap beans, experimental results have consistently shown that yields increase when rows are spaced approximately 9 to 12 inches apart when compared with 36-inch rows. In spite of this information, present harvesters can only be used on rows about 36 inches apart. The wide rows are vestiges of the necessity to fit the rows to the width of a horse for cultivation.

Closely related to the changes in row spacing and plant size is the evolution of harvesting methods. The usual stages proceed from hand harvesting, to mechanical aids for hand harvest (as conveyors), to destructive machine harvest following hand harvest, to a single destructive harvest. The most advanced stage is the single destructive machine harvest.

An evolutionary sequence is also involved in handling the harvested crop. In the early stages of machine harvesting, the crop is usually collected in some small container already in use. Sometimes the packing and sorting operations are an integral part of the harvester. In more advanced operations the crop is handled in bulk and transported to a central location for washing, grading, and packing or processing.

There is a need for an integrated approach to mechanization. If we understand the evolutionary steps, then search for presently available ideas, we can frequently mechanize a crop by putting the ideas together in sequence or in one machine. Varieties, fertilization, precision seeding, weed, insect, and disease control, plant spacing, scheduled plantings, irrigation, mechanical harvesting and mechanized postharvest handling must all be considered simultaneously if we are to be most efficient.