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*Labor and wage (price)*

*North Carolina*

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# Tobacco Harvesting



*a  
need  
for  
mechanization*

DEPARTMENT OF AGRICULTURAL ENGINEERING  
N. C. AGRICULTURAL EXPERIMENT STATION

# THE NEED FOR TOBACCO HARVESTING MECHANIZATION

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## INTRODUCTION

The production of tobacco is perhaps the most laborious farm task in the Southeast today. Harvesting alone requires as much or more labor than any other operation in the production of tobacco, yet it is the only operation in which some progress has not been made in labor reduction and work simplification. This paper outlines in some detail the problem that exists and the solution.

## THE SITUATION

### High Gross Income

Tobacco is an important cash crop in the Southeast. It is most important in North Carolina where in 1949, 61 per cent or approximately \$487,000,000 of the total cash farm income comes from tobacco. In some of the counties it amounts to as much as 90 per cent of the total income. Its importance can be emphasized by the statement that "The cash value of our 1949 tobacco crop was equal to that of the cattle industry in Texas, three times the value of the citrus fruit crop of Florida and California, equal to the wheat crop in Kansas and five times the value of the potato crop in Maine." (1)

Chart I shows the percentage of the total farm income and land used for the four top ranking crops in North Carolina. It will be noted that tobacco which contributed 51 per cent of the total gross income for the state was produced on only 8 per cent of the farm land. This further emphasizes the high acre value of this particular crop and its importance to the south.

### Acknowledgement:

The assistance of H. Brooks James, Head, Dept. Agricultural Economics, and Robert W. Wilson, Assistant Professor of Agricultural Engineering, N. C. State College, in the preparation of this treatise is acknowledged.

