UNIVERSITY OF TENNESSEE

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Upon the request of the Committee on Graduate Study the undersigned have examined a thesis entitled

A PRELIMINARY STUDY OF THE COOPERATIVE MARKETING OF TENNESSEE SWEET POTATOES

presented by BRODER FREDERICK LUCAS,

candidate for the degree of Master of Science in Agriculture, and hereby certify that it is worthy of acceptance.

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Date Aug. 7, 1930

A PRELIMINARY STUDY OF THE COOPERATIVE MARKETING OF TENNESSEE SWEET POTATOES

A THESIS

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of the

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in

Partial Fulfillment of the Requirements

for the degree of

Master of Science in Agriculture

BRODER FREDERICK LUCAS

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PREFACE

The material herein presented has been collected and arranged in such order as appeared most suitable for future use, under the direction of the Department of Agricultural Economics in the College of Agriculture of the University of Tennessee. Its purpose is to relate research already done by others to findings made in the course of this study in such a manner as to form the groundwork for more detailed investigation of the cooperative marketing of Tennessee sweet potatoes.

In the collection of data and in suggestions for conducting investigation and setting forth results, Professor C. E. Allred, Head of the Department, has given valuable aid at the cost of much time and effort. Similar assistance, together with the detailed assembly of information constituting Chapter III, has been rendered by S. W. Atkins, Assistant Economist in the Department. Painstaking care in constructing tables, charts, and maps, in the mounting of illustrations, and in final preparation of the manuscript is the contribution of Miss Mildred Gallaher. Without the support of these members of the Department, the completion of this investigation in its present form would have been wholly impossible. Grateful acknowledgement of their assistance is hereby accorded.

Thanks are likewise due the many growers, managers of cooperatives, country shippers, business men, city receivers, proprietors of public eating places, county agents, marketing experts, and officials of railways who extended courtesy in answering questionnaires and requests for information, and in giving interviews.

Broder F. Lucas

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INTRODUCTION

Need for the Study

During the past few years, there has been an increasing volume of complaint from the producers of sweet potatoes over the low prices received and the general unsatisfactory state of the industry. This unhealthful condition has been reflected in diminished activity among Tennessee's cooperative sweet potato marketing associations; and, taken with the general lack of system in the whole process of conveying this commodity from producer to consumer, and with the conspicuous lack of data on this process, the marketing of sweet potatoes now offers a fertile field for productive research.

Purview of the Study

The essentials of growing, fertilizing, storage, grading, packing, and other necessary operations have already been dealt with in detail by numerous writers, in publications which are available to all interested. It is, therefore, the policy in this study to refer to these matters in brief form, taking up more fully those phases in which the findings herein presented may serve to supplement previous work by others, and also those phases in which the new data conflict with former findings. Thus it is seen that effort herein is chiefly directed at a clear presentation of original findings resultant from study of the sweet potato industry of the United States, and particularly of Tennessee, and at the formulation of a sound program for advancing the cooperative organization of the sweet potato industry, based upon these findings.

An idea of the phases here taken up may be gained by perusal of the chapter headings. Many aspects worthy of careful investigation, which it has not been possible to cover here, remain. A review of these occurs in the concluding chapter of this study, and should offer suggestions of interest to those who are interested in the sweet potato enterprise, and who may wish to project this research further.

Sources of Material

Mr. John B. Shepard, Senior Agricultural Statistician connected with the Outlook Reports of the Bureau of Agricultural Economics at Washington, when approached regarding more adequate information upon the sweet potato industry, said that the Bureau had less information available upon sweet potatoes than upon any other important crop, and that they regarded information from both their own (Outlook) and census figures with some doubt, since conflicts in data between them were frequent. It is important that this situation be improved if an adequate picture of the industry is to be gained.

Facing this situation of inadequate, and in some cases possibly inaccurate, data, it has been attempted to gather as comprehensive information as could be commandeered, with the hope of bringing the light of truth to bear upon the situation. A list of the general sources from which data has been collected appears below. Reference to particular sources of information will be made from time to time.

Sources of Data

1. Standard works dealing with the sweet potato and with marketing.
2. United States Census Reports.
3. Yearbooks, statistical bulletins, and other publications of the United States Department of Agriculture.

4. Daily, weekly, and monthly reports and summaries of production, shipments, and markets, issued by the United States Department of Agriculture and the Bureau of Railway Economics.

5. Publications of many agricultural colleges and experiment stations.

6. Questionnaires sent to growers, shippers, and cooperative associations in the commercial sweet potato production areas of Tennessee, and to receivers of sweet potatoes on large terminal markets in many parts of the United States and Canada.

7. Correspondence with those to whom questionnaires were sent, and with experts in the marketing service at Boston, Providence, Richmond, and Atlanta; also with specialists at the experiment stations in nearly all states producing sweet potatoes, as well as in the Department of Agriculture of Canada.

8. Personal interviews at the local offices of the Southern and Louisville and Nashville Railways, upon rates and other matters.

9. Rate quotations and other information from 27 railways and steamship companies.

10. Personal interviews with farmers, wholesalers, and retailers upon the Knoxville and Chattanooga public markets.

11. Personal interviews at 34 hotels, restaurants, cafeterias, and boarding houses in Knoxville.

12. A field trip of 800 miles through southern East Tennessee and eastern Middle Tennessee, in the course of which officials of 17 sweet potato cooperative marketing associations, and a large number of growers, dealers, and local business men, were interviewed.

A PRELIMINARY STUDY OF THE

COOPERATIVE MARKETING OF TENNESSEE SWEET POTATOES

PART I. PRODUCTION

CHAPTER I

FUNDAMENTAL CONSIDERATIONS IN THE PRODUCTION OF SWEET POTATOES FOR THE MARKET

1. Taxonomy.
2. History.
3. Geography
4. Climati and Soil.
5. Growing.
6. Storage.
7. Varieties.
8. Fertilizer.
9. Diseases.

1. Taxonomy

The sweet potato (Ipomoea Batatas) belongs to the morning glory family (Convolualaceae). (1, Waite, in Cyclopedia of American Agriculture, p. 613.) There are over four hundred species of Ipomoea, but the sweet potato is the only one that produces edible roots, though others have roots of medicinal value. (2, Jones and Roos, Sweet Potato Culture, p. 7.) It is a tuberous-rooted perennial. The stems are slender, usually creeping, but in some varieties bushy, and are milky, as are the roots.

The "potato" of Shakespeare was what we now know as the sweet potato. (3, Fitz, Sweet Potato Culture, p. 7.) The name "potato" was later applied to the Irish potato. Sweet and Irish potatoes are not of the same botanical family, the application of similar names coming from a resemblance in appearance. The sweet potato is an enlarged root, while the Irish potato is an enlarged underground stem. (4, Fraser, in Cyclopedia of American Agriculture, p. 520.)

Another unfortunate confusion of names arises when the term "yam" is applied, as it commonly is, to the moist-fleshed varieties of sweet potatoes. The true yam belongs to the genus Dioscorea, a very different plant, (5, Hand

and Cockerham, The Sweet Potato, p. 6.), several species of which have trailing stems and enlarged underground tubers, some being edible.

2. History

It is not certainly known in what region the sweet potato originated. Many authorities incline to the idea that it is a native of tropical America, while some consider it native to the tropics of both hemispheres. At all events, it was under cultivation by the natives in both Americas when the white man came; and there is evidence that it was cultivated in China for centuries before that time. The early peoples of the Pacific distributed it widely through their warmer regions. It was apparently introduced into Europe from America, by the Spanish, long before the Irish potato invaded that continent. However, the sweet potato did not find strong favor in Europe and was not successful in establishing itself firmly in the diet there as it did in America, where it has been a staple food in the South from the early days of the colonies. Its common use in the North came gradually, as transportation and distribution facilities became available, and is by no means yet completely developed, a factor offering a valuable opportunity to the southern producer.

3. Geography

The sweet potato is now grown over a wide portion of the world, in tropical, sub-tropical, and some temperate regions, including Africa, India, Japan, Malaya, Hawaii, the Phillipines and other Pacific Islands, the West Indies, tropical America, and southern United States. In all of these regions it is of considerable importance as a food crop, but it is in the United States that it reaches its greatest commercial importance. Its minor importance in Europe is conspicuous, since there are extensive areas in the Medi-

terranean region which would appear to be adapted to its cultivation.

4. Climate and Soil

While the sweet potato may be grown for home use under widely varying climatic conditions and on many soil types, the fact remains that it is a warm climate crop and is not grown even in garden patches in the northernmost states of the United States or in Canada. The consensus of opinion among authorities appears to be that the length of growing season necessary for the crop to attain normal maturity is four months to 135 days, with plenty of sunshine and warm nights. It thrives best upon a warm, loose soil of sand or loam with a clay subsoil. It is drought-resistant but extremely sensitive to frost, and is retarded in growth where nights are cool.

5. Growing

Cultural considerations - The sweet potato is an easy crop to grow and fair yields can be obtained over a wide area with little effort, especially in southeastern and south central United States, if the season is favorable. In fact, this very characteristic has encouraged laxity in preparation of the soil and cultivation of the crop in those sections where it is grown largely for home consumption. On wornout cotton lands and poor soils which give low yields of other crops, good crops of the sweet potato can often be grown, especially where such soil-building practices as the use of legumes are judiciously followed. It fits conveniently into the farming system; and rotations including it are easily adapted to conditions throughout the greater part of its range; from Florida, where it often constitutes one of three crops grown annually upon the same soil, to the northern producing sections, where only one crop each year can be grown.

In Tennessee, the length of the growing season is not sufficient to

permit the setting of sweet potatoes after another crop has been harvested and insure their reaching full maturity. In some parts of the state this tends to restrict sweet potato acreage. An example of such a condition is found in Franklin County, near Belvidere, Winchester, and Decherd, where early Irish potatoes are an important crop. Sweet potatoes cannot successfully be grown after the Irish potatoes are harvested. The growers there prefer to grow early Irish potatoes because of the quicker returns and because they can thus double crop, following the Irish potatoes with crops which will reach maturity before autumn frosts.

Considering the ease with which sweet potatoes are produced for home consumption throughout the South and the border states, it seems probable that the commercial area could be readily expanded if demand could be so increased as to raise prices to a level which would repay growers for the extra effort and expense involved in producing and marketing the quality of product which the consumer demands. Where sweet potatoes are grown commercially, greater care is usually exercised in using disease-free seed, seed beds, and storages; and in grading, packing, and handling the product. It is also usual to find more fertilizer used; and storage houses involving a considerable investment are essential to the proper curing and safe preservation of the crop, except where marketing "green" (or uncured) is the general practice.

Bedding - Seed is usually bedded after danger of frost is past, though in the northern producing regions where the season is short beds are often protected by glass or canvas, or are artificially heated by the use of manure, flues, or steam or hot-water pipes (see Fig. 1). The date of bedding varies with location; in Tennessee it is usual to bed in late March or early April. Opinions of growers differ as to the best size of sweet potato to bed for seed, but it is customary to use small to medium-sized tubers for this pur-

pose.

Propagation - Two common methods of propagation are found: (1) The plants resulting from the sprouting of tubers in the seed bed are drawn and set. (2) Vine cuttings are taken from the growing plants obtained by the first method, three, four, or more weeks after they have been set (6, Thompson, Sweet Potato Production and Handling, p. 30), or from vines growing from potatoes bedded end to end in rows, especially for the production of cuttings (7, McGinty, The Sweet Potato Contest - 1929, p. 9), and are used for setting. The former method proves advantageous in the time saved for northern areas. The outstanding advantage of the second method is that vine cuttings are much more likely to be free of disease; it is also found that smoother potatoes are produced from vine cuttings. In sections where the season is short it is customary to grow the commercial crop from plants, while vine cuttings are set to produce disease-free seed for the next season.

Soil Preparation - The soil should be thoroughly fitted, and it is well to apply fertilizer during the fitting process and at least a week before setting, especially if heavy fertilization is practiced, otherwise the tender plants are likely to be injured by the concentrated materials. The practice of applying fertilizer close to the rows after setting and then working it in by cultivation also prevents injury. Fertilizer may be applied either broadcast or only to the rows, the former method being best for the poorer soils. It is important to choose well drained land for growing the crop. A common practice, particularly on the heavier soils, is to plant in ridges to insure adequate drainage. A deep, loose soil is apt to produce stringy, poorly shaped tubers (see Fig. 4), while soils that are very fertile tend to cause excessively large potatoes which often crack open. Both these conditions should be avoided by the commercial producer, since it is a medium-sized, shapely potato that attracts the consumer.

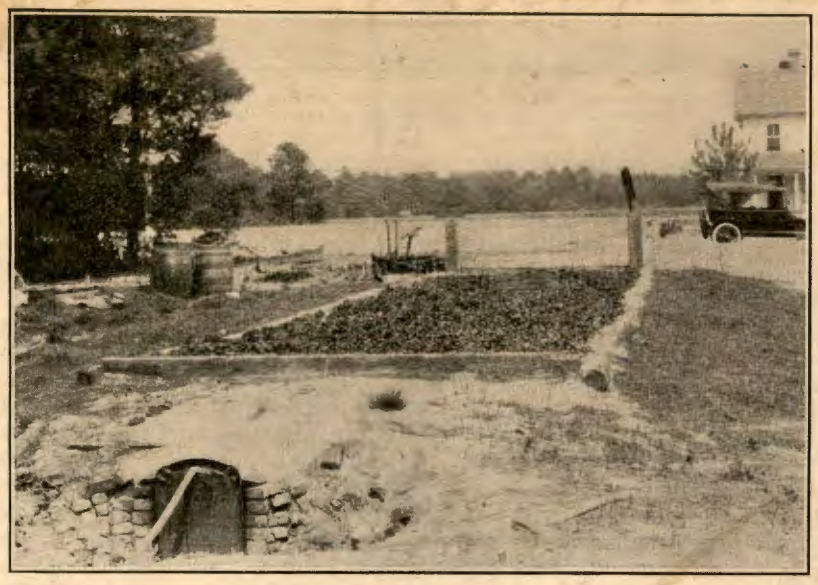


Fig. 1

~~FIG. 145.~~—A typical sweet-potato plant bed such as is employed by the growers of the Virginia, Maryland, and Delaware region



Fig. 2

~~FIG. 13.~~—A sweet-potato field at harvest time. After plowing, the sweet potatoes are scratched out by hand and allowed to dry before being placed in barrels or baskets



Fig. 3

~~FIG. 147.~~—Sweet-potato storage house having top and bottom ventilation and provided with a stove for heating

Setting - While it is doubtless true that the great part of the crop is transplanted by the back-breaking method of hand setting, or, at best, by the somewhat easier process of using shovel and tongs, commercial growers are able to effect an important saving in time by the use of transplanting machines, hand setting upon large scale being slow and expensive.

Cultivation - Like other cultivated crops, the sweet potato needs attention shortly after planting, in order that weeds may not gain headway. Frequent cultivations, particularly after each rain, keep the soil loose and are an important factor in producing large yields. The soil is worked toward the ridges that these may be broad, flat, and retentive of moisture. The amount of hand-hoeing necessary is largely dependent upon skill in the use of horse or mule-drawn cultivators and upon how badly the soil is infested with weeds. The final working, or "laying by", is performed when the vines become long enough to be bothersome. The soil is shoved well up to the ridges, and thereafter no attention is necessary until time for harvesting.

Harvesting - Except where production is for the early market, the crop should be matured before digging is commenced. However, it should be dug before a killing frost occurs, as the sap from frozen vines works down to the tubers and causes rapid decay. Small areas may be dug by hand, but various types of plows are more practical where growing is on a large scale (see Figs. 2, 5, and 6). It must always be kept in mind that rough handling and consequent injury causes heavy losses by decay.

