INTRODUCTION TO THE SYMPOSIUM

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During the past five years, mechanized growing and harvesting of certain fruit and vegetable crops made tremendous gains. Within the next five years several additional crops will probably be mechanized. The degree of mechanization varies with the area and with the crop. Factors such as climate, varieties, cultural practices, machine development, labor supply and whether the crop is grown for fresh market or processing, all have influenced the present status of mechanization.

Specialists working with both fruits and vegetables from Eastern and Western United States were invited to speak at the Symposium. Their interests as related to mechanization were in production, breeding, engineering and processing. They were asked to summarize and interpret the research findings in their specialties. Mechanization concepts, and principles of mechanization were discussed using crop examples. The impact and interactions of mechanization on the fruit and vegetable processing industry as to quality, economics, and sociology were also explored.

Dr. Roy Bainer, Dean of the College of Engineering at the Davis Campus of the University of California set the stage for the Symposium by outlining the history of the development of mechanization in agriculture.

Looking toward the future, projections by the speakers were that cultural practices will continue to change, becoming more efficient as new varieties and machines are developed. Rates of fertilization will advance as plant populations increase, but probably not at the same speed. Sprinkler irrigation will come into its own as the need for perfect seedling emergence and complete chemical weed control becomes apparent. Improved sprinkler systems will be developed, along with better selective herbicides. Chemical plant regulators will be used to control plant growth, fruit set, and ripening. Farm operations will become larger, and will require massive investments for sophisticated equipment. To handle this equipment, the skills of farm laborers will have to be raised as their numbers diminish.

MECHANIZATION IN AGRICULTURE

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The strong position of the United States in today's world is largely due to a prospering mechanized agricultural industry-an industry that produces the nation's food and fiber in abundance with around 6 per cent of the nation's working force on the production line. The millions released from producing the necessities of life are freed to other industries, services and professions, thereby contributing to America's remarkable industrial expansion and the prevailing high standard of living.

Progress in agricultural mechanization during the past 60 years is unparalleled. It has no been matched in our history or in any other major area. McKibben suggest that the rapid evolution in mechanization in the United States is the "result of a combination of favorable circumstances-a combination unique in the World's history and one which probably will not appear again." He lists 26 elements of this combination. Included are such factors as: a stable and equitable government; a system of free enterprise; a rapidly increasing population occupying new land; a surplus of clear level land well suited to mechanization; a shortage or infrequent surplus of agricultural labor; a rapidly expanding and effective industrial development; an abundance of natural resources; and a remarkable development of transportation facilities.

California has been one of the leading contributors to agricultural mechanization. This has been due to many high labor input crops produced in the state and a general shortage of dependable labor to meet peak demands. Furthermore, transportation charges to markets, which are 2 to 3,000 miles away, have gradually increased over the years. Anything that was done to reduce production costs assisted in maintaining a competitive position with other producing areas.

To meet peak labor demands in the past, it was necessary to import labor. Many of the Chinese brought in following the gold rush to build the transcontinental railroad found employment in agriculture when the railroad was completed. Laborers from the Philippines came to work in the fruit, lettuce and asparagus fields. Nationals from Mexico were used for general field work, including the thinning of sugar beets and harvesting of beets and tomatoes. American Indians were brought in from the southwest reservations during World War II to harvest sugar beets. On the other hand, only a relatively few of the negroes who came in from the South to work in the shipyards accepted employment in agricultural production following the war.

Over the past 50 years, the University of California has developed an outstanding agricultural research staff on the Davis campus to assist in the solving of many problems facing California agriculture. Much of the success of this group is the result of an interdisciplinary approach to problem solving. As a typical example, agricultural engineering has had cooperative projects with practically every department from agronomy to zoology. Furthermore, many of the commodity groups have given financial assistance for research in their areas.

Following World War II an inventory was taken by the Department of Agricultural Engineering of the progress to date in agricultural mechanization. By that time, the production of cereal crops, forage crops, sugar beets and cotton was well on the way toward complete mechanization. It was immediately evident that if engineering was to continue in its important role in rounding out the total picture, research work had to be initiated involving the mechanization of vegetable, vine and tree crops. As a consequence, certain crops, because of their relative importance, were selected for study. In the vegetable area, asparagus, lettuce and tomatoes were considered. Under the vine classification, attention was directed toward raisin and wine grapes. Prunes, olives, peaches and walnuts were selected for the initial studies on tree crops. In all cases the engineers were joined by plant scientists in the various areas. In situations involving processing, the food scientist participated in the program. Later, projects were initiated involving citrus harvesting, forced air cooling of fresh fruit, electronic color sorting, and packing houses.

One of the most significant events in the history of agricultural mechanization occurred in California in the summer of 1854. In that year, the Moore-Haskell combined harvester-thresher was transported