# PERCENTAGE OF TOTAL NORTH CAROLINA CASH INCOME AND LAND USED FOR PRINCIPAL CROPS IN 1949

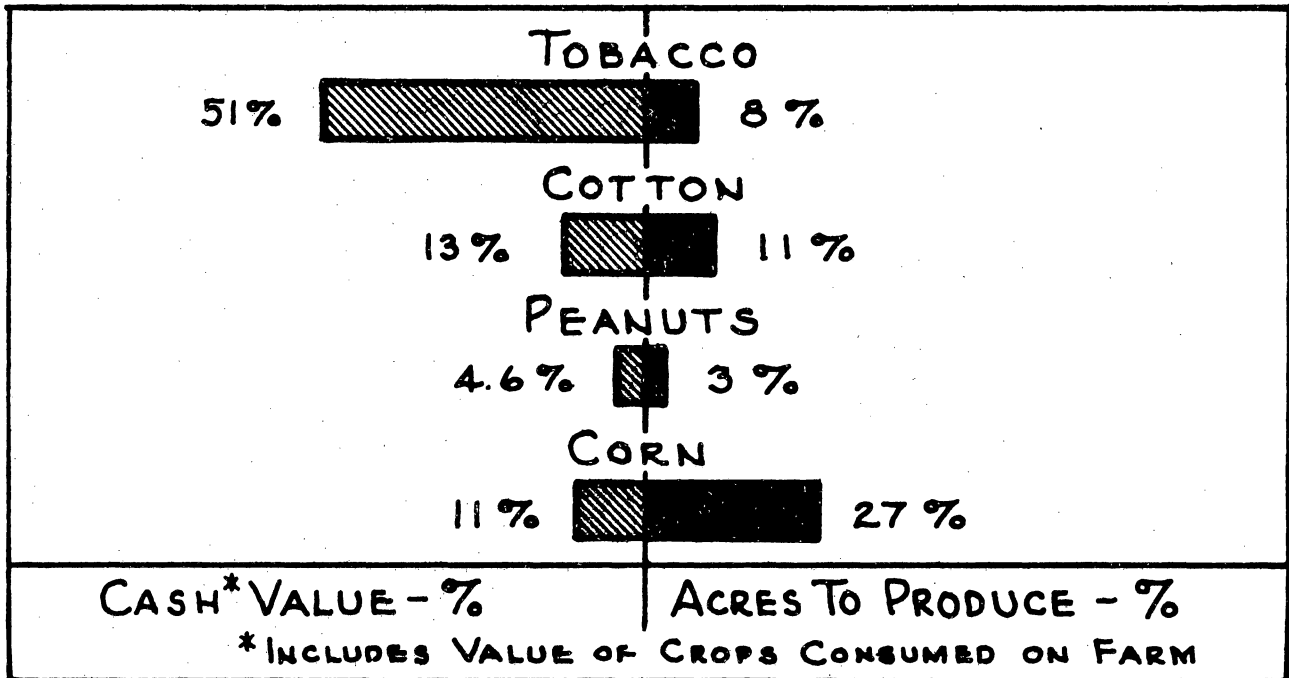
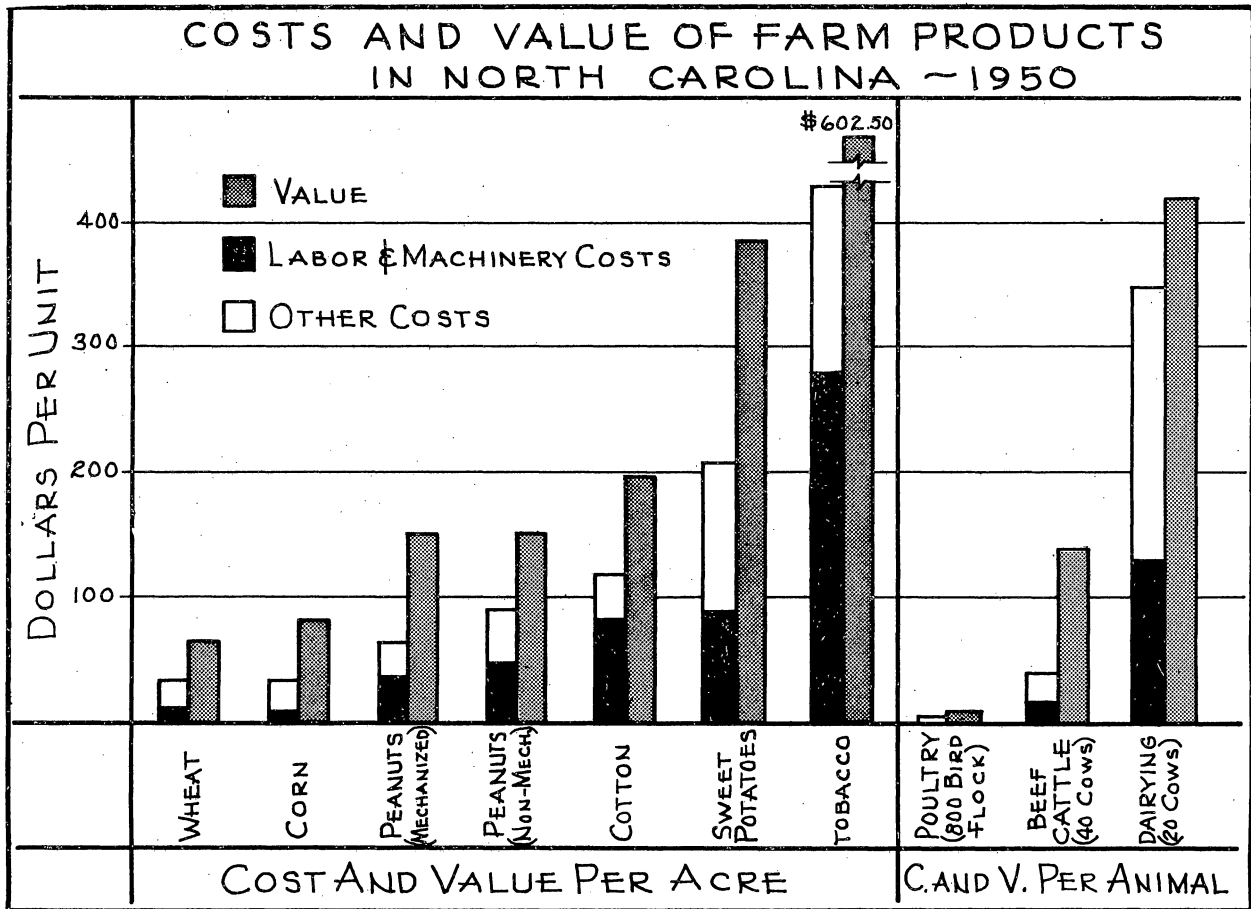


Chart I

## High Production Cost

Although the gross income from tobacco is high, the net return is discouraging due to excessive production costs. Chart 2 shows that the production cost of around \$430 per acre is higher than that for any other field crop or animal product in North Carolina. If the labor and machinery costs for producing tobacco (\$280/acre) can be reduced to a reasonable figure, comparable to say cotton or peanuts, approximately \$130/acre per year should be saved. This is a total annual saving of more than \$80,000,000 for the state. Thus, one of our greatest opportunities for increasing the net income of the Southern farmer is to lower the labor and machinery costs for producing tobacco.