Sweet potatoes are commonly gathered up directly into the hampers or crates in which they will be stored or from which they will be dumped into storage bins, though some growers re-sort before storing. Unless this latter practice is followed, the field sorting is very important, in order that storage space may not be taken up by potatoes worthless except for feeding stock, or by those affected by disease which are apt to spread infection to the rest

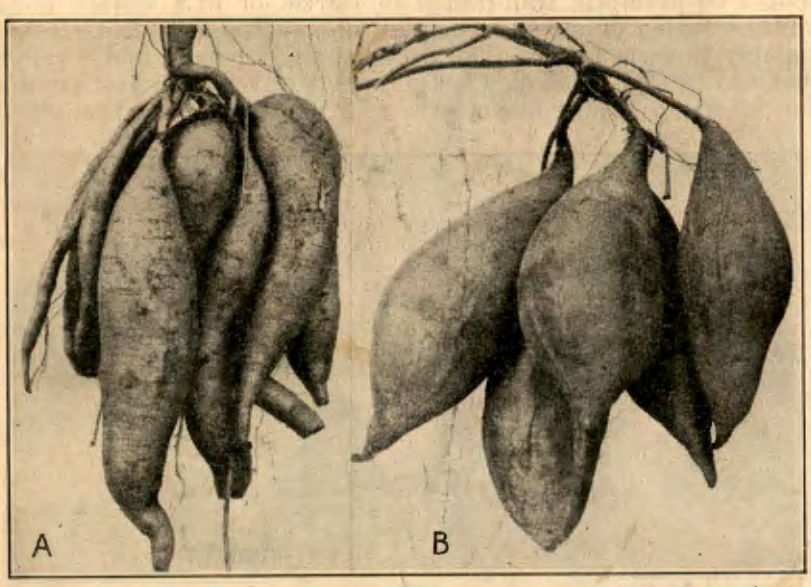


FIG. 144.—A. Effect of deep soil on shape of sweet potatoes. B. Soil of moderate depth tends to produce short, chunky sweet potatoes

Fig. 4



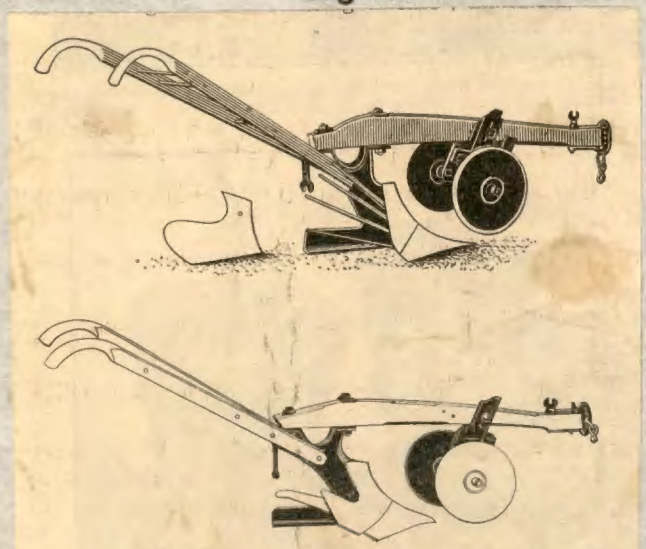


FIG. 17.—Special plows used for digging sweet potatoes. The rolling colters cut the vines, and the rods free the sweet potatoes from the soil and vines

Fig. 5

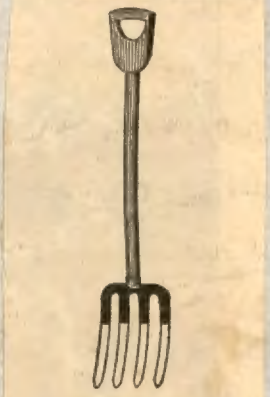


FIG. 16.—A spading fork which is satisfactory for digging sweet potatoes on a small scale

Fig. 6

of the crop.

6. Storage

Another consideration, and an important one, for the commercial grower, is the necessity for storage facilities. Except where the crop is marketed "green", such facilities will be needed. The "banking" of potatoes in fields and the pit storage, which are commonly practiced in the non-commercial areas, have four main disadvantages: "(1) the large proportion of loss, due to decay; (2) the inferior quality of the sound potatoes, due to lack of proper curing; (3) the loss on the market, because banked potatoes will keep for such a short period after being removed; and (4) the inconvenience of getting the potatoes when needed, especially during cold or rainy weather." (8, Thompson, Storage of Sweet Potatoes, pp. 18-19.) For satisfactory curing and storage heated houses with proper ventilation are essential (see Fig. 3). This involves either an outlay of capital or the rental of storage space. The question of storage will be more fully treated in a later chapter.

7. Varieties

As illustrated in Figures 7 and 8, sweet potatoes are usually classified as "moist-fleshed" and "dry-fleshed". The former are sweeter, more suitable for southern producing conditions, and favored on the southern markets; the latter make up the bulk of the sweet potatoes reaching northern markets, where they are preferred; they are less sweet; and are grown almost to the exclusion of other varieties in the northeastern commercial production region, including part of North Carolina, the Eastern Shore of Virginia and Maryland, Delaware, and New Jersey. Indiana also produces this type, as does California. They are suited to conditions found in the more northern producing areas.

Within these groups, certain varieties are outstanding commercially.

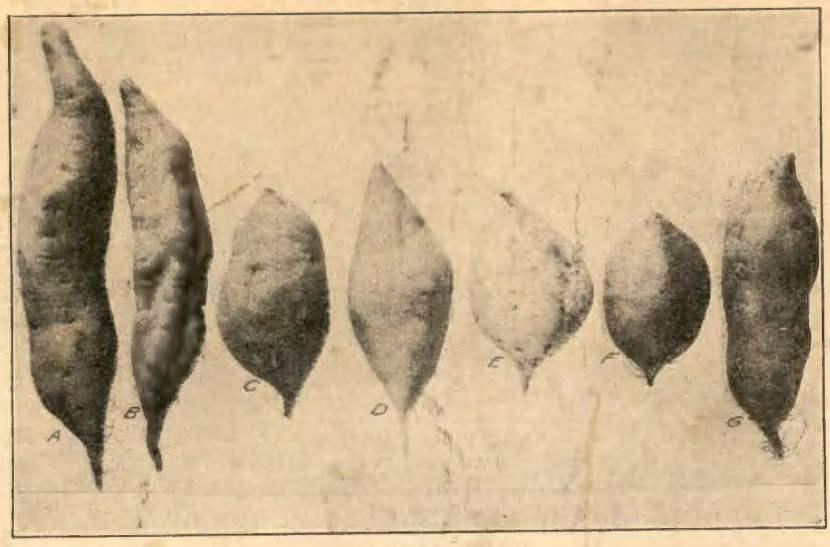


FIG. 22.—Typical specimens of some of the commercial moist-fleshed varieties of sweet potatoes; *A*, Yellow Belmont; *B*, Pumpkin "Yam"; *C*, Porto Rico; *D*, Nancy Hall; *E*, Southern Queen; *F*, Dooley; *G*, Bunch

Fig. 7

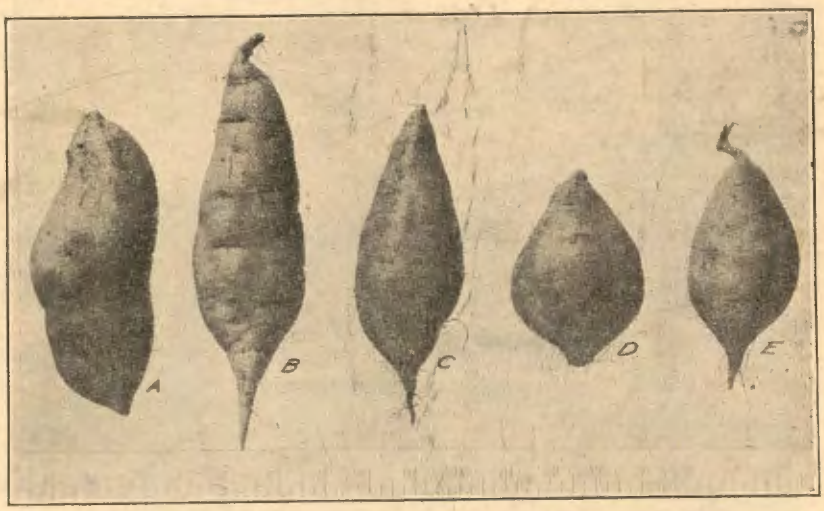


FIG. 21.—Some of the important commercial dry-fleshed varieties of sweet potatoes: *A*, Big-stem Jersey; *B*, Triumph; *C*, Yellow Jersey; *D*, Yellow Jersey; *E*, Red Jersey. Note the two distinct types of the Yellow Jersey variety

Fig. 8



FIG. 19.—Sweet potatoes graded in the field and packed in bushel hampers

Fig. 9

Among those of the moist-fleshed type, the Nancy Hall receives the widest distribution, being well known on northern markets, especially those of the Middle West. It has a skin which is yellowish in color and looks somewhat like the Jersey type. The Porto Rico is another moist-fleshed variety which enters the commercial field notably. It is a favorite in southern cities. The skin is pink to rosy red in color.

Two varieties lead commercially among those of the dry-fleshed group: the yellow Jersey and the Big Stem Jersey. The trade on northeastern markets is largely in these varieties. The Triumph, an early variety of the dry-fleshed type, is important at the first of the season on some markets.

Among Tennessee producers, the Nancy Hall is the favorite variety, as shown by Table I, which is a tabulation of answers to questions upon variety received in 90 replies to a questionnaire circulated widely among commercial sweet potato growers in all sections of Tennessee.

Table I

Comparison of Popularity of Various Varieties of Sweet Potatoes in Commercial Production Areas in Tennessee

	For local markets	For shipping	Ocassionally or not commercially
Number of farmers growing:			
Nancy Hall	68	67	6
Porto Rico	9	2	19
Triumph [a]	4	1	2
Southern Queen	1		15
Big Stem Jersey			5
Long Red			1
Bunch			1

a. All commercial production of the Triumph variety was in the La-follette region where they were preferred because of freedom from disease, and where they were sold in nearby coal mining towns.

It appears that the Nancy Hall best satisfies the markets in which Tennessee growers sell, both locally and at points distant enough to necessitate

shipment, since 68 of those who replied to the questionnaire reported growing that variety for local markets, and 67 for shipment. Tennessee already has established a reputation for Nancy Hall sweet potatoes with the trade, and therein lies one of the strongest arguments for concentration upon the production of that variety. Marketing activities are greatly facilitated where one variety only is shipped from a given shipping point or area. It is, therefore, very doubtful whether anything would be gained were Tennessee growers to forego their advantage in continuing to produce Nancy Halls by attempting to wrest a portion of the market for the dry-fleshed type from the producing area of the Northeast, and this in the face of the lack of adaptibility of the dry-fleshed varieties to southern growing conditions.

Table I does not indicate much activity in the commercial production of Porto Ricos, only nine of the replies confirming production for local markets, and only two for shipping, though such local cities as Chattanooga and Memphis are good markets for that variety. However, 19 growers reported occasional or non-commercial production of this variety, indicating a liking for Porto Ricos for home use; and 15 reported similar production of the Southern Queen, which is sometimes locally termed "the old-fashioned sweet potato." Other varieties receive little attention from this group of producers, except that the Triumph is grown for local markets near Lafollette because of apparent adaptibility to growing conditions in this higher area and because of freedom from disease.

8. Fertilizer

The extent to which fertilizer is used for growing sweet potatoes varies greatly among individual growers, and particularly between commercial sections and non-commercial sections. The formula of that used is apt to vary from community to community, and this may or may not be in accord with

the requirements of the soil. It seems that in many instances the particular brand and formula pushed for sale by the local dealer predominates in popularity, and its suitability to local needs, as well as its relative economy for the grower, are largely dependent upon the caliber of the dealer and his interest in the true welfare of the agriculture of the locality.

It is frequently stated that the size and shape of sweet potatoes is greatly influenced by fertilizers used. The results of the South Carolina contest (7, McGinty, Sweet Potato Contest - 1929, pp. 10-12) and a Virginia experiment which covers a period of nine years (9, Zimmerly, Sweet Potato Fertilizers, pp. 712-713) bear out the truth of this statement and indicate that a liberal application of potash is an important factor in producing a high percentage of potatoes of such size and shape as to warrant their being graded as "primes" or "No. 1's", not to mention its marked influence in increasing yields (9, Ibid., p. 710). On the basis of these studies, the South Carolina recommendation is 800 to 1000 lbs. of a fertilizer containing 8 to 10 per cent of potash, for growing Porto Ricos, while that of the Virginia Station is for 1000 pounds of 3-3-15 (NPK), or its equivalent, for growing Big Stem Jerseys under their conditions.

Of 90 Tennessee growers replying to questions on fertilization in the questionnaire already referred to, 78 use fertilizer, 12 do not; thus the use of fertilizer among commercial growers in Tennessee appears to be the usual practice. Of the 78 using fertilizer, 21 use acid phosphate exclusively; 17 use acid phosphate and other fertilizing materials, purchasing the latter either ready-mixed or as separate constituents; and 40 use no acid phosphate. In the light of results obtained from the studies in South Carolina and Virginia, mentioned above, it seems that the use of phosphoric acid is a minor consideration in sweet potato production and that its use as the only plant food applied is hardly warranted for this crop. On the other

hand, the importance of potash, which these studies emphasize, makes a consideration of the use of that constituent worthwhile to the grower. Of the 54 formulas of mixed fertilizers used which were reported in the questionnaire replies, 5-8-6 (NPK) appeared most frequently, being reported in 11 instances. It was a favorite in West Tennessee. In 24 of the 54 formulas, the percentage of potash was 4, this percentage occurring most often. It is significant that only 7 reported a formula with 8% or more of potash.

Though the data at hand are insufficient to establish correlations of yield with fertilizer used, it would appear that Tennessee growers might well consider increasing the quantity of potash used, possibly replacing a part of the phosphoric acid with this constituent in some instances. The use of large quantities of nitrogen tends to produce heavy vine growth, but tubers of poor shape and inferior eating qualities.

It is well to keep in mind that the amount of fertilizer which it is profitable to apply varies with the selling price of the crop. Thus when a crop moves at a high price, the additional returns from heavier application of fertilizer are large and the limit to which it is profitable to increase the quantity applied rises. On the other hand, as the price falls this limit becomes lower until the point is reached at which the application of any fertilizer at all decreases the net returns. Since sweet potatoes are an easy crop to raise, it is patent that, over a period of years, they will be a low-priced commodity. For this reason it appears that the prevalent conservatism among farmers in fertilizing the crop is not without economic foundation, though a careful consideration of individual conditions and of the general situation in the industry from year to year would doubtless often show an opportunity to increase profits through heavier fertilization, and would, in any case, prove more satisfactory than a haphazard policy.

With those who for any reason cannot formulate an intelligent policy, there is a wide open field for helpful service on the part of Smith-Hughes teachers and County Agents in dealing with the economic side of fertilization.

9. Diseases

That diseases, both in the field and in storage, are a serious handicap to sweet potato production is well known to all who are familiar with the crop. The comprehensive treatment of this phase of the industry in a recent bulletin (10, Harter, Sweet Potato Diseases), which is readily available to all, makes it seem unnecessary to take up the subject here in detail. The bulletin referred to lists and treats of the following diseases:

Field diseases:	Storage rots:
Stem rot (wilt)	**Soft rot**
Black rot	Ring rot
Foot rot	**Black rot**
Scurf	Dry rot
Root rot	**Java black rot**
Mottle necrosis	Charcoal rot
Soil rot	
Leaf blight	
Leaf spot	
White rust	

Of these diseases, black rot, in its various forms, probably causes the greatest loss to the grower. It is difficult to control, particularly in heavy commercial production areas where sweet potatoes are grown on the same fields frequently.

Measures which deserve attention in gaining and maintaining freedom from disease in general are: (a) proper seed selection in the field; (b) growing seed from vine cuttings; (c) use of clean soil for bedding seed, for growing vines for cuttings, and for growing the crop; (d) crop rotations such that sweet potatoes will not be planted on the same ground of-

tener than once in three or four years; (e) disinfection of packages, storage houses, and permanent cold frames and hot-beds; (f) good ventilation in storage houses; (g) proper care and termperature regulation while in storage; and (h) care in handling at all times.

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CHAPTER II

ACREAGE, PRODUCTION, AND YIELDS IN THE UNITED STATES

1. Position of the Sweet Potato Among Vegetable Crops.
2. Classification of Production Areas.
3. Relative Status of Census Geographical Divisions.
4. Trends in Acreage, Production, and Yield in the United States.
5. Yield Trends by Census Geographical Divisions.
6. Development of Production in the United States.
7. Concentration of Production.
8. Factors Further Affecting Production.
9. Trends in Sweet Potato Production per Capita.
10. Is It Desirable to Expand Production of the Sweet Potato?

