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PROGRESS REPORT - FARM MACHINERY AND MECHANIZATION

A commercial fresh-market cabbage harvester was evaluated in a test at Columbia in cooperation with the manufacturer, a local farmer, Extension Horticultural Specialists, and research personnel in the BAE Department. Results indicated that the machine is functionally capable of performing its intended job of cutting, elevating, and loading cabbage into a bulk conveyance. Labor requirements for harvesting may be reducible by as much as 50% by use of the machine. Problems center around lack of uniformity of head size and development, which translates into considerable yield reduction when once-over harvesting is practiced, thus making the mechanization of this operation of dubious economic practicality under existing circumstances. Improvements are needed in production practices which will insure uniform head size at harvest; otherwise selective hand harvest will almost necessarily precede once-over mechanical harvest in order to realize a profitable yield. The latter alternative does little to alleviate dependence on manual labor.

Extension agents in the Albemarle Sound region indicated that growers of fresh-market cucumbers were in dire need of a mechanical harvester for their crop, due to dwindling labor supplies. Work was initiated in the fall of 1970 to determine if the multipick cucumber harvester for pickling cucumbers being developed in the Biological and Agricultural Engineering Department at N. C. State University would harvest fresh-market cucumbers, which are much larger than pickling types and generally grow on larger vines. Harvesting tests were only partially successful. Elevators and other components of the harvester, designed for the smaller pickling cucumbers, were not large enough to accommodate the large "slicer" type. The throat of the machine was not large enough for the bigger vines encountered. The machine was designed to pick cucumbers before they reach a large size, and slicer types are not marketable until they reach a rather large size; therefore too many undersized cucumbers were picked. With appropriate modifications, however, the multipick can probably be adapted to pick fresh-market cucumbers satisfactorily.

Western North Carolina tomato growers are calling for mechanization as a result of dwindling labor supplies and "scaling up" operations on the part of many growers to increase income. Home-made harvesting aids have been rigged up by several growers with the help of Extension agents, and some commercial equipment is being adapted for use. However, Extension agents have requested assistance in developing plans for a multifunctional (harvesting, spraying, suckering, tying) machine which could be built locally and which would more precisely satisfy the requirements than anything now in use. Such a project was undertaken by Extension BAE in 1970-71, and a prototype machine is being built and tested. Once perfected, plans will be developed and made available for building the harvesting aid in local machine shops or home workshops. With this machine, 3 people (any or all of which may be youth) can harvest up to an acre and a half of tomatoes in a 10-hour day. Drudgery will be eliminated, and better utilization of the available land will be possible by eliminating "tractor skip rows" currently necessary in many fields.

Land preparation and tillage operations for many field crops grown in eastern North Carolina are costly, time-consuming, and may be creating adverse growing conditions through excessive sub-soil compaction. In addition, conventionally plowed fields are susceptible to wind erosion in the spring, and blowing sand can damage young crops such as cotton. Alternative land preparation practices are under investigation which will reduce the number of trips across the field, move some of the work load from spring to fall to alleviate the spring bottleneck, and help control wind erosion and crop damage from "sandblast". Previous work of this type with cotton on private farms has been expanded to include corn and peanuts in a 3-year rotation, several different tillage schemes such as fall bedding and no-tillage planting with and without subsoiling, and rotary tillage in the row area only. A conventional-tillage check is included in a randomized and replicated test at the Peanut Belt Research Station at Lewiston. Soils, Agronomy, and BAE Extension specialists are involved in the project.

Mechanical blueberry harvesting is becoming a reality in North Carolina, and the problems and uncertainties associated therewith are causing growers concern. Little is known about the efficiency or effectiveness of these harvesters in terms of their capacity, harvesting losses, fruit quality, bush damage, or the costs of harvesting and packing mechanically as opposed to hand harvesting. Since hand labor is becoming unavailable, however, the trend to mechanical harvesting is expected to accelerate dramatically in the next few years, and more information is needed to enable growers to manage the harvesting and marketing of blueberries efficiently under this new and unfamiliar set of circumstances.

A cooperative effort was undertaken in 197. to get information on many aspects of mechanical blueberry harvesting in North Carolina. Both Extension and Research personnel from several departments on campus, county Extension personnel and several growers cooperated to collect as much information as possible on 5 leased harvesters operating on some 500 acres of blueberries in Bladen County. All phases of harvesting, cleaning, and packing were studied, and an analysis is being made to provide management assistance to growers who are caught up in this rapid transition from hand to mechanized harvesting.

(Note: The crash program undertaken with blueberries to deal with de facto mechanization and its attendant problems portends the need to look ahead to other such situations which will occur with different commodities as hand labor suddenly becomes inadequate. Similar efforts to gather information and formulate recommendations pertinent to a proper approach to mechanization of these crops should be undertaken in advance of the change, while it can be done in an orderly and efficient fashion. Such is the philosophy behind the cabbage harvester and cucumber harvester work being done currently by this department in cooperation with Horticulture. More effort of this type is needed.)

Other Extension activities include: (1) Providing leadership and support for assigned 4-H projects and activities, including Tractor and Small Engines, Bicycle, and Safety; (2) Holding various county, district, and area meetings as required; (3) Coordinating departmental participation in Robeson County Farm Trade Show; (4) Supplying articles and presentations for the mass media; (5) Furnishing consultation and assistance to other specialists, county extension personnel, farmers, grower associations, and private industry as requested.

Committee work, meetings attended and papers presented, publications and articles prepared are listed on the attached sheet.

Committees Served On:

(1) PM-48 Fruit and Vegetable Harvesting Committee, ASAE

(2) Safety Committee, School of Engineering

(3) Program Committee, American Peanut Research and Education Association

Meetings Attended and Papers Presented:

(1) American Peanut Research and Education Association, San Antonio, Texas, July 1970. Paper presented: "Field Losses of Peanuts in North Carolina", Published in Proceedings APREA Vol. 2, No. 1.

(2) Southeastern Cotton Workshop, Tifton, Ga., October 1970. Paper presented: "Minimum Tillage Practices for Cotton".

(3) Southeast Region ASAE - ASAS - Southern Agricultural Workers, Jacksonville, Fla., February 1971. Paper presented (with E. G. Humphries and J. R. Hammerle): "Vegetable Crops Mechanization at North Carolina State".

Publications Prepared:

(1) "Increasing the Efficiency of Field Machinery", Extension Folder 294, February 1971.

(2) "Planning for Profit", Extension Circular Series No's. 518-528.

(3) Cotton Production Guide, April 1971.

Articles Prepared:

(1) "Peanut Inverters Come of Age", Virginia-Carolina Peanut News, Fall 1970.

(2) "Understand Land Preparation Objectives, Follow Procedures", The Peanut Farmer, March 1971.