Chart 2 also shows what was accomplished in peanut production through mechanization. The net return per acre for peanuts produced with partial mechanization was \$87.93 as against \$61.19 with no mechanization.



From: Cost of Producing Farm Products  
 P.E. Information Series No. 29  
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Chart 2

Chart 3 shows another example of lower cost of production through mechanization. It is the result of a study made in the Tidewater Area of North Carolina in 1949. "Tractor power was more economical than mule power for all except the smallest farms in this study. In addition, mechanization (1) almost doubled the output per worker, (2) freed for other purposes land that had been used to support workstock, (3) improved the timeliness of farm operations and (4) made power available for general farm use." (2) The use of tractor power on tobacco will make possible more acres and hours of annual use for the tractor, and will result in lower operating costs for the farmer.

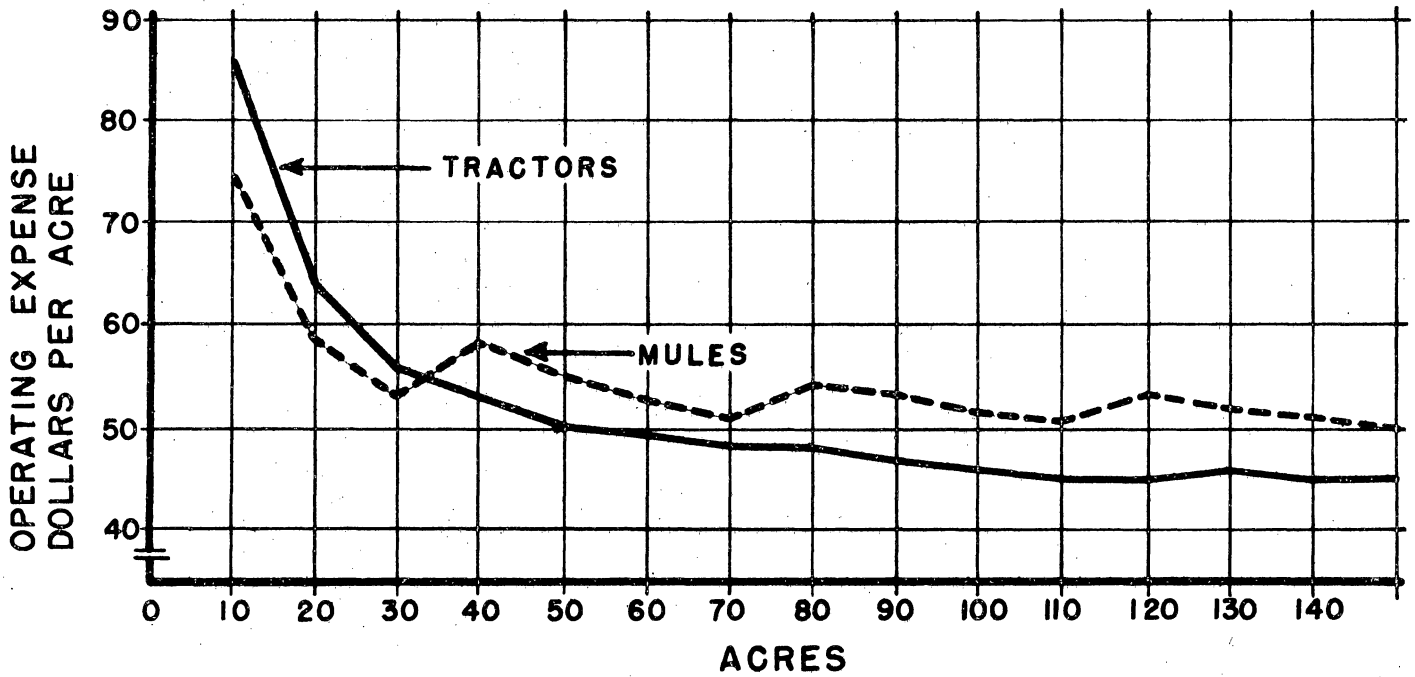


Chart 3

Small Fields

Typical of so many southern crops, the acreage of tobacco per farm is low. Chart 4 shows that in 1939, 66 per cent of our total acreage was produced on farms with less than six acres of tobacco per farm. This, as in many of our other crops, poses a difficult but not insurmountable problem for economical and practical mechanization. Some increase in the acreage per farm may be expected with mechanization; however, the problem of developing equipment suited to relatively small fields will exist with this particular crop.