1. Position of the Sweet Potato Among Vegetable Crops

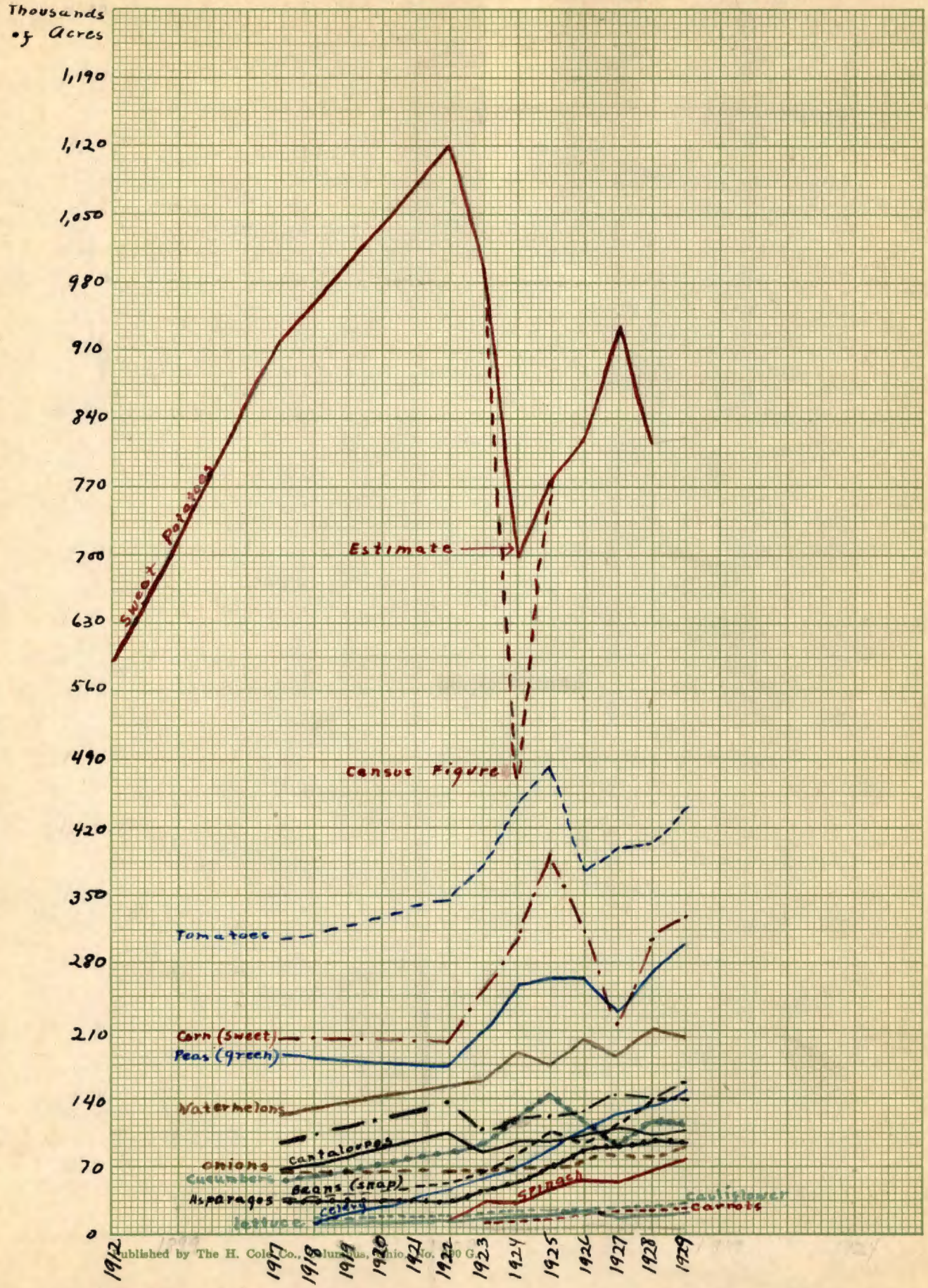
The sweet potato constitutes the second largest vegetable crop of the United States, being exceeded in importance only by the Irish potato. The acreage devoted to its production greatly exceeds that of any other vegetable crop with the one exception mentioned, as shown by Chart 1.

It is also noteworthy in this illustration that a marked reduction in acreage of the sweet potato crop came much sooner after the War than with most other vegetables, though the reaction affected cabbage and cantaloupes at about the same time, in 1923. In contrast, the acreage of tomatoes, sweet corn, cucumbers, and snap beans continued to expand three years longer, not falling off until 1926.

Possibly this difference may be explained by two factors. In the first place, the tastes of the consuming public were in that period, and still are, shifting away from the former staples, and toward fresh vegetables such as those listed in the second group; a shift accompanying, and to a considerable degree controlled by, the improvement in facilities for transporting and distributing fresh vegetables. While this increasing use of fresh vegetables supported, for a time, an increased acreage of the certain vegetables mentioned,

Chart 1

Estimated Acreage of Vegetables (Irish Potatoes Not Included)



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eventually production was carried too far and acreage toppled. But, to go a step further, such vegetables as celery and lettuce enjoyed so great an increase in demand that they did not experience acreage reduction. In the second place, there was a great artificial stimulation of production of sweet potatoes, as well as of other staples, under war pressure; and this stimulation was supported by war prices and by war demand, to furnish food to the armies and to much of civilian Europe. In this chaos of food substituting and thrift, a rapid increase in sweet potato acreage took place, which later proved to be disproportionate to demand as conditions gradually settled back to normal. The acreage reduction came quickly and was violent.

While considering Chart 1 it is, perhaps, significant to note that those vegetables which have enjoyed nearly steady gains in acreage, namely, lettuce, asparagus, celery, and spinach, are those with more limited areas of optimum production. All four of those named are grown ideally on muck soils, which are not extensively developed as compared with other soil types. The next group, tomatoes, sweet corn, green peas, and cucumbers, have been much more widely grown; though when compared with the staples, in which class sweet potatoes fall, their acreages are insignificant. Thus we find that those crops which were most widely grown, and most widely consumed, experienced the reaction soonest, being most sensitive to the lessened demand for foodstuffs.

2. Classification of Production Areas

For convenience in referring to production areas, the states growing sweet potatoes "may be grouped into sections, according to their geographical position, the varieties of sweet potatoes grown, and the purpose for which the crop is produced". (1, Gatlin, Marketing Southern-Grown Sweet Potatoes, pp. 1-2.) This publication enumerates three convenient groups. These divisions

are, in a general way, accepted in referring to the industry. The first group is called the northeastern section and includes New Jersey, Delaware, Maryland, and Virginia; the second, the southern section, which approximately includes the cotton belt, consists of North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Tennessee, Louisiana, Arkansas, Oklahoma, and Texas; and the third group is made up of scattered areas over the rest of the country, in Kentucky, Illinois, Indiana, Iowa, Kansas, Missouri, New Mexico, California, and other states.

Northeastern Section - The greatest density of sweet potato acreage is in southern New Jersey. The nearby consuming markets and the suitable soil and climate have combined to make this, together with the Eastern Shore of Virginia and Maryland, and part of Delaware, the most important commercial producing area in the United States. This northeastern section was responsible for developing the first market for sweet potatoes in the northern cities and non-producing areas; and with this development went the establishing of a preference for the yellow-skinned dry-fleshed type of potato, which was the type seemingly adapted to northeastern producing conditions. The whole industry is here developed upon the cash crop basis.

Southern Section - In the southern or cotton belt section, a more natural home for the sweet potato, the industry developed along the lines of a food and feed crop, easy to grow and of basic importance in the agricultural system, but of no importance as a cash crop, except locally. The taste for the sweeter, moist-fleshed type of potato, which flourished in this region and which was of higher feeding value, became inherent in the population; but for many years little or no attention was given to production for shipment to the North. Gradually, however, shipping developed and was given a tremendous impetus by war conditions. Whereas storage had for-

merly been almost entirely in pits and banks, with resultant heavy losses from decay, houses for curing and storage now appeared widely; and the large savings which were thus brought about stimulated the industry. Sweet, moist-fleshed potatoes, in particular those with red skins, did not find ready reception upon northern markets; but the southern-grown sweet has been favored with an ever-expanding demand as people became accustomed to it and learned how best to prepare it for the table.

Other Sections - The scattered areas mentioned, with the possible exception of Kentucky, incline more to the kind of development which occurred in the northeastern section, having been promoted largely through the stimulation of cash markets for the crop. The type grown is not uniform for these sections, depending largely upon local growing conditions and the demands of the respective markets.

Table II illustrates the contrast in importance of production and shipping in the three groups discussed.

Table II

Percentage of U. S. Production and Shipments of Sweet Potatoes by Groups of Producing States

	Northeastern Section		Southern Section		Other Sections	
	[a]1920-21	1928	[a]1920-21	1928	[a]1920-21	1928
% of U. S. crop produced in	10—	14.2	83+	77.8	7	8
% total U. S. carlot shipments originating in	65+	57.7	30	35.2	5—	7

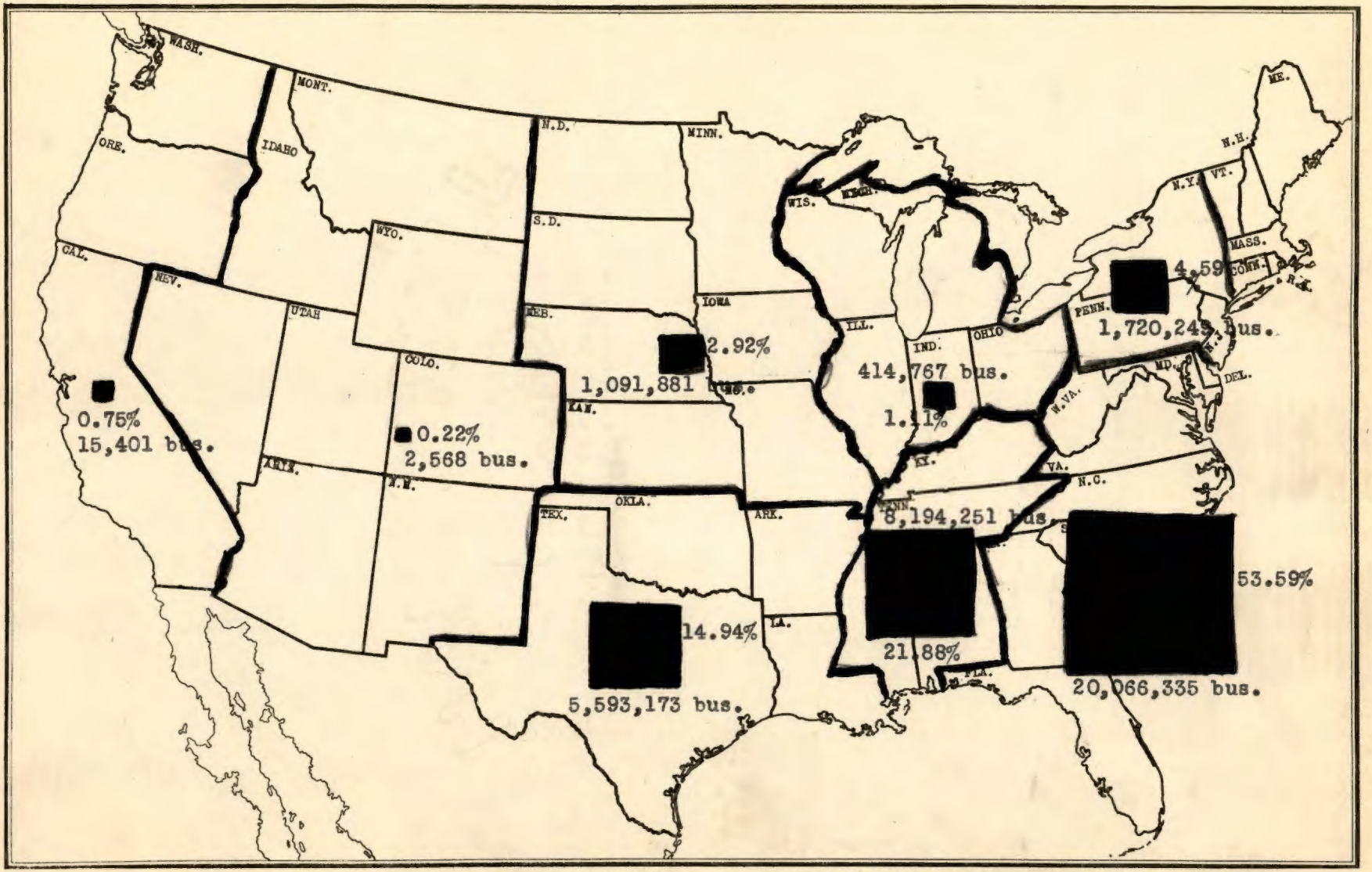
[a] Percentages for 1920-21 taken from Gatlin, G. O. Marketing Southern-Grown Sweet Potatoes. U. S. D. A. Department Bulletin 1208, p. 2. (March, 1924.)

It is seen that in 1920-21 the northeastern section, with less than 10%

of the nation's production of sweet potatoes, originated over 65% of the carloads shipped; in the same year, the southern section produced over 83% of the crop, but only originated 30% of the carloads moving to market; and other sections produced 7% and originated less than 5% of the carload shipments. It should also be remembered that, even in that year, truck shipments were of great importance in the northeastern section, and much less in the South, thus increasing the lead of the former. This clearly illustrates the contrast in importance of production for shipping between the northeastern and southern sections in that year. In fact, while the former marketed, in carloads, approximately 71% of its production, the carload shipments of the latter amounted to less than 4% of its crop. (1, Gatlin, Marketing Southern-Grown Sweet Potatoes, p. 2.)

By comparison of the figures for the season of 1920-21 with those for 1928, two interesting features become apparent: First, the relative importance of production in the northeastern and scattered sections has increased at the expense of that in the southern section, which produced but 77.8% of the country's crop in 1928, compared with over 83% in 1920-21. This, apparently, is an indication of the general tendency toward concentration of crop production in the most favored commercial areas which is taking place over the world. Second, the relative importance of carload shipments from the southern and scattered areas is increasing, while that of such shipments from the northeastern section is decreasing. The southern section gained 5.2% and the scattered sections nearly 2% in their proportion of United States carload shipments, from 1920-21 to 1928; but the northeastern section sustained this relative loss. Answers are found in the constant reaching out of the two former groups for the markets of the country, and in the progressive popularization of the moist-fleshed varieties. However, it must not be forgotten that the growing utilization of truck movement in marketing sweet potatoes from the northeastern section may largely account for the decreased relative importance of that area in carload shipments. Even so, that the relative importance of southern production has decreased while that of its shipments has increased, is, perhaps, an indication of concentration of production in commercial areas within that section.

Census Divisions - Unfortunately for the purposes of this study, the



Map.1. Distribution of Sweet Potato Production, by Census Geographical Divisions, 1924.

United States Census Bureau finds, since it must consider all crops, that a division of the states which is somewhat different from that already discussed is most expedient. In dealing with data from the census, therefore, it has been found best to conform to the census subdivisions: New England, Middle Atlantic, South Atlantic, East South Central, West South Central, East North Central, West North Central, Mountain States, and Pacific States.

Reference to Map 1 will give information as to the states included in each of these subdivisions and also an idea of the relative importance of each group in the sweet potato industry. The figures given are for 1924, a year of greatly reduced acreage and production. It is apparent from an examination of this map that the South Atlantic States are the most dominant group in sweet potato production, growing over 53% of the nation's crop in 1924. This group is followed in importance, first, by the East South Central, and next, by the West South Central divisions. The greater part of those grown in the Middle Atlantic States are produced in southern New Jersey, that state accounting for 1,662,610 bushels of the 1,720,249 shown for the group.

3. Relative Status of Geographical Divisions

Farmers Growing Sweet Potatoes - Table III shows the total number of farmers growing sweet potatoes in the census years 1899, 1909, 1919, and 1924. In the United States as a whole, in the three southern divisions, and in the Pacific and Mountain States there was a progressive increase in the number of farmers growing sweet potatoes from 1899 to 1919; but in the more northern sections 1909 saw a reduction over 1899, and 1919 showed renewed activity in these areas resulting from the impetus of the War.

However, comparison of the 1919 data with those for 1924 reveals a great exodus of farmers from the sweet potato industry in the United States

as a whole, in each geographical division, and in each individual state where the crop was grown. This desertion was particularly marked in such states as Indiana, Pennsylvania, Ohio, and Iowa - marginal areas of production which had taken up the sweet potato as a war-time crop. Examining the figures for the four periods for the northern states, at the end of the table, beginning with Michigan, one finds further evidence of migration of the crop from marginal areas to more favored regions. These northern states were wholly or practically out of the industry by 1924.

Table III

Number Farmers Growing Sweet Potatoes
Ranked According to 1924 Returns

States	1924	1919	1909	1899
United States	685,054	1,406,780	1,121,900	1,001,719
South Atlantic	318,248	544,089	484,044	422,078
E. S. Central	217,194	433,313	368,122	289,039
W. S. Central	105,236	272,939	162,853	139,875
W. N. Central	25,408	74,702	47,155	57,026
E. N. Central	11,068	59,148	39,470	64,369
Middle Atlantic	6,896	19,836	18,634	28,560
Pacific	690	1,845	1,152	570
Mountain	314	891	420	188
New England	0	17	50	14
Georgia	100,558	181,987	131,458	103,983
North Carolina	89,782	137,230	142,238	112,951
Alabama	83,413	149,639	117,522	87,134
South Carolina	56,659	106,104	88,340	79,145
Tennessee	53,905	99,550	89,361	74,968
Kentucky	41,343	70,183	63,646	59,447
Arkansas	41,295	84,189	53,297	35,732
Virginia	39,611	59,537	67,506	68,104
Mississippi	38,533	113,941	97,593	67,490
Texas	27,350	82,437	48,002	63,209
Louisiana	25,624	69,473	52,074	29,014
Missouri	20,422	58,242	36,258	41,689
Florida	18,472	27,847	23,076	23,967
Oklahoma	10,967	36,840	9,480	11,920
Illinois	6,176	26,745	19,675	20,076
Maryland	5,949	11,484	11,175	11,037
West Virginia	4,186	15,283	15,632	18,512
New Jersey	3,918	6,418	7,666	7,980
Kansas	3,742	9,268	6,099	8,490

(continued)

Table III (cont.)

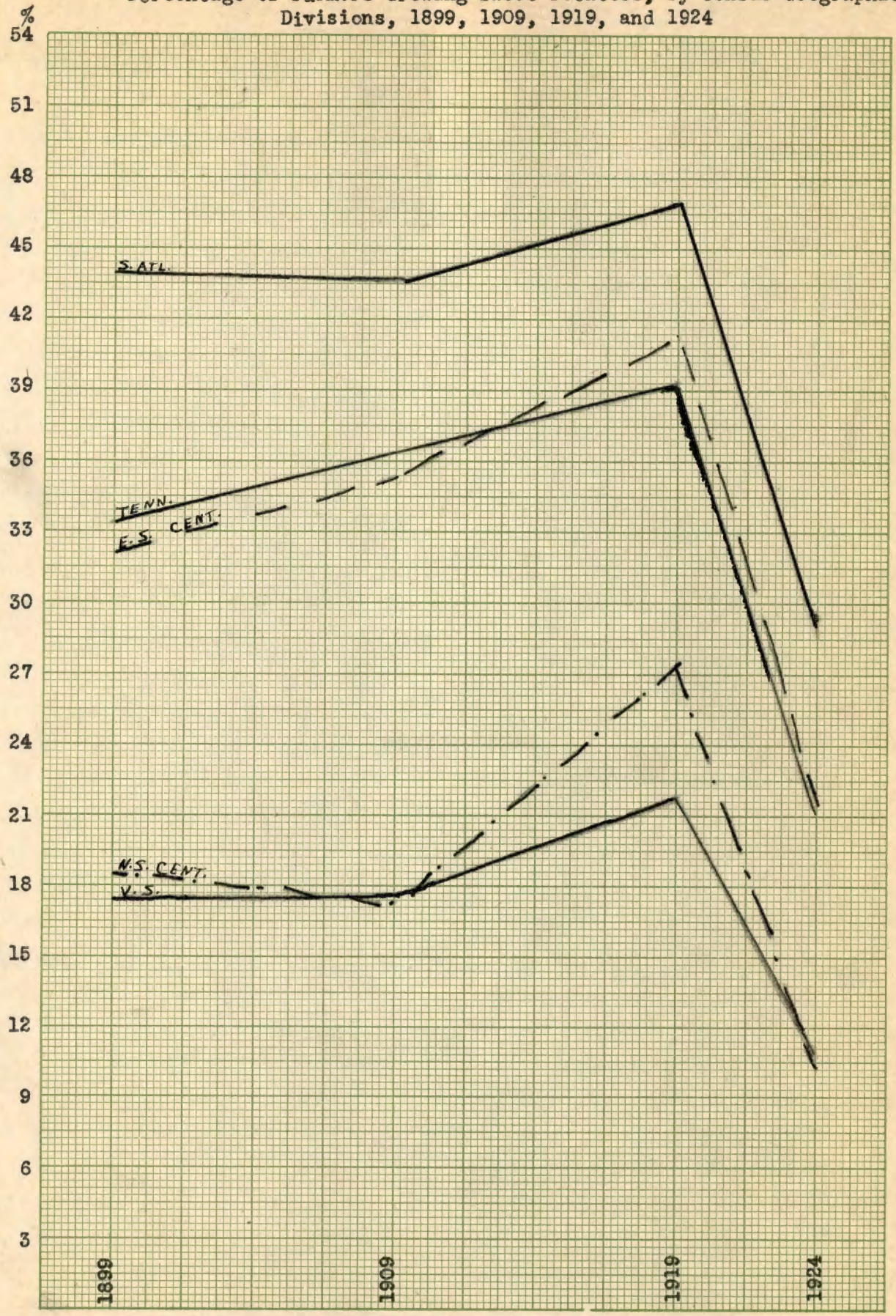
States	1924	1919	1909	1899
Indiana	3,185	19,439	11,420	25,507
Delaware	2,994	4,547	4,566	4,332
Pennsylvania	2,971	13,363	10,859	20,459
Ohio	1,688	12,870	8,238	18,484
Iowa	730	6,397	3,667	5,450
California	664	1,814	1,133	477
Nebraska	514	774	1,083	1,384
New Mexico	159	526	200	42
Arizona	130	290	139	58
D. of C.	37	70	53	47
Oregon	26	31	11	27
Colorado	25	61	50	25
Michigan	21	94	124	291
New York	7	55	109	121
Connecticut	0	15	23	3
Idaho	0	0	5	7
Maine	0	0	20	0
Massachusetts	0	0	22	2
Minnesota	0	12	15	7
Montana	0	0	0	0
New Hampshire	0	0	0	1
Nevada	0	13	20	7
Rhode Island	0	2	3	4
South Dakota	0	9	30	5
Utah	0	1	5	49
Vermont	0	0	2	4
Washington	0	0	8	66
Wisconsin	0	0	13	11
Wyoming	0	0	1	0
North Dakota	0	0	3	1

These conclusions are more clearly illustrated when the number of farmers producing sweet potatoes is put on a percentage basis, as in Table IV, which converts the data of Table III to percentage of the total number of farmers. This device further illustrates the relative unimportance of the industry in states outside the South Atlantic, East South Central, and West South Central groups, with the exceptions of New Jersey and Missouri.

Chart 2, constructed from the percentage figures of Table IV, sets forth an interesting comparison of the percentages of farmers growing sweet potatoes in the three chief sweet potato producing divisions, to-

Chart 2.

Percentage of Farmers Growing Sweet Potatoes, by Census Geographical Divisions, 1899, 1909, 1919, and 1924



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gether with like data for the United States as a whole and for Tennessee. The South Atlantic States, which are the most important producing area, likewise have the largest percentage of farmers growing sweet potatoes, followed by the East South Central, and next, by the West South Central States. Tennessee has been typical of the group of which it is a member; while the United States as a whole is slightly below the West South Central group, as the percentage for the country is pulled downward by the North, where none of the farmers are engaged in growing the sweet potato. The increased number of producers under war influence, and the drastic diminution in their numbers under the influence of low prices following the deflation period, are illustrated by all the graphs.

Table IV

Percentage of Farmers Growing Sweet Potatoes
Ranked by 1924 Percentages

States	1924	1919	1909	1899
United States	10.8	21.81	17.6	17.5
South Atlantic	28.7	46.95	43.5	43.9
E. S. Central	21.6	41.21	35.3	32.0
W. S. Central	10.3	27.40	17.3	18.5
W. N. Central	2.3	6.81	4.2	5.4
Middle Atlantic	1.6	4.67	4.0	5.9
E. N. Central	1.1	5.45	3.5	5.7
Mountain	0.1	0.37	0.2	0.2
Pacific	0.3	0.79	0.6	0.4
New England	0	0.01	0.03	(a)
Georgia	40.4	58.57	45.2	46.3
Alabama	35.1	58.43	44.7	39.0
South Carolina	32.8	55.06	50.1	50.9
North Carolina	31.7	50.87	56.1	50.3
Florida	31.2	51.56	46.1	58.7
Delaware	29.2	44.84	42.1	44.7
D. of C.	26.6	34.31	24.4	17.5
Tennessee	21.3	39.38	36.3	33.4
Virginia	20.4	31.97	36.7	40.6

(continued)

Table IV (cont.)

States	1924	1919	1909	1899
Louisiana	19.3	51.29	43.2	25.0
Arkansas	18.8	36.19	24.8	20.0
Kentucky	16.0	25.93	24.6	25.3
Mississippi	15.0	41.87	35.6	30.6
New Jersey	13.2	21.61	22.9	23.0
Maryland	12.1	23.97	22.8	24.0
Missouri	7.8	22.14	13.1	14.6
Texas	5.9	18.91	11.5	17.9
Oklahoma	5.6	19.19	5.0	11.0
West Virginia	4.8	17.51	16.2	19.9
Illinois	2.7	11.28	7.8	7.6
Kansas	2.3	5.61	3.4	4.9
Indiana	1.6	9.48	5.3	11.5
Pennsylvania	1.5	6.61	4.9	9.1
Arizona	1.2	2.91	1.506	1.0
Ohio	0.7	5.01	3.0	6.7
New Mexico	0.5	1.76	0.560	0.3
California	0.5	1.54	1.3	0.7
Nebraska	0.4	0.62	0.835	1.1
Iowa	0.3	3.00	1.7	2.4
Oregon	0.05	0.06	0.024	0.1
Colorado	0.04	0.10	0.108	0.1
Michigan	0.01	0.05	0.059	0.1
New York	0.003	0.03	0.050	0.1
Connecticut	0	0.07	0.085	(a)
Idaho	0	0	0.016	(a)
Maine	0	0	0	0
Massachusetts	0	0	0,059	(a)
Minnesota	0	0.006	0.009	(a)
Montana	0	0	0	0
New Hampshire	0	0	0	(a)
Nevada	0	0.41	0.743	0.3
Rhode Island	0	0.05	0.056	0.1
South Dakota	0	0.01	0.04	(a)
Utah	0	0.003	0.023	0.3
Vermong	0	0	0.006	(a)
Washington	0	0	0.014	0.2
Wisconsin	0	0	0.008	(a)
Wyoming	0	0	0.009	0
North Dakota	0	0	0.004	(a)

[a] Less than 1/10 of 1%

Acres of Sweet Potatoes per Farm - In Table V a somewhat different aspect of the industry may be examined. Here is presented a tabulation of the average number of acres of sweet potatoes grown per farm on the farms

raising the crop. Foremost in point of interest is the rank of the subdivisions and of the states in this respect. The Pacific states are indisputably far in the lead, through the dominance of California, which leads all other states, and where the crop is produced on a commercial basis in concentrated areas. They are followed by the Mountain and Middle Atlantic states, where production is likewise concentrated in commercial areas. These leaders are trailed by the southern areas, where growing for home consumption is practiced, pulling downward the average acreage of growers.

Table V

Number Acres of Sweet Potatoes per Farm Growing Them
Ranked by 1924 Acreages

States	1924	1919	1909	1899
United States	0.68	0.6	0.6	0.5
Pacific	5.06	4.1	4.4	3.0
Mountain	2.55	1.4	1.0	0.9
Middle Atlantic	1.91	0.9	1.3	0.8
W. S. Central	0.89	0.7	0.8	0.6
South Atlantic	0.71	0.6	0.6	0.6
East S. Central	0.53	0.5	0.4	0.4
West N. Central	0.45	0.3	0.3	0.3
East N. Central	0.43	0.2	0.3	0.2
New England	0	0.5	1.0	0.6
California	5.22	4.2	4.5	3.4
New Mexico	3.46	1.2	1.1	1.1
New Jersey	3.18	2.4	2.9	2.6
D. of C.	2.00	1.6	2.4	3.1
Iowa	1.82	0.5	0.6	0.5
Arizona	1.80	1.1	1.4	0.9
Delaware	1.65	2.2	1.1	0.5
Louisiana	1.51	1.0	1.1	0.9
Maryland	1.12	0.9	0.7	0.6
Florida	1.07	0.9	1.0	1.0
Oregon	1.00	0.3	0.5	1.0
Kansas	0.91	0.5	0.8	0.5
Texas	0.91	0.8	0.9	0.7
Oklahoma	0.85	0.5	0.5	0.3
Nebraska	0.82	0.4	0.3	0.4
Georgia	0.79	0.6	0.6	0.7
Mississippi	0.73	0.6	0.6	0.6
Virginia	0.72	0.7	0.6	0.6

(continued)

Table V (cont.)

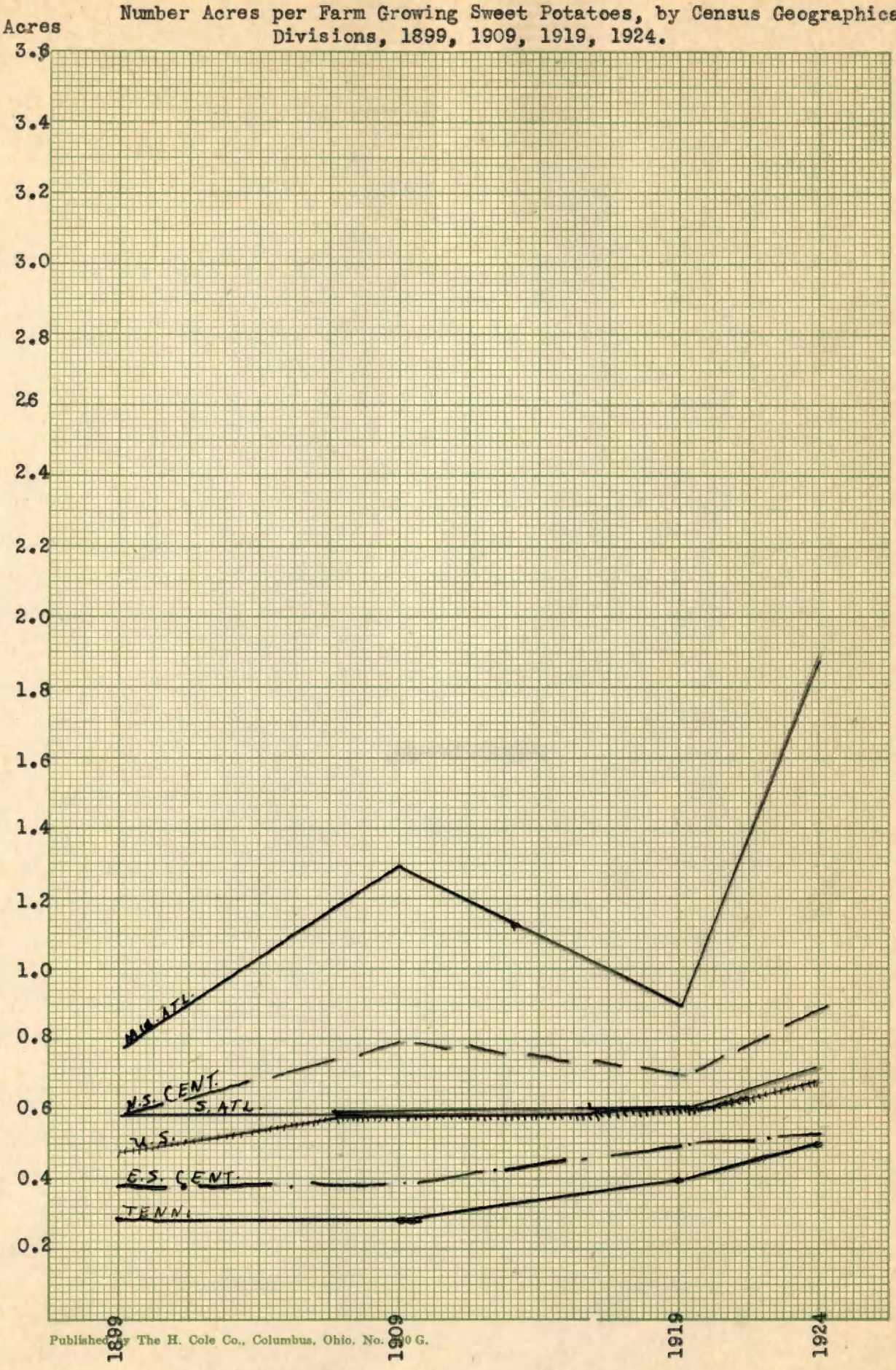
States	1924	1919	1909	1899
Colorado	0.64	0.6	0.4	0.8
South Carolina	0.61	0.6	0.6	0.6
Alabama	0.58	0.6	0.6	0.6
New York	0.57	0.3	1.0	0.6
North Carolina	0.57	0.5	0.6	0.6
Tennessee	0.50	0.4	0.3	0.3
Arkansas	0.50	0.5	0.4	0.4
Illinois	0.49	0.3	0.5	0.4
Indiana	0.38	0.2	0.1	0.2
Michigan	0.33	0.2	0.2	0.2
Missouri	0.30	0.2	0.2	0.2
Ohio	0.30	0.2	0.1	0.2
Kentucky	0.26	0.2	0.2	0.2
Pennsylvania	0.26	0.2	0.1	0.2
West Virginia	0.24	0.2	0.1	0.2
Connecticut	0	0.6	1.8	0.7
Idaho	0	0	0.2	0.9
Maine	0	0	0	0
Massachusetts	0	0	0.2	?
Minnesota	0	0.2	?	0.6
Montana	0	0	0	0
New Hampshire	0	0	0	1.0
Nevada	0	0.5	0.3	0.7
Rhode Island	0	?	?	0.2
South Dakota	0	0.6	0.2	0.6
Utah	0	?	?	0.8
Vermont	0	0	0.5	1.0
Washington	0	0	0.6	0.8
Wisconsin	0	0	0.3	0.4
Wyoming	0	0	?	0
North Dakota	0	0	?	?

The trend from census period to census period between 1899 and 1924 is displayed in Chart 3, which is constructed from the figures in Table V better to illustrate what has been the tendency in acreage on growers' farms in the most important production subdivisions, in the United States, and in Tennessee. The general trend over the whole period has, in each instance, been upward.

In the first ten years it was upward or stabilized in all groups shown, the greatest increase in acreage per grower occurring in the Middle Atlantic group, where the industry is nearly wholly commercial. The war-time expansion in number of producers appears to have affected the Middle Atlantic and West South Central states by attracting new producers with small acreages

Chart 3.

Number Acres per Farm Growing Sweet Potatoes, by Census Geographical Divisions, 1899, 1909, 1919, 1924.



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to enter the field, thus depressing the average acreage of growers in 1919. On the other hand, the effect in the East South Central group, where the industry was already established for home use on most farms, was to stimulate an increase in acreage per farm. The South Atlantic States held to their customary area of the crop per farm. With the exodus of growers from the industry following the post-war depression, the net result, shown in the 1924 figures, was in each instance an increase in the average acreage; the small marginal growers apparently leaving the production to the larger, more firmly established commercial producer, in the more favored areas. This tendency was particularly apparent in the Middle Atlantic group, dominated by the New Jersey commercial growers.

The Pacific States group was deliberately omitted from this chart because to have shown its high rank would have injured the clarity of presentation of trends in other subdivisions, due to the necessity of reducing the scale. One other point of interest illustrated by the chart might be mentioned: The acreage per farm growing sweet potatoes in the United States runs very close to that for farms in the South Atlantic States. This group, being the greatest production region, has a pronounced influence upon the country's average.