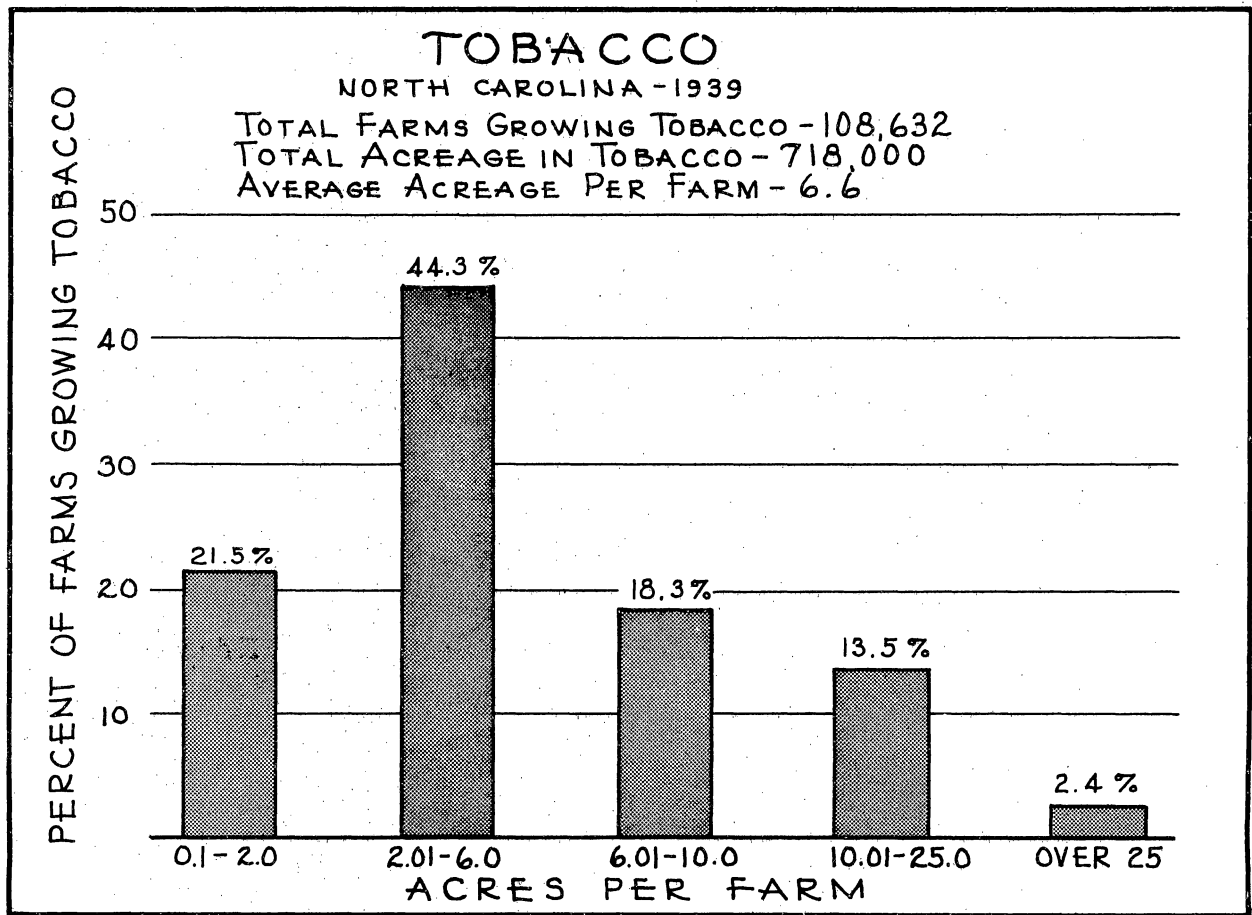


Chart 4

### High Labor Requirements

The production of tobacco requires more labor per acre than any other major field crop or livestock enterprise in the Southeast. Chart No. 5 shows this in relation to cotton, sweet potatoes, peanuts, corn and wheat, poultry, beef cattle, and dairying.