Percentage of Production - Table VI is included for the purpose of making comparisons between regions and between states as to importance in the production of sweet potatoes. From investigation of this table, one of the first discoveries which one makes is that the South Atlantic group of states is most important among the geographic divisions, and has been in every census year from 1879 to 1924. In each census year from 1899 to 1924, with the exception of 1919, this group produced fifty per cent or more of the total United States crop. In 1919, under war-time influences the crop had expanded in other divisions, particularly the East and West South Central

groups, at the expense of the relative importance of the South Atlantic, Middle Atlantic, and East and West North Central areas; but the result of retrenchment shown by the 1924 figures was to restore substantially the same relationship as had been usual before the War, except that the East North Central group had failed to return to as high a position as it formerly occupied, and that the Mountain States had gained.

Table VI
Percentage of Total U. S. Crop of Sweet Potatoes
Ranked by 1924 Percentages

States	1924	1919	1909	1899	1889	1879
United States	100.0	100.0	100.0	100.0	100.0	100.0
South Atlantic	53.6	44.9	50.0	51.5	44.7	46.1
East South Central	21.9	26.0	22.9	20.6	23.7	31.3
West South Central	14.9	21.7	15.2	15.1	21.1	11.0
Middle Atlantic	4.6	2.5	5.6	6.3	5.3	6.8
West North Central	2.9	2.2	2.9	3.5	3.0	2.3
East North Central	1.1	1.4	2.3	2.4	1.8	2.2
Pacific	0.7	1.1	1.0	0.6	0.3	0.3
Mountain	0.2	0.1	0.1	(a)	(a)	0.03
New England	0	(a)	(a)	(a)	(a)	(a)
Georgia	16.1	13.0	12.5	12.0	12.8	13.2
North Carolina	11.9	10.2	14.3	13.6	12.9	13.7
Virginia	10.3	7.7	8.9	10.5	6.4	5.7
Alabama	9.5	10.4	8.8	8.1	9.9	10.3
Tennessee	6.4	5.7	4.2	3.7	4.5	7.1
South Carolina	6.3	6.9	7.3	7.9	7.0	6.6
Louisiana	4.6	6.8	7.2	4.4	4.4	3.9
New Jersey	4.4	2.3	5.4	5.7	5.1	6.3
Florida	4.4	3.2	3.5	4.8	4.0	5.1
Arkansas	4.4	5.1	2.8	2.3	4.1	2.6
Mississippi	3.9	8.4	7.5	6.6	7.3	10.8
Texas	3.8	7.5	4.6	7.8	12.5	4.4
Maryland	2.5	1.9	1.8	1.6	0.9	1.0
Oklahoma	2.1	2.4	0.6	0.7	(a)	(b)
Kentucky	2.1	1.6	2.2	2.2	2.1	3.0
Delaware	1.9	1.9	1.2	0.5	0.5	0.6
Missouri	1.6	1.3	1.5	1.7	1.3	1.3
Kansas	1.0	0.6	0.9	1.1	1.2	0.6
California	0.7	1.1	1.0	0.8	0.3	0.3
Illinois	0.7	0.9	1.8	1.2	1.0	0.7
Indiana	0.3	0.3	0.3	0.6	0.4	0.7
Iowa	0.2	0.3	0.4	0.5	0.4	0.4
West Virginia	0.2	0.3	0.4	0.5	0.3	0.3
New Mexico	0.2	0.1	(a)	(a)	(a)	(a)

(continued)

Table VI (cont.)

States	1924	1919	1909	1899	1889	1879
Pennsylvania	0.2	0.2	0.2	0.5	0.2	0.6
Ohio	0.1	0.3	0.2	0.6	0.3	0.7
Nebraska	0.1	(a)	(a)	0.1	0.1	(a)
Arizona	0.1	(a)	(a)	(a)	(a)	(a)
D. of C.	(a)	(a)	(a)	(a)	0.1	0.1
Colorado	(a)	(a)	(a)	(a)	(a)	0
Oregon	(a)	(a)	(a)	(a)	(a)	0
Michigan	(a)	(a)	(a)	(a)	(a)	(a)
New York	(a)	(a)	(a)	(a)	(a)	(a)
Connecticut	0	(a)	(a)	(a)	(a)	(a)
Idaho	0	0	(a)	(a)	(a)	0
Maine	0	0	0	0	(a)	0
Massachusetts	0	0	(a)	(a)	(a)	(a)
Minnesota	0	(a)	(a)	(a)	(a)	0
Montana	0	0	0	0	0	0
New Hampshire	0	0	0	(a)	(a)	0
Nevada	0	(a)	(a)	(a)	(a)	0
Rhode Island	0	(a)	(a)	(a)	(a)	(a)
South Dakota	0	(a)	(a)	(a)	(a)	0
Utah	0	(a)	(a)	(a)	(a)	0
Vermont	0	0	(a)	(a)	0	0
Washington	0	0	(a)	(a)	(a)	0
Wisconsin	0	0	(a)	(a)	(a)	(a)
Wyoming	0	0	(a)	0	0	0
North Dakota	0	0	(a)	(a)	(a)	0

[a] Less than 1/10 of 1%.

[b] Indian Territory 0.

An intensely interesting conclusion may be drawn from this percentage comparison of war-time relative importance with pre-war and post-war relationships. The shift which occurred under war-time prices and production encouragement shows that there is a great potential source of supply in the East and West South Central States, awaiting only favorable demand to stimulate its utilization. This situation stamps the two regions named as marginal, under the conditions that have existed in the past, their relative disadvantage in proximity to markets and the competition of cotton and other crops acting to check the development of their sweet potato industry.

In 1879 the relative importance of the East South Central group was much

greater than at any time since; but gains in relative importance of the West South Central and South Atlantic groups relegated the East South Central states to the position in which it has tended to remain from 1889 to 1924, 1919 excepted. The increasing importance of the Pacific and Mountain groups is significant, despite the set-back which befell the former in 1924.

In Table VII, a comparison of rank in importance for the six census years, one finds the states truly leading in production.

Table VII

Rank of First Six States in Sweet Potato Production, Census Years 1879 - 1924

	1924	1919	1909	1899	1889	1879
First Place	Ga.	Ga.	N. C.	N. C.	N. C.	N. C.
Second "	N. C.	Ala.	Ga.	Ga.	Ga.	Ga.
Third "	Va.	N. C.	Ala.	Va.	Lex.	Miss.
Fourth "	Ala.	Miss	Va.	Ala.	Ala.	Ala.
Fifth "	Tenn.	Va.	Miss.	S. C.	Miss.	Tenn.
Sixth "	S. C.	Tex.	S. C.	Tex.	S. C.	S. C.

The table gives North Carolina the leading position, with four first places, a second, and a third in the six census years. However, it is significant that in the last two Georgia has gained the ascendency. Georgia is a close second for the years tabulated with two first places and four seconds. Alabama has a second, a third, and four fourth places, and is the only other state which is found in one of the first six places in all of the six years. South Carolina places five times, Virginia and Mississippi place four times, Texas places three times, and Tennessee twice - in the first and last years of the series, showing her relative decline and return to importance.

It might be well to associate the situation in the South Atlantic group of the two leading states in production, and of two others which placed in

Table VII, with the relatively great importance of that area in the industry.

4. Trends in Acreage, Production, and Yield in the United States

1879 - 1924 - In Chart 4 it has been attempted to compare trends in acreage, production, and yield by census years for the forty-five year period, 1879 to 1924. In order to place these important phases upon a comparable basis, all three graphs were based upon their respective averages for the six census periods involved. Thus the line XX' represents three separate averages. In other words, had the acreage been uniformly at the average of the six census years, in each of these years, the acreage graph would have been a straight line, falling upon XX'. Likewise, had production been uniformly at the average, its graph would have coincided with the line XX'; and had yield been at the average each of the six years, its graph would also have fallen upon the line XX'.

In bringing the three factors under consideration into the relationship explained above, the following steps were taken:

First, the left-hand margin was scaled for acreage and the average acreage of the six years (569,755 A.) was plotted at the point X.

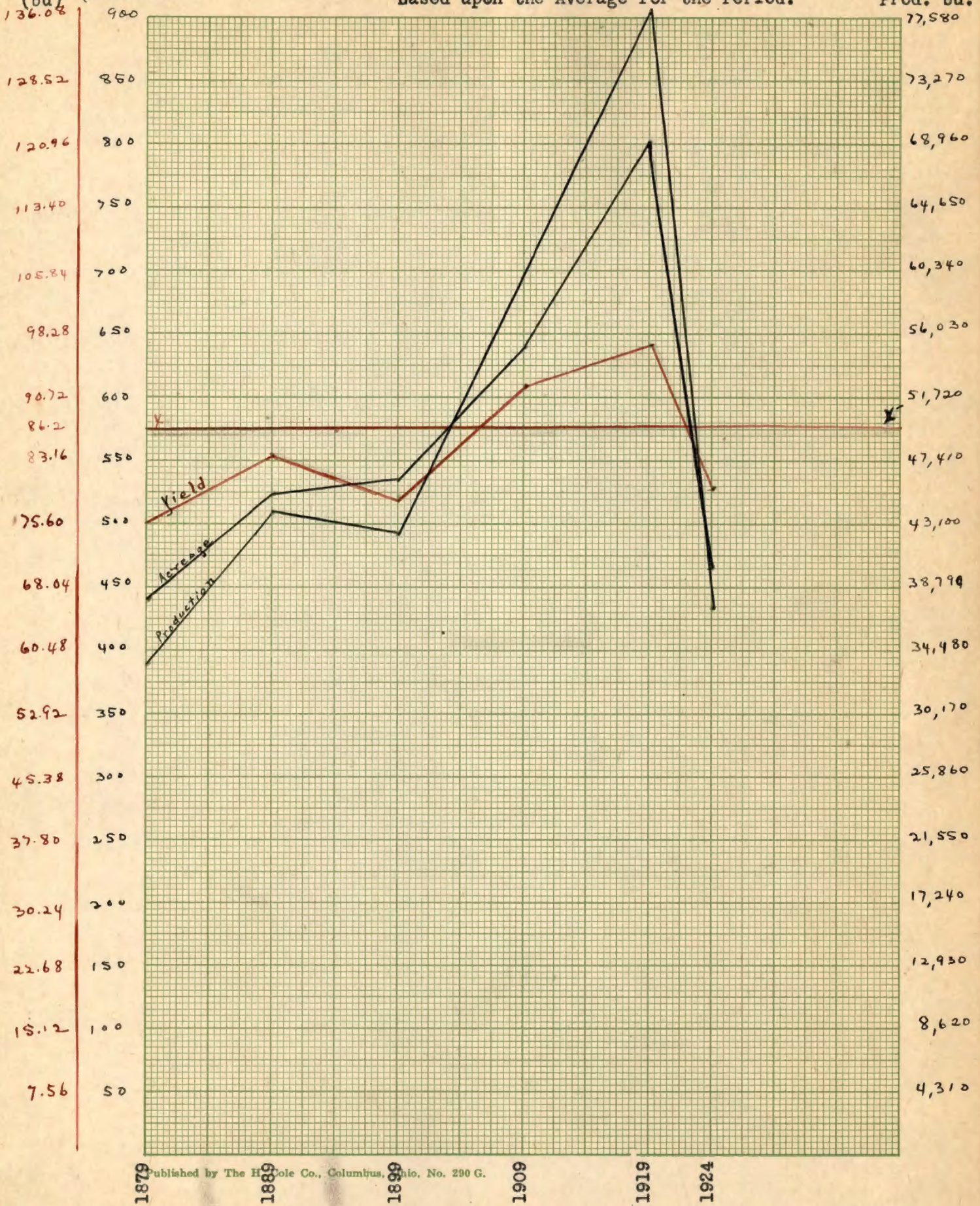
Second, the average production (49,102,370 bu.) was plotted at X' and the right hand margin scaled accordingly for production. Since the average production for the six years, divided by the average acreage for the six years gives the average yield for the period (86.2 bu. per A.), it is evident that any figure in the acreage scale multiplied by the average yield, will give the corresponding figure in the production scale.

Third, since the line XX' represents the average level of yield, or 86.2 bushels per acre, and the lowest line of the chart represents zero, a scale corresponding to the points already evaluated in the acreage scale

Chart 4.

Trends in Acreage, Production, and Yields, Census Years 1879-1924.

Based upon the Average for the Period.



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was constructed by finding the value of each small square and then using the simple process of multiplication.

In studying this chart, it should be kept in mind that each graph is plotted upon its respective scale, there being three separate scales so arranged that should the yield for any year plotted fall upon the line XX', the points for acreage and production would coincide, above, below, or on the line XX'.

In analysing the chart, it is first apparent that from 1879 to 1919, there was a general upward trend in acreage, production, and yield, and that this trend was always upward, for the years charted, in the case of acreage, though yield and production suffered a minor slump in 1899. This upward trend indicates the expansion of the industry to meet the increased demand arising from increase in population, wider use of the commodity, and, in the last period, from war-time stimulation. The disastrous results to all three factors following post-war deflation is evident in the precipitous descent of the three graphs from their 1919 peaks to the low levels where they rested in 1924. In that year yield was lower than for any census year since 1899 and both production and acreage reached their lowest census year levels since 1879.

It is, of course, patent that, since production is the product of acreage and yield, it would be impossible for both acreage and yield to be farther above or below the average than production. However, it is perhaps a coincidence, and perhaps of some significance, that in the six census years plotted an acreage which was below the average invaribly was coincident with a yield which was also below average, while in both years in which the acreage was above the average, the yield was also above the average. A possible explanation for this similar trend of the two factors, resulting in a more violent fluctuation of the third, is that in years when past ex-

perience has set up the psychological state which results in a low acreage, this same discouraged attitude and lack of interest governs the grower in his preparation of the soil, bedding of the seed, and fertilization and cultivation of the crop. The inevitable result is low yield. On the other hand, in a year when the grower has high hopes of gain, his enthusiasm not only leads him to increase acreage, but also to plant, fertilize, and care for the crop in such a manner that high yield is only to be expected. Other factors, particularly weather, enter and may abet or disrupt the results of these influences; but for the years charted, acreage and yield were always both above or both below the average.

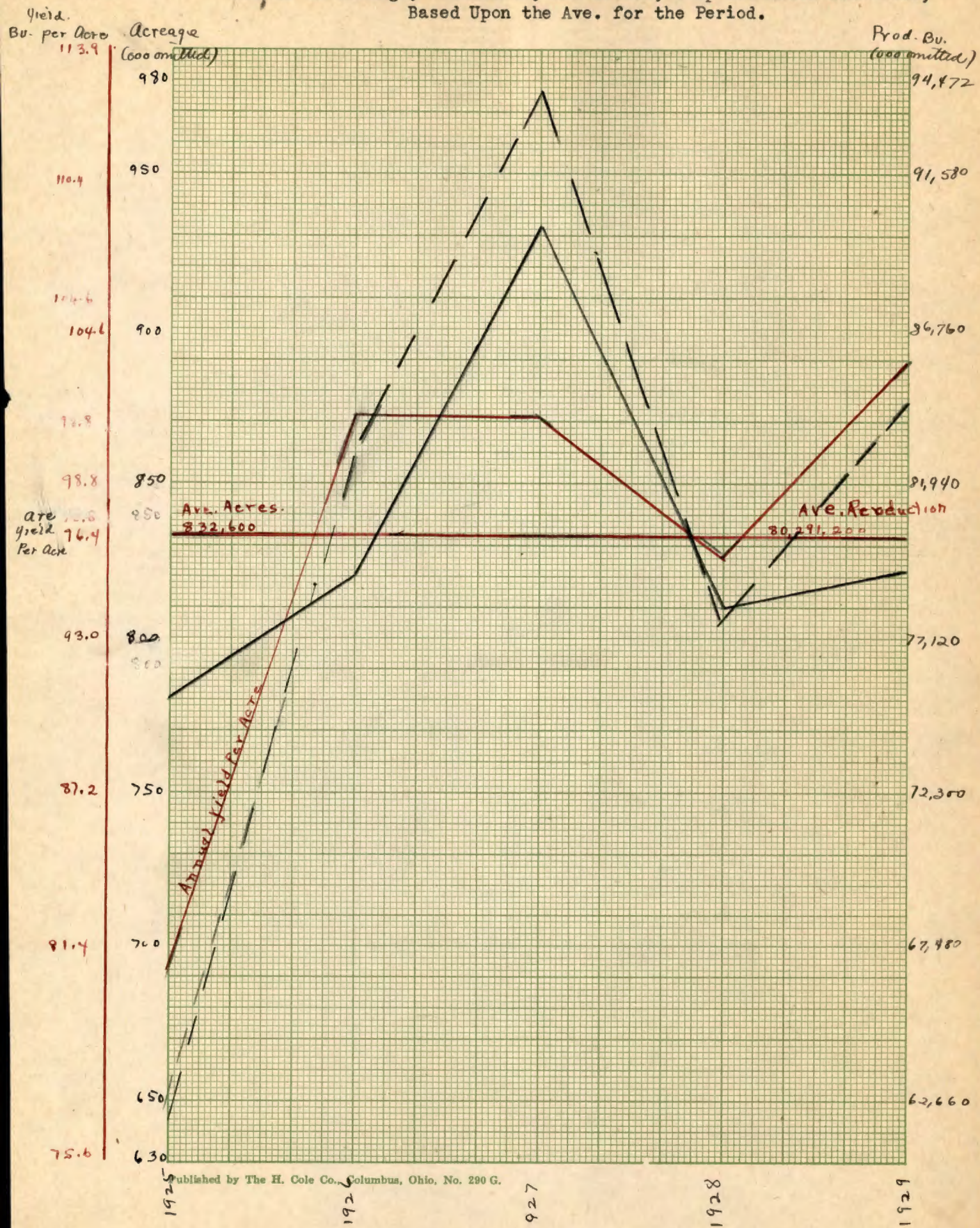
In addition to the trends discussed, it is perhaps noteworthy that, relative to the average, yield fluctuates less violently than acreage, and that production shows the greatest variation from the average, as it must from its very nature, so long as acreage and production both remain on the same side of the average line.

1925 - 1929 - Chart 5 is constructed on exactly the same principle as Chart 4 and covers the five years since the 1924 census, using the averages of crop estimate figures for acreage, production, and yields as the basis of comparison. Since the general level of all three factors had risen, and in order to so scale the chart as to make fluctuations more easily comprehended, the lowest line was allowed to represent 630,000 acres and corresponding points in the production and acreage scales. This in no way affected the scaling principle used, but merely is analagous to cutting off the bottom of the chart, which would contain no graph lines, but merely the scales.

While the estimates of acreage and production for 1925 were markedly above the census figures for these factors in 1924, the yield was very nearly identical. All three were lower than in any of the subsequent four years.

Chart 5.

Trends in Acreage, Production, and Yields, Crop Estimates 1925-1929, Based Upon the Ave. for the Period.



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By 1926 all had risen, but an acreage which was below average held production within bounds. The expansion continued and the high acreage and yield of 1927 so increased production that the 1928 results showed a reaction which it was only logical to expect, all three figures falling below the average. 1929 evidenced a slight recovery in acreage, a greater improvement in yield, and a production moderately above the average.

Thus, in the five year period, the industry has emerged from a depression; climbed to a peak of production with 94,112,000 bu., which approached that of 1922, the greatest in the history of the industry, when 109,394,000 bu. were produced; experienced a minor depression; and again trended upward. The trend for the whole period has, in the case of each factor, been upward, though that of acreage has been conservatively so, four of the five years having acreages below the five-year average, counterbalanced by the disastrously high acreage of 1927.

In this five-year period yield has twice been above the average when acreage has been slightly below, and in three of the five years, yield has been relatively higher than acreage. This shift of yields to a relatively higher level, together with conservatism in acreage expansion, is, possibly, an indication of the modern tendency to concentrate production upon a more intensive basis.

Considering the two charts (4 and 5) one sees the upward movement of the industry in acreage, production, and yields, the effects of over and underproduction and notes that in only two of the eleven years charted has it failed to hold true that yield has been below or above average simultaneously with acreage. This last observation would seem to indicate that there are real causative factors at work which have brought about this result.

5. Yield Trends by Census Geographical Divisions

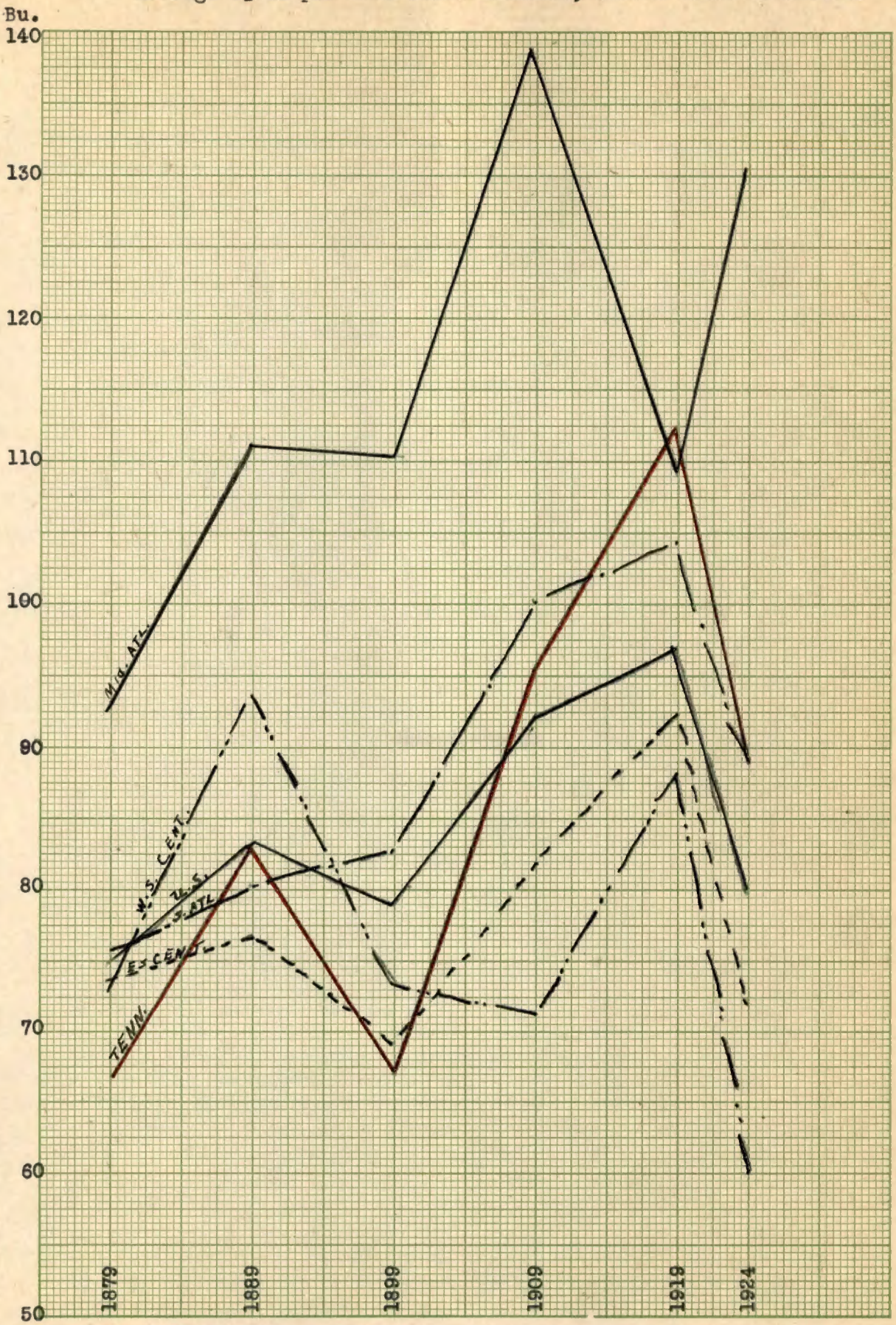
The general upward trend of yields in the United States since 1879 has already been considered. It now seems wise to examine, by groups of states, the component trends which, together, have determined the shape of the graph of yield for the country as a whole.

1879 - 1924 - In Chart 6 are plotted graphs of yield in each of the four census geographical divisions most important in the sweet potato industry. The graph of yield for the United States is also shown; and superimposed upon these, for purposes of comparison, is the graph of Tennessee yields.

Examination reveals that the graph for the United States most nearly follows that for the South Atlantic States, which is the expected situation when it is remembered that the South Atlantic States have usually produced about 50% of the United States crop. The South Atlantic group has nearly always had higher yields than the average for the United States, largely on account of the inclusion of the Eastern Shore trucking section in this group. The yields of the East South Central States, second in importance among the groups, also bear a similarity to those of the United States, though ranging lower. The general trend in yield in the United States and in the two groups mentioned has been upward. Now, considering the West South Central group, it is found that, while the general shape of the graph of yield is, for the most part, similar to the three already mentioned, the fluctuations are more violent and the trend is downward,/ indicating the marginal position of the area. In the last remaining group, the the Middle Atlantic States, the upward trend is apparent, but the shape of the graph is dissimilar to all of the others, especially for the last two periods included, its yield being low in 1919, when all other divisions had

Chart 6.

Average Yield per Acre Sweet Potatoes, Census Years 1879-1924.



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high yields, and high in 1924, when there was a sharp decline in yields for the other groups. Three factors may explain this atypical situation: The Middle Atlantic group is strongly dominated by the southern New Jersey producing area. Its weather conditions are often very different from those of the South. Also, this section, close to good markets, is less affected by depressions in the industry.

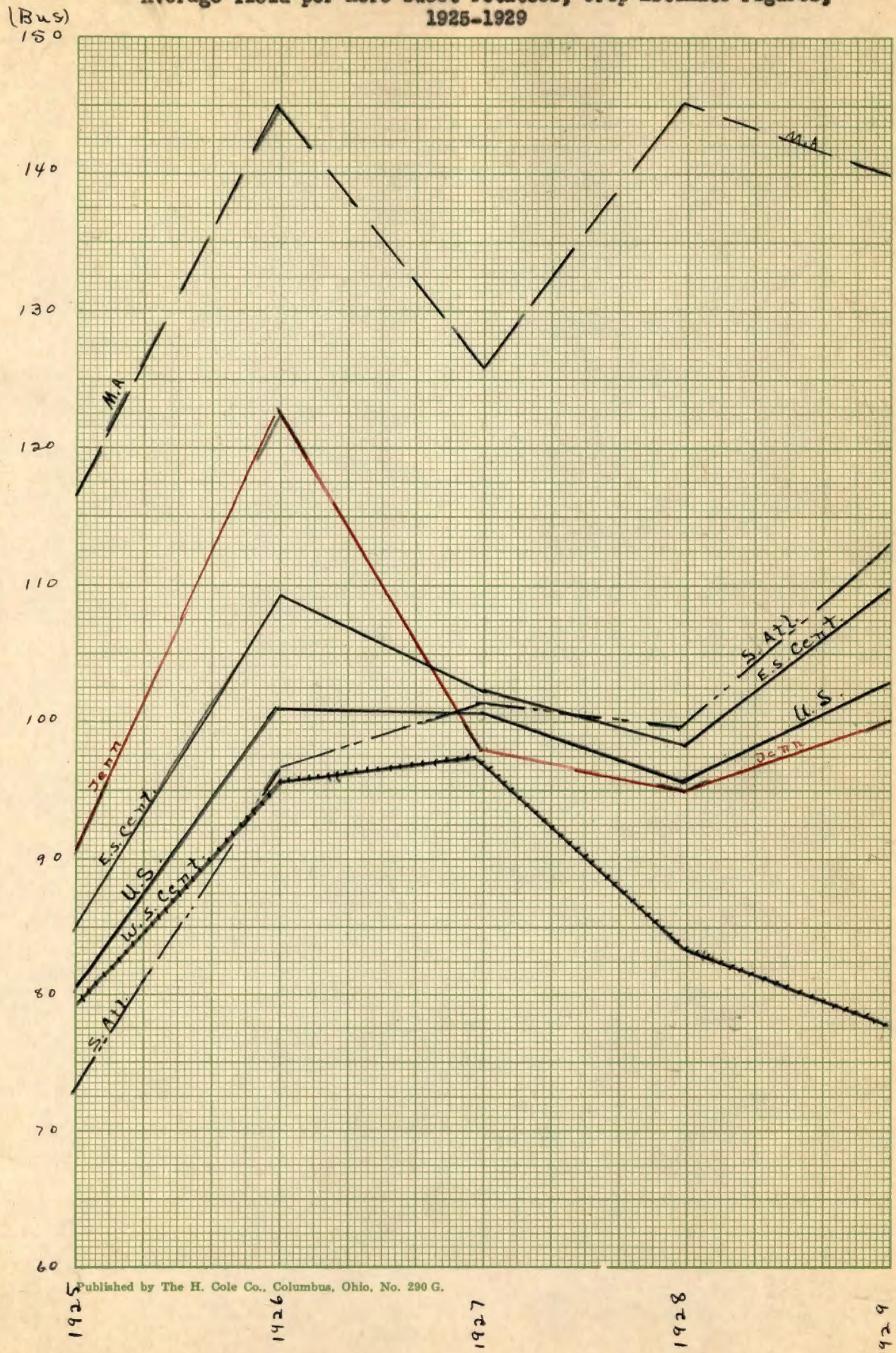
The Middle Atlantic group exhibits superiority in yield. Its lowest yield for the six years was nearly as high as the highest yield in the West South Central group and was well above the average for the United States and for other groups. This is again the result of proximity to good markets. A more certain outlet for the crop, lower transportation costs, and a greater opportunity to take advantage of temporary rises in price in many nearby markets inspire confidence in the grower, which results in better fertilization and cultural practices. The enterprise is on a more stable economic basis and profits are more dependable.

Tennessee clearly evidences its migration from an early position in the division of producers for home use and livestock feeding, with low yields, to its comparatively recent status as one of the important shipping states, with a considerable acreage under intensive production methods, and with consequent higher yields.

1925 - 1929 - Considering the trends for the same divisions and for Tennessee and the United States over the five years since the 1924 census, as shown in Chart 7, which was constructed with the yields computed from crop estimate figures, it is seen that yields for the United States, Tennessee, and the South Atlantic and East South Central groups ran very close together in 1927 and 1928, and did not spread greatly in 1929. For these three years, both the groups mentioned were slightly above the United States

Chart 7.

Average Yield per Acre Sweet Potatoes, Crop Estimate Figures, 1925-1929



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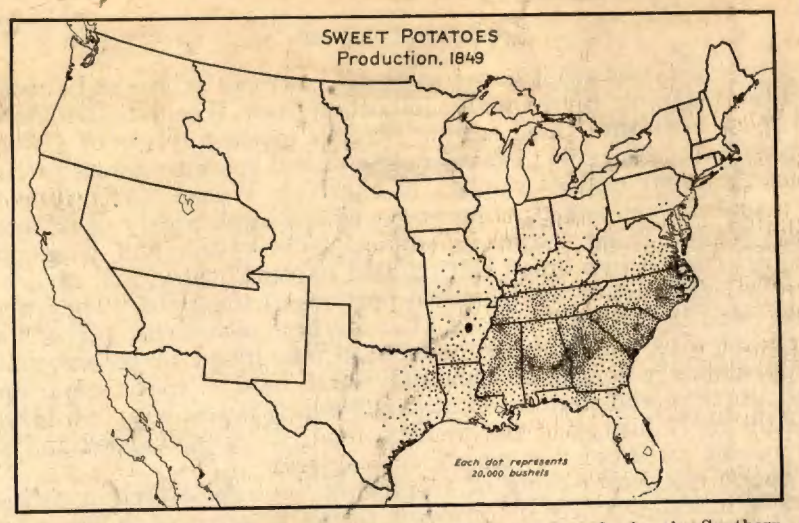
average, and Tennessee was just below that average. All of these four graphs exhibit an upward trend for the five-year period. Tennessee's high yield of 123 bushels per acre, in 1926, was almost phenomenal and, together with the heaviest acreage of the period, brought unfavorable results to the sweet potato industry of the state, as will be further discussed.

The yield of the West South Central group trended upward during 1925, 1926, and 1927, and in the last year was close to the other four graphs mentioned, but after the overproduction of 1927 it dropped off much more rapidly than the others, and while they recovered in 1929, it fell off still further; so that its net trend for the period was actually downward.

The Middle Atlantic yield was again far above that of other groups and above the yield in Tennessee and in the United States. It trended upward for the five years. The nearest approach to its high position was made in 1926, by Tennessee, but even that approach fell short by 22 bushels per acre. Though the Mountain group does not appear on Chart 7, because of its relative insignificance in the industry, it is worthy of mention that, with its small areas of specialized culture, it has lately attained uniform high yields, nearly equaling, and once surpassing, the Middle Atlantic group.