The following is an itemized list of hand operations that are now being used to harvest, cure, grade and market the crop:

#### HARVESTING

1. Pull leaves and place under arm.
2. Carry arm load to sled and place in sled.
3. Pull loaded sled to looping location and place tobacco by hand from sled to table.
4. Two workers hand one looper three or four leaves at a time.
5. Loopers loop hands on stick.
6. Stick is placed in pile or on rack.
7. Sticks are carried to barn and handed to men in barn.
8. Two men in barn receive sticks and place.

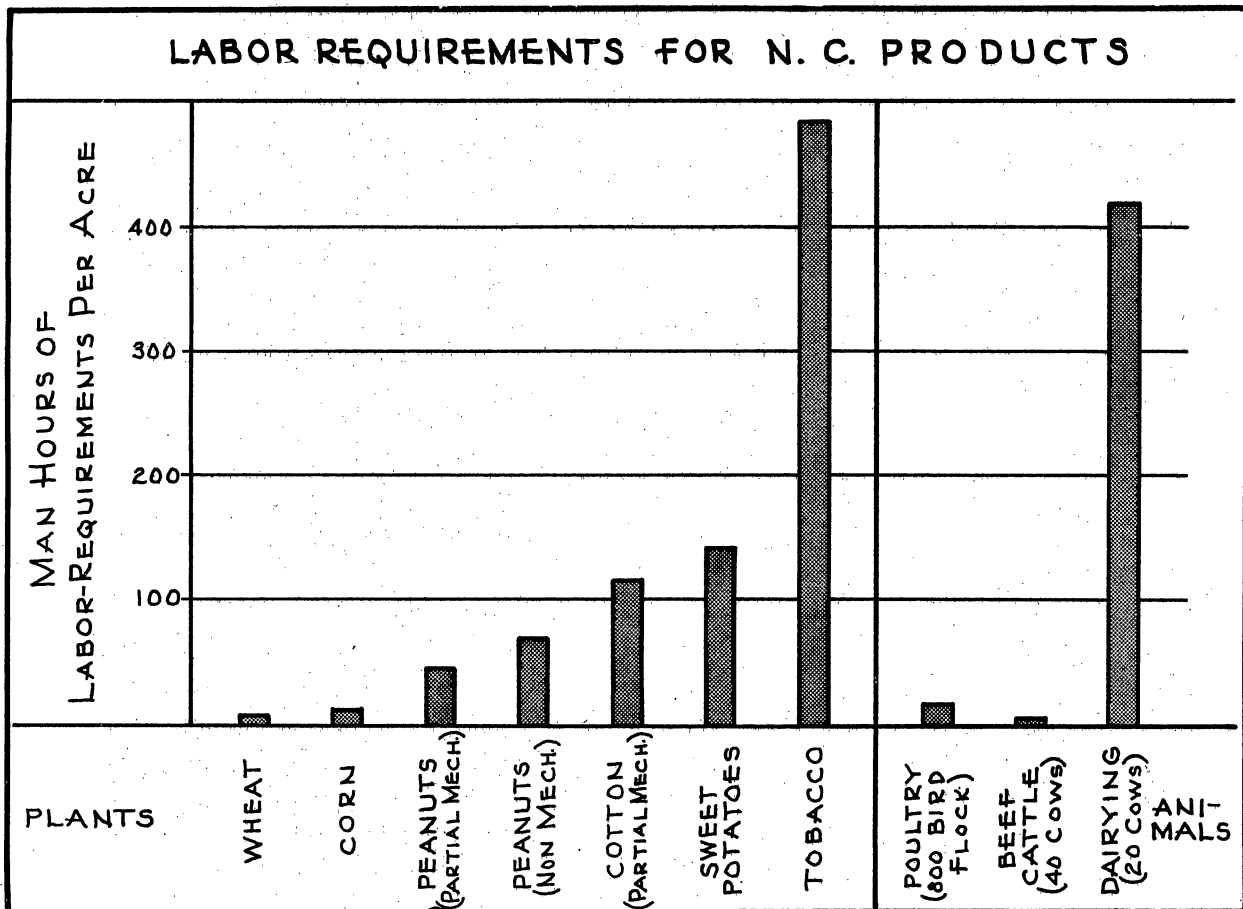
### REMOVING FROM BARN AND PACKING

1. Two men in barn remove sticks.
2. Two men receive sticks and place on truck.
3. Truck to pack house and unload sticks. (3 handlings).
4. Repacking (3 handlings).