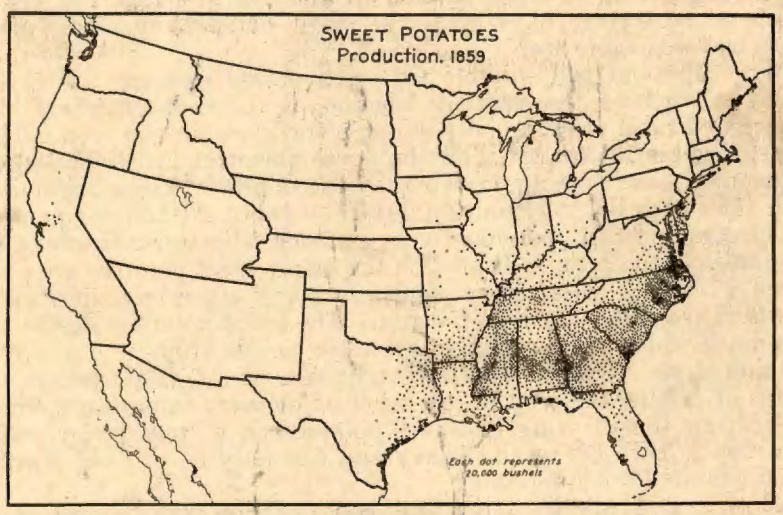
6. Development of Production in the United States

As stated elsewhere, the sweet potato was found among the crops cultivated by the natives when white men first reached America. It formed a staple for early colonists and was greatly appreciated as a source of food for the large holdings of slaves which were an important factor in early southern agriculture. A study of production over a long period of time has shown an upward trend which is still in progress. To give a clearer picture of this progress, Maps 2 to 9 are included and, with their foot-notes,



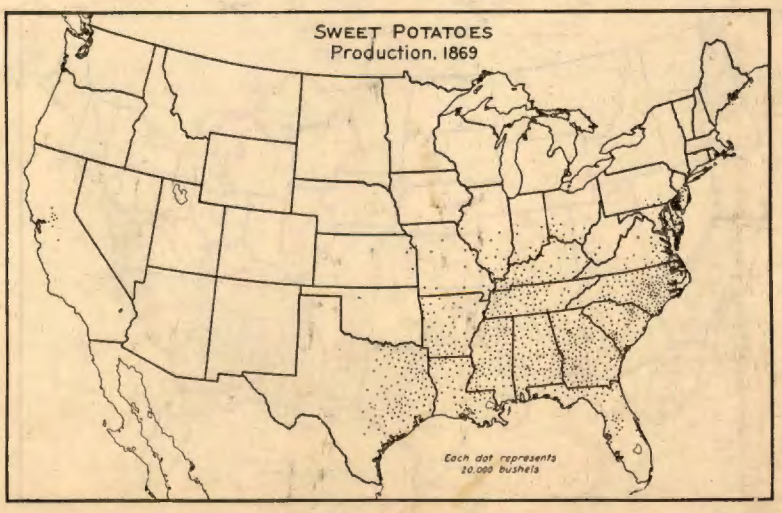
Map 2

FIG. 189.—In 1849 production of sweet potatoes was largely in six Southern States east of the Mississippi River



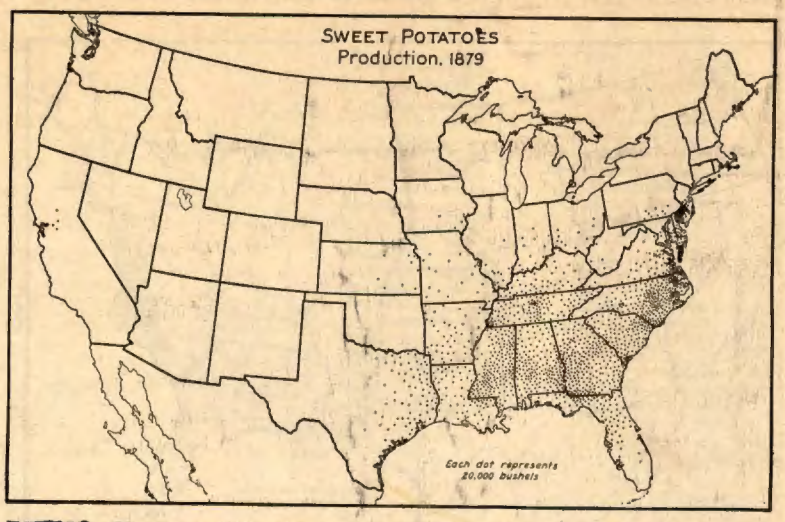
Map 3

FIG. 190.—No change in the bulk of production is to be noted in 1859, although some extension of area is seen. New Jersey and Delaware show increases, and Iowa and California are added to the States growing sweet potatoes



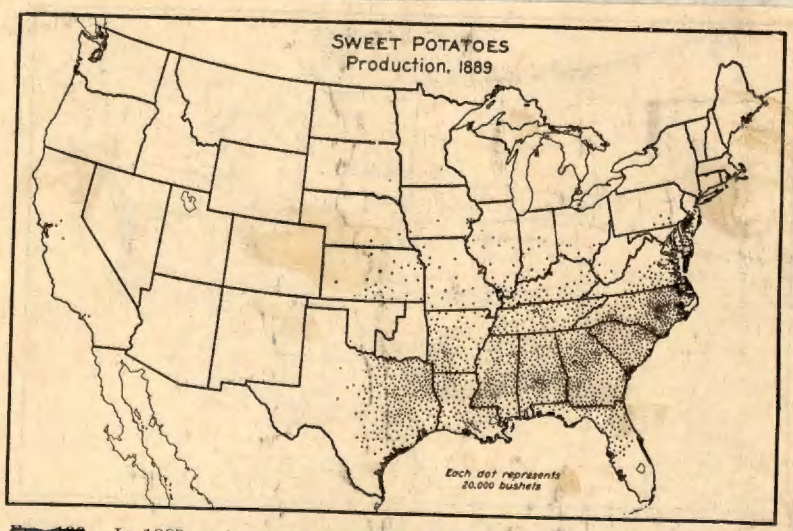
Map 4

FIG. 191.—In 1869 production had fallen off somewhat in the six Southern States, had increased in New Jersey and Florida, and extended into Kansas



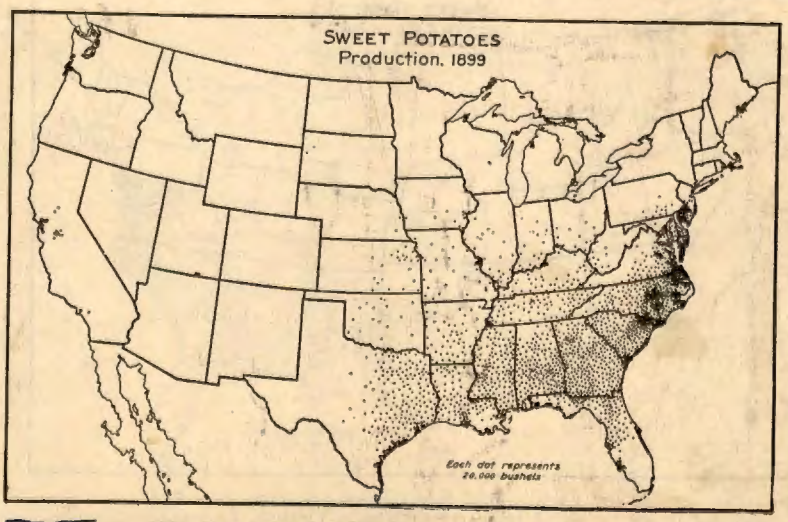
Map 5

[redacted].—There was little change in production in 1879 over that of 10 years previous except for slight further extension in Virginia, Florida, and Kansas



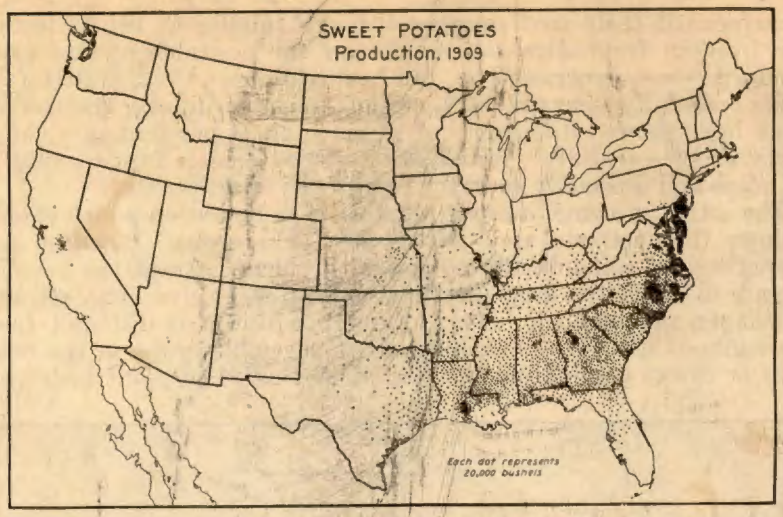
Map 6

[redacted].—In 1889 an increased production is shown in Texas, Louisiana, Arkansas, and Kansas. Nebraska is added to the States growing sweet potatoes



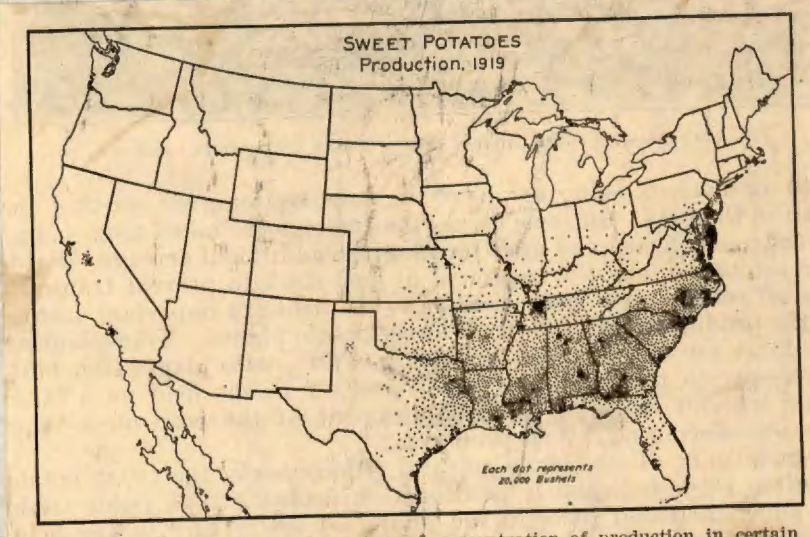
Map 7

[redacted].—In 1899 there was a further increase in production in New Jersey, Virginia, and North Carolina. Oklahoma appears as a producer



Map 8

Fig. 137.—In 1909 there appears a marked concentration of production in certain States, notably New Jersey, the Eastern Shore of Maryland and Virginia, North Carolina, and southern Louisiana. Arizona is added to the list of producing States



Map 9

Fig. 138.—In 1919 the tendency toward concentration of production in certain areas is even more noticeable than 10 years previously. The producing area is extended in Ohio and Iowa, and New Mexico shows for the first time



Map 10

Fig. 139.—Sweet potatoes are a southern crop, but are grown as far north as New Jersey, Indiana, and Iowa. Most of the acreage shown is for home consumption, but those raised in eastern Virginia and Maryland, Delaware, and southern New Jersey are mostly sold in large cities extending from Washington to New York and Boston. The area in northwestern Tennessee supplies Chicago, Detroit, and other central markets. The production of hops is now almost confined to western Oregon and Washington and the great valley of California. Hemp, formerly an important crop in Kentucky, is now grown mostly in Wisconsin

form a brief history of the industry from 1849 to 1919 which is easy to grasp.

Reference to Map 2 shows the early development of sweet potato growing in the South, its native home and also the home of slave labor. Little expansion of the producing area had occurred by 1859, though more concentration is noticeable in the northeastern section and the East North Central States had increased production. At this time, railway facilities for placing the crop on northern markets cheaply were developing rapidly. The map foot-note also points to the entry of California and Iowa as growing states; and by 1869 Kansas had followed their lead. The general retrogression of the industry in the South in that year was probably due to the disrupted conditions existing after the Civil War. Little change is seen in the more northern producing states, except that New Jersey had increased production considerably.

The map for 1879 (Map 5) shows gradual expansion of the industry, production in that year being 33,378,693 bushels; and by 1889 it had increased to 43,950,261 bushels, the map (Map 6) showing a general increase in production and a marked increase in the Northeast. This area and the Carolinas had still further expanded production by 1899, though the total crop for the country had decreased slightly (see Table VIII).

Further increase in the industry in 1909 and the great increase to a production of 78,091,913 bushels in 1919 under war influence are given graphic presentation by Maps 8 and 9.

Table VIII shows the United States production in bushels by census years from 1879 to 1924 and may be useful for comparison with the map series.

Table VIII

United States Production of Sweet Potatoes, Census Years 1879 to 1924

1879	33,378,693	1909	59,232,070
1889	43,950,261	1919	78,091,913
1899	42,517,402	1924	37,443,870

7. Concentration of Production

Additional study of Maps 2 to 9 shows a tendency toward concentration of production in certain areas having favorable factors of one kind or another. By 1919 this tendency toward concentration had made great progress (see Map 9).

Such specialization of production in advantageous sections is not characteristic of sweet potatoes alone, but is increasing in practically all farm enterprises. Where crops are poor in yield or quality, or where they are uncertain, growers gradually lose out in production competition and are forced into enterprises in which their relative advantage is greater. The movement is constantly away from the former wide distribution of small quantity production and toward intensive production where soil, climate, transportation, market, or other advantages prevail.

That this change is in progress is evidenced by Table IX, which shows, for the sweet potato shipping states, the number of counties in each which increased sweet potato acreage from 1919 to 1924, the total number of counties in each state, whether sweet potato acreage increased or decreased in the state as a whole, and the percentage of counties growing sweet potatoes in 1919 and in 1924.

From this table it is seen that, while for every shipping state for which data are available the percentage of counties growing sweet potatoes decreased or remained stationary, and, while in all of these states acreage decreased for this period, yet in all but three there was one or more counties with acreage increase, and in the cases of Kentucky and Texas over thirty counties in each increased their sweet potato acreage. Likewise, Missouri, Oklahoma, Tennessee, North Carolina, Virginia, Georgia, and Kansas had from 11 to 21 counties increasing acreage. This increase in certain counties, coincident with reduction in acreage in the state as a whole and with frequent reductions in the percentage

of counties growing the crop, is indicative of the general trend toward concentration.

Table IX

Sweet Potato Shipping States

Showing Number of Counties Increasing Sweet Potato Acreage, Acreage Increase or Decrease, and Percentage of Counties Growing Sweet Potatoes 1914 - 1924

States Ranked by Number of Counties Showing Increase in Sweet Potato Acreage, 1919 - 1924	Number of Counties Showing Increase in Sweet Potato Acreage, 1919-1924	Number of Counties in State	Inc. or Dec. in Acreage of Sweet Potatoes 1919-1924	Percentage of Counties Growing Sweet Potatoes	
				1919	1924
Kentucky	34	120	Dec.	100.0	96.7
Texas	32	254	Dec.	89.7	73.6
Kansas	21	105	Dec.	91.4	80.0
Georgia	17	161	Dec.	100.0	100.0
Virginia	17	100	Dec.	100.0	96.0
North Carolina	16	100	Dec.	100.0	100.0
Tennessee	16	95	Dec.	100.0	98.9
Oklahoma	15	77	Dec.	98.7	98.7
Missouri	11	115	Dec.	100.0	100.0
Arkansas	9	75	Dec.	100.0	100.0
Louisiana	6	64	Dec.	100.0	96.9
Illinois	6	102	Dec.	91.2	86.3
New Mexico	4	31	Dec.	65.5	41.9
South Carolina	3	46	Dec.	100.0	100.0
Maryland	1	23	Dec.	100.0	100.0
Mississippi	1	82	Dec.	100.0	98.8
New Jersey	1	21	Dec.	95.2	71.4
Alabama	0	67	Dec.	100.0	100.0
Delaware	0	3	Dec.	100.0	100.0
Florida	0	63	Dec.	100.0	96.8
Indiana	(a)	92	Dec.	-	93.5
Iowa	(a)	99	Dec.	-	80.8
California	(a)	58	Dec.	-	39.7

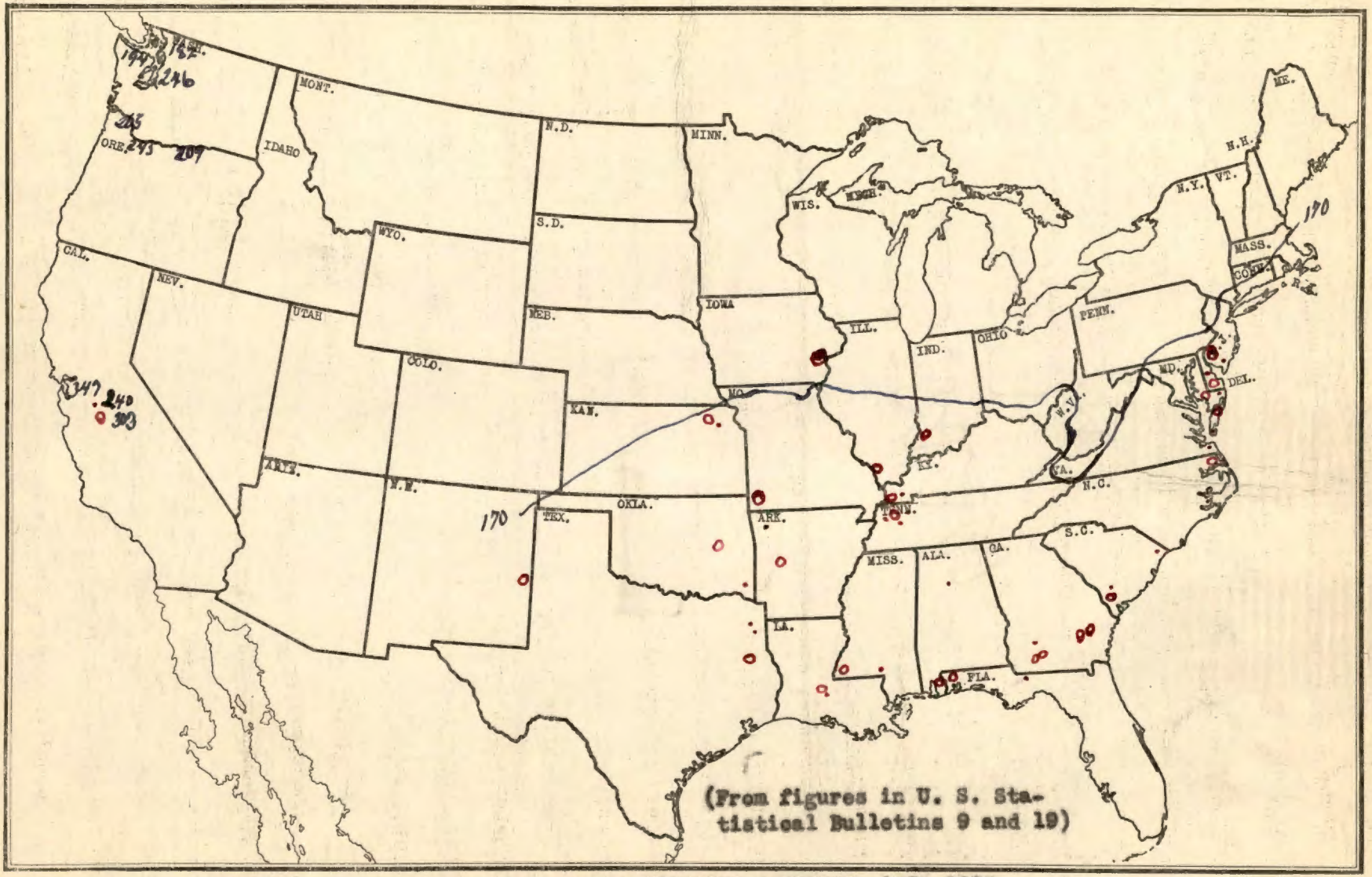
[a] No data for 1919.