### GRADING

1. Sticks removed to ordering pit.
2. From ordering room to grading room.
3. Leaves removed from sticks.
4. Leaves separated into grades.
5. Leaves tied into hands.
6. Hands packed.
7. Hands loaded on truck and taken to market.
8. Hands unloaded at warehouse and packed on basket.

From the above it is estimated that there would be a total of about 240,000 leaf handlings plus about 29,000 stick handlings of tobacco per acre (assuming 120,000 leaves per acre, 80 leaves per stick, and that one would handle an average of 2 leaves each time). From this, one can better appreciate the disagreeable and time consuming job of producing tobacco and can better understand why hand labor is listed as one of the chief objections to farming as a profession.



From: Cost of Producing Farm Products  
A. E. Information Series No. 29  
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Chart 5



Peak Labor Demand

Chart 6 shows how the labor required for tobacco production is distributed throughout the year. It will be noted that July and August are peak months and thus require a high concentration of labor. This fact causes many farmers to carry excess labor throughout the year providing housing and minimum employment during the slack season. This, more than any other one cause, prevents the full acceptance of approved mechanization practices for this and other crops.

It will be noted from Chart 6 that harvesting (barning) accounts for much of the labor during the peak months and also is one of the largest single items. Out of the total 480 man hours required, approximately 165 is attributed to harvesting. Our greatest need is to reduce this to a more reasonable figure.

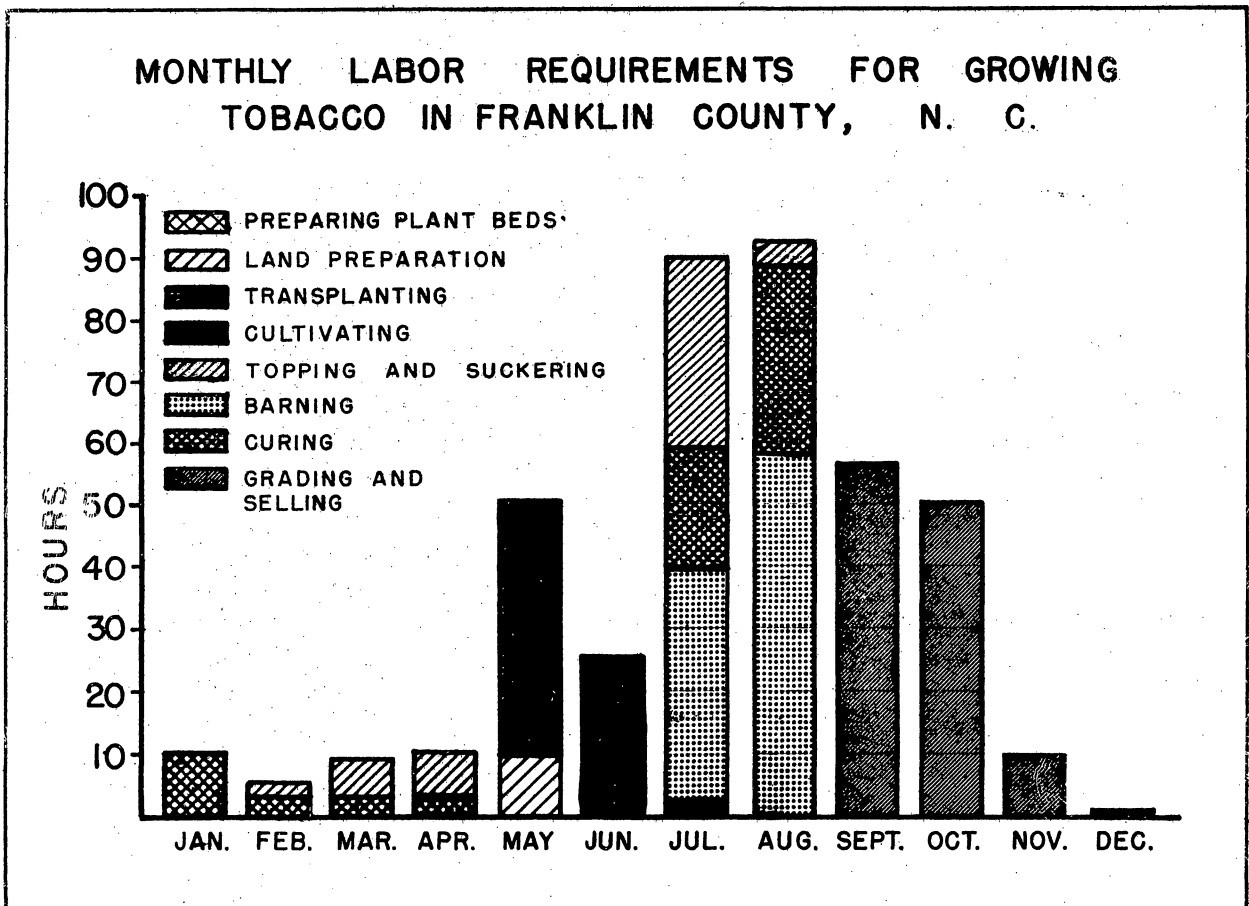
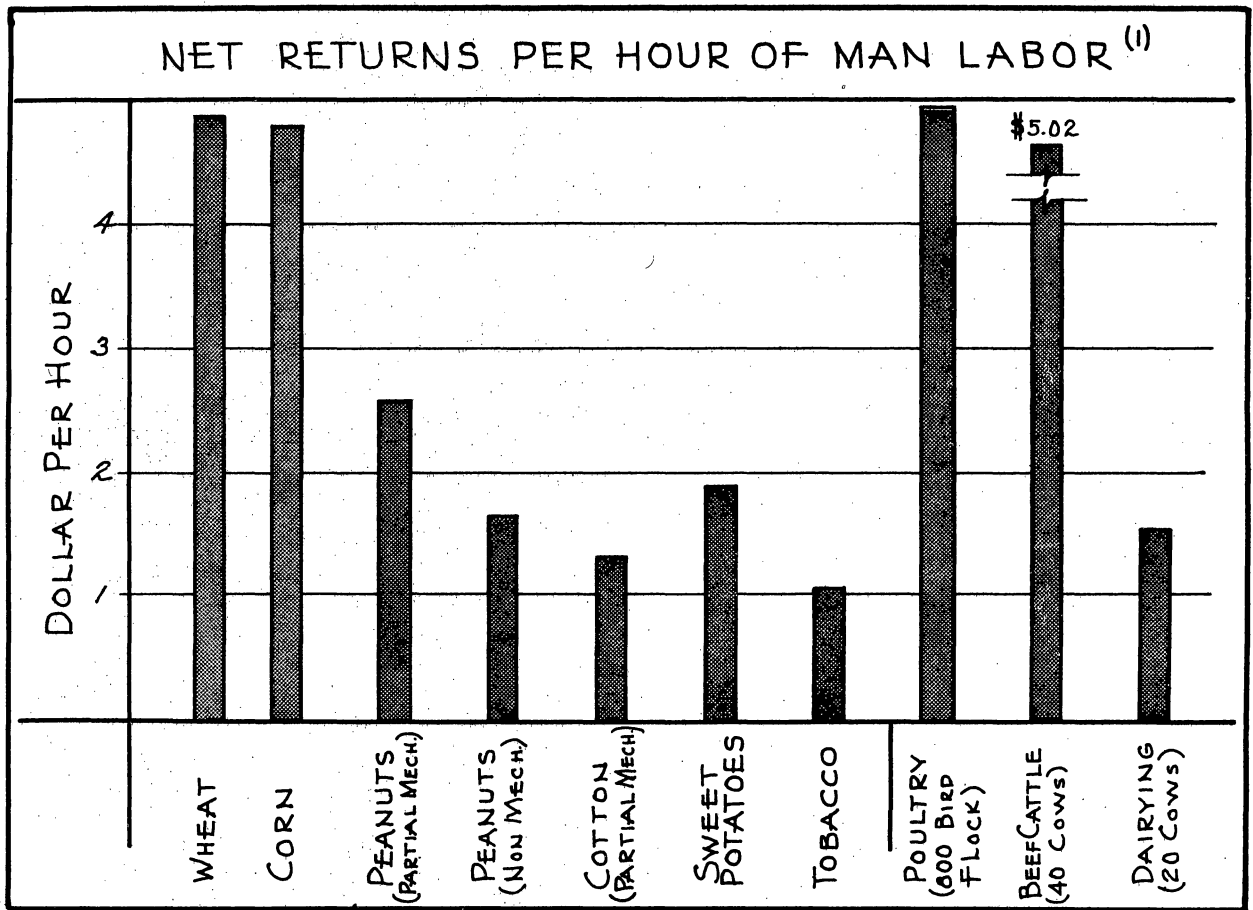


Chart 6

Low Hourly Wage

As previously mentioned, the high gross income figure is very misleading. In reality, one's true income is determined by the net return (difference between gross income and cost of production) and the time required to produce the product. For example, if the gross income is low, the cost to produce high and the time required high, the return to labor will be low. Chart 7 shows that the net returns per hour of man labor for tobacco is lower than any of our crops and animal products. It will be noted in particular that the hourly returns are in proportion to the degree of mechanization. The crops that can be produced with few hours of man labor returns more dollars per hour of time spent.



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(1) Represents returns over direct cash costs with no charge for land, management, or capital.

Chart 7

If the South is to retain its production of flue-cured tobacco, it is necessary that greater returns be made possible so that competition from high hourly return crops and off-farm enterprises can be met. Off-farm enterprises may well be used to supplement rather than compete with tobacco production, thus making possible an even higher standard of living for our people. It should also be mentioned here that many foreign countries, such as Africa, South America, India, and China are all potential tobacco producing countries and with their plentiful supply of cheap labor may well supply the needs of the world.

### THE SOLUTION

To increase the net returns, to increase the hourly wage, to make production of tobacco more attractive for the farm family and to satisfactorily meet competition, the development of labor reducing technology is essential. To accomplish this, research should be carried out on all phases of production, but in particular, harvesting; for not only is it a high labor consumer, but it is also the bottleneck to satisfactory acceptance of mechanization in other phases of tobacco production and to the advancement in mechanizing other crops and products grown or recommended in combination with tobacco.

Progress in developing improved tools and methods is being made in most phases of tobacco production with the exception of harvesting. For example, the labor requirement and cost for cultivation has been reduced by the development and adaptation of the rotary hoe to tobacco. Approximately twelve man hours of labor per acre can be saved by this new tool and method. Also the development of a tool together with a control liquid for topping and suckering tobacco has promise of reducing the labor requirement by approximately 25 man hours per acre. The present practice is by hand, usually requiring three trip through the field. Similar progress can be made in harvesting. Although similar accomplish-



The laborious unpleasant task of topping and suckering tobacco (left) may be improved by the use of mineral oil emulsion and an applicator called the "Clip-Oil" (below). This newly developed tool and procedure will do the job in one operation and will reduce the cost over the present practice by at least \$10 per acre. Similar advancement can be made in harvesting.





Most common cultivation practice for tobacco uses mule powered cultivators and hand hoes (left above). Advanced practice utilize the tractor and rotary hoe (right above). This newly adapted tool and procedure when used on the first two cultivations will reduce labor requirement by 12 man hours and cost by at least \$10.00 per acre. Tractor power and tools have been made practical for all tobacco production operations except insecticide control and harvesting.

ments would only be steps towards full realization of our aims, they nevertheless serve to provide directional progress and some immediate relief to the tobacco farmer. The labor situation is so acute in some instances that help should be provided at once.

It should be pointed out that more fundamental research than the short range approach suggested above will, in the long run, provide a storehouse of knowledge as a foundation for our greatest advancement. The research for this long range approach should be carried out on harvesting, curing, grading, and marketing and should be well integrated. This is justified when one recognizes that curing methods and procedures influence the harvesting and the grading. For example, the curing process determines the quantity, the degree of ripeness of leaf, and the manner in which the leaf is handled and presented for curing. It is conceivable that a curing process may be devised whereby more of the leaves can be harvested and handled at the same time. In somewhat similar manner, the curing process determines the extent of grading and the manner in which the leaf is handled for grading. It is conceivable that knowing what leaf to prime and what curing environment is required that fewer grades will emerge from the curing process thus simplifying the grading and marketing and making possible improvements in practice.

Fundamental curing research is presently being carried out in a satisfactory manner, and it remains for equal emphasis to be placed on the harvesting and mechanical handling phases. This will provide the knowledge of how to effectively handle the leaf from the field plant to the market floor and will insure complete fruitfulness of all joint efforts.

In the carrying out of this research work all equipment would need to be adapted to the skill of the farm operator and the typical small tobacco field of



irregular shape. As improved equipment and methods are developed an educational follow-up should aim at improving the skill of the operator and the shape and size of field, thus making it possible for continued and greater progress in mechanization.

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