At this point it may be well to consider in what general regions specialization in sweet potato production is apt to develop. Two major influences tend to develop such production. First, a good local market will

stimulate the industry within reach of that market. Second, a favorable combination of climate and soil gives an advantage that less favored regions will find it difficult to overcome.

Possibly a clearer realization of the influence of the factors last mentioned on the geographical location of producing sections in the United States may be gained by consideration of the areas producing them for shipment; for, while such factors as local demand and requirements for home use may act to counterbalance unfavorable growing conditions, the continued production of quantities for shipment to the general market in competition with other producing areas, and despite the competitive demand of other crops for the land and labor, are at least an indication of the prevalence of optimum conditions in climate and soil. One other factor is essential to a commercial production area, the presence of favorable transportation facilities. Such facilities are so widely distributed in the United States that their presence could hardly be assigned as the major reason for the situation shown by Map 11.

The first striking feature of this illustration is that the most important shipping county in every state, save one, occurs south of the line which, according to Brigham and McFarlane, marks the northernmost limit of a growing season of 170 days. (2, Brigham and McFarlane, Essentials of Geography, p. 42.) The one exception occurs on sandy soils of the Mississippi basin in Muscatine County, Iowa. It is noteworthy that a considerable portion of the Atlantic Coast of a more northern latitude than Muscatine lies within the area having a growing season of 170 days or more; yet sweet potatoes are not commercially grown in this area. Thompson (3, Thompson, Sweet Potato Production and Handling, p. 11) explains this situation thus: "On Long Island, where the growing season is long, the sweet potato does



MAP 11 CHIEF SWEET POTATO SHIPPING COUNTIES, 1920-1925

Chief Shipping Counties O Counties Next in Importance •

not produce a satisfactory crop because during the early part and the latter part of the growing season the days are relatively cool and the nights are cool most of the time." The same conditions prevail in all this area. It appears that the continental type of climate prevailing in the Muscatine area, where the growing season is shorter but where the change from cold to warm in spring is more violent and the weather hot, day and night, through a goodly portion of the summer, is more favorable to their production than the oceanic type of climate of the North Atlantic Coast. But in such northern latitudes as Iowa the soil becomes a very important factor, since unfavorable soil and short growing season form a combination which is almost certain to preclude high yields. In the Pacific Coast area the varied elevations make for great variations in length of growing season within a few miles. In Map 11 enough figures for particular areas are given to show why it has been possible to introduce the sweet potato as a crop in the Pacific Northwest, as well as the favorable climate of the chief producing area in California.

The second feature of note is the manner in which important shipping areas cling to the low elevations and sandy soils. Thus, if one were to draw a line connecting consecutively the principal shipping counties of the Atlantic and Gulf Coast states, from Gloucester County, New Jersey, to St. Landry County, Louisiana, he could scarcely find a point on the line which would be more than one hundred miles distant from the sea. This points to the favorable conditions offered for the production of sweet potatoes by the low, sandy, warm coastal plain region. Now, following up the Mississippi Valley to the interior shipping areas, it is evident that those in Tennessee, Kentucky, Illinois, Indiana, and Iowa are close to the Mississippi or to its tributaries. Rivers not forming state boundaries are not shown; but upon investigation one finds that Yell County, Arkansas, is on the Arkansas River; Okfuskee County, Oklahoma, on the Canadian; Pottawatomie County,

Kansas, on the Kansas; and Newton County, Missouri, near the Neosho. Going still further and examining a physical map of the central states, one discovers that at least a part of each of these principal shipping counties lies below 1000 feet in elevation and that those in Arkansas, Illinois, and Indiana are partly, and those in Tennessee and Kentucky, wholly below the 500 foot level. All of this indicates that the sweet potato will subsidise those who give it a home in a low, warm region, and that production will be likely to concentrate in such areas.

If additional evidence in this connection is needed we might point to Merced and Stanislaus Counties, the chief shipping area of California, in the low hot San Joaquin Valley, to the absence of a single shipping area of primary importance in or near the Appalachian Highlands; and to the sweet potato contest recently completed in South Carolina. (4, McGinty, The Sweet Potato Contest - 1929, p. 4.) In this contest the state was divided into three districts. The Lower District included a belt approximately 35 miles in width along the coast, the Middle District a belt about 45 miles in width lying between the coastal region and the higher end of the state, and the Upper District, including the whole western end of the state and bordering the Appalachians. Even this Upper District contains very little territory over 1000 feet in elevation; yet its disadvantage when compared with the lower districts is indicated by the results shown in Table X, which is taken from that study and shows a comparison of total yields and yields of No. 1's for the three districts. (4, Ibid., p. 5.) That a step up in elevation apparently brought a step down in yield, and particularly in yield of No. 1's is indicated:

Table X
Yield per Acre by Districts
South Carolina Sweet Potato Study - 1929

	No. of Contestants	Total Yields per Acre	Yield of No. 1's Bu. per Acre
Upper District	32	254	109
Middle District	83	301	174
Lower District	65	320	212

Since 1925 there have been occasional changes in the principal shipping counties within certain states; e. g., Toombs County, Georgia, has outranked other counties of that state; but the principles illustrated have not changed. The chief shipping counties of 1920-1925 are here used for sake of comparison with the 1919 census map of production (Map 19). Upon making this comparison, one finds evidence, first, of the influence of local markets and, second, of home consumption upon production. The former is illustrated by the concentration of production around such cities as Los Angeles, Memphis, Knoxville, Montgomery, and Atlanta, located within the area where sweet potatoes can be raised. These markets are attractive enough to stimulate production; but the production is for the local markets, there being little or no shipping from these sections, which indicates that other enterprises are more profitable than the production of sweet potatoes for the general market in these locations. The latter influence is amply illustrated by the entire cotton belt outside the chief shipping areas. Map 9 shows a wide distribution of production in this area, a production more concentrated than that in some of the shipping areas farther north; yet the great bulk of this production is fed to livestock, consumed locally, or spoils in storage.

8. Factors Further Affecting Production

Aside from these fundamental considerations of climate, soil, and markets, numerous factors enter to influence local acreages and production, as well

as those of the whole country, from year to year. Among these, one of the most prominent is the competition between sweet and Irish potatoes. Areas of commercial production of the two crops overlap in relatively few places. One example of such overlapping is found on the Eastern Shore of Virginia and Maryland. Where overlapping does occur, low prices for Irish potatoes are apt to cause an increase in sweet potato acreage the following year. But even where there is no direct competition for acreage, the size of the country's crop of Irish potatoes and their price have a strong influence upon the price of sweet potatoes, since there is a class of consumer which will shift its buying from one commodity to the other according to price, and thus the acreage of the following year is likely to show the effects.

There is a further conflict within the sweet potato industry, arising from competition between the moist- and dry-fleshed types, an overproduction of one depressing the price of the other, and, therefore, the subsequent production.

In the cotton belt, sweet potato acreage increases after a year of low cotton prices, as either can be grown as a cash crop in many sections. Examples of this tendency may be found by inspection of cotton prices for 1926 and 1927 and of sweet potato acreage for 1927 and 1928. In 1926 the price of cotton was low and sweet potato acreage was increased 15.5% in cotton states in 1927. In 1927 the price of cotton rose decidedly and there was a resultant sharp reduction in the 1928 sweet potato acreage of the cotton belt.

The price of sweet potatoes naturally influences subsequent acreage, increasing production after good prices until, sooner or later, overproduction brings prices downward once more.

9. Trends in Sweet Potato Production per Capita

When placed upon a per capita basis, new aspects of the problem of production are thrown into relief which are worthy of careful consideration by those interested in expanding the industry. An examination of Table XI and Chart 8, which show the relationship of production to population, reveals the character of this relationship in census years from 1850 to 1920, and the estimated relationship in 1929.

Table XI

Per Capita Production of Sweet Potatoes in the United States

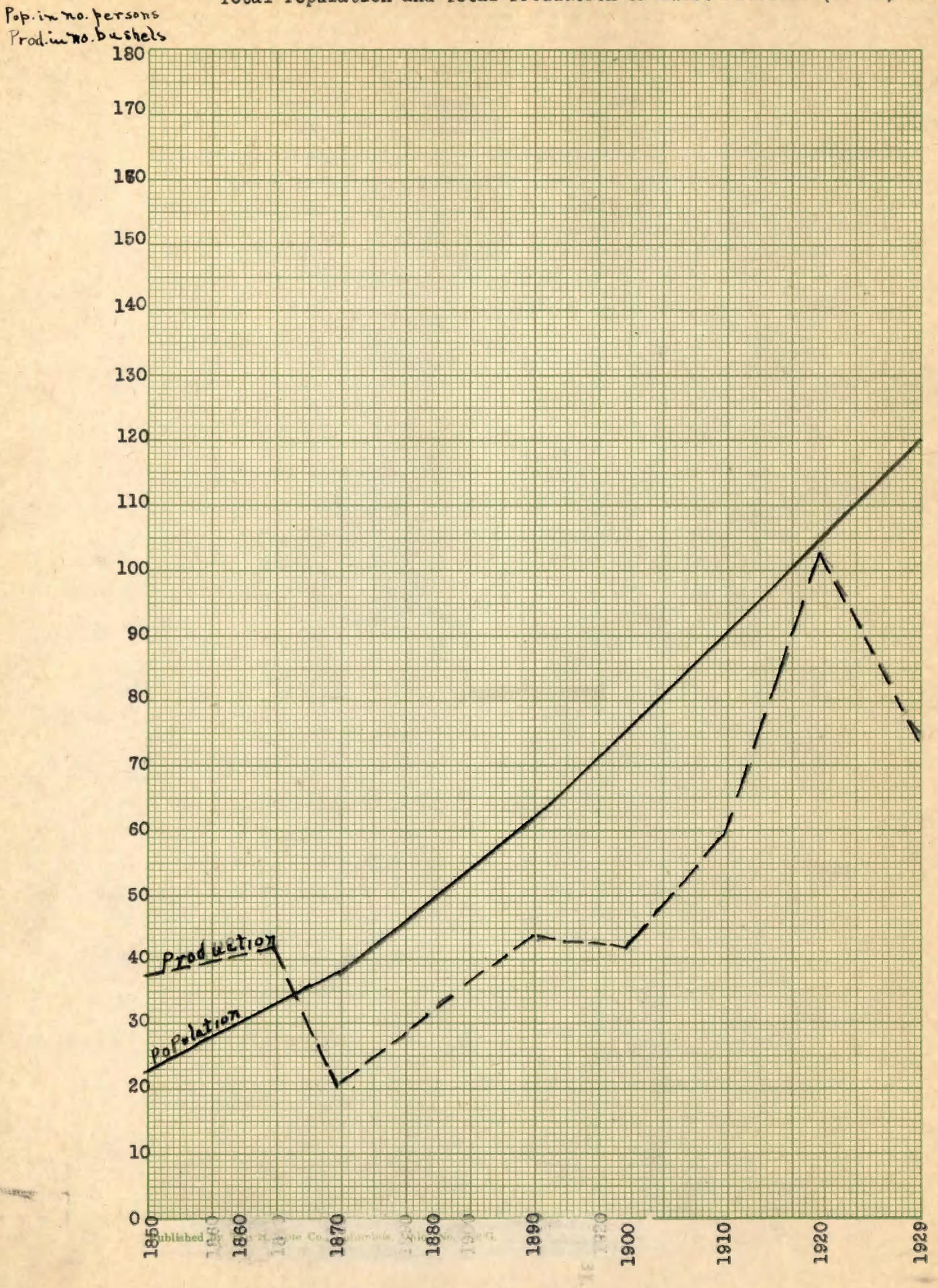
Year	No. Bu. Sweet Potatoes Produced per Capita (U. S.)	Year	No. Bu. Sweet Potatoes Produced per Capita (U. S.)
1850	1.65	1890	0.70
1860	1.34	1900	0.55
1870	0.56	1910	0.65
1880	0.67	1920	0.98
		1929	0.63

In 1850 the per capita production of sweet potatoes was 1.65 bushels, and in 1860 it was 1.34. Then it dropped and was never above 0.70 at any census period until 1920, when it rose to 0.98. In 1929 it had fallen to 0.63.

The probable explanation of this is that before the Civil War the Southern states constituted a large percentage of the population of the entire country. Immediately after the Civil War the West was opened up and a very large number of people went there, these coming largely from northern Europe where they had not been familiar with the sweet potato. Storage facilities had not been developed for the crop in the South and comparatively few sweets were shipped out of that area. Probably this accounts for the high per capita production in the early days, and the rapid fall.

Chart 8.

Total Population and Total Production of Sweet Potatoes (U. S.)



In 1920 the census showed the large 1919 crop, which was the result of the great expansion affecting crop acreages of all kinds arising from the World War.

In 1929 the per capita production was down to practically the same point as in 1910, before the World War began.

It seems that, except for the influence of the World War, the per capita production has stayed fairly close to 2/3 of a bushel per capita during the past 60 years.

10. Is It Desirable to Expand Production of the Sweet Potato?

During and following the World War the per capita production of sweet potatoes increased from a pre-war average of approximately 0.6 bu. to an average of 0.94 bu. for the 5-year period preceding 1924. In 1922 the crop averaged slightly more than 1 bushel per capita and the high point of profitable production was passed. Prices were very low, and the acreage was sharply reduced the following year.

Influences Stimulating Production - A group of influences is at work which tends constantly to increase sweet potato production. Important among these are: the suitability of sweet potatoes for replacing cotton where boll weevil is troublesome; similar suitability for those areas crowded from cotton production by the Southwest; use of sweet potatoes as an aid to diversification in farming; increase in northern demand; improved storage methods and facilities; and increased opportunity to market the crop for cash at digging time. The factor last mentioned has resulted largely from the influx of dealers to favorable producing areas and their construction and ownership of storage facilities where they can hold potatoes, bought at low prices in the autumn, for high winter and spring markets.

Several classes of producers find increased production profitable: those who need more sweet potatoes for home use; those whose livestock enterprises warrant their production for feeding purposes; those conveniently located for taking advantage of local markets; those so favorably situated that production costs are low; and those enjoying an advantage of location such that transportation costs to market are relatively light. Such growers can, and doubtless will, expand their production to the limit of profitableness. Those less favored by special advantages should go cautiously and consider the consequences.

When production surpasses consumption the producer suffers; and on the average of a period of years, it is doubtful if the consumer benefits, since the reaction after low prices is high prices which tend to counterbalance all previous advantages to the consumer. Both producer and consumer would benefit from a better adjustment of supply to demand.

Could the growers uniformly produce such a moderate and even crop, year by year, that the price would be fairly profitable to them, and still sufficiently low to consumers to maintain and increase consumption, the situation would be as satisfactory as one can well imagine. In attempting such an adjustment the growers have the advantage of a good outlet for the surplus through livestock feeding. Hogs are especially useful in this respect, as they will make satisfactory gains in weight, and perform most expensive process in production - the harvesting - doing their own digging.

It is well known that high prices for any considerable period so stimulate production that the reaction is injurious, if not disastrous, to producers, yet little has been done to preclude this serious situation and growers periodically undergo rigorous treatment at the hands of changes in the economic cycle. Widening distribution and increasing demand, which is aided by improved quality, are helpful in moderating the effects. However, the only certain remedy is to

Table XII

Educational Work by Extension Service on Sweet Potatoes, 1927

United States As a Whole

Project or Line of Work	Reported by County Agricultural Agents		Reported by Home Demonstration Agents		Reported by Club Agents[a]		Total of All Lines of Work	
	Agents Reporting	Number	Agents Reporting	Number	Agents Reporting	Number	Agents Reporting	Number
Adult result demonstrations	489	5284	-	-	-	-	489	5284
Junior demonstrations[b]	308	2599	-	-	8	218	316	2817
Farms planting improved seed	344	6048	-	-	3	51	347	6099
Farms practicing seed selection	269	3372	-	-	1	6	270	3378
Farms treating seed for disease	311	5818	-	-	-	-	311	5818
Farms spraying or dusting for disease and insects	65	800	-	-	-	-	65	800
Farms adopting other improved practices	192	3650	-	-	2	38	194	3688
Different farms adopting better practices	611	18919	-	-	3	78	614	18977

[a] Includes a small amount of work in counties without extension agents, reported by state club leaders.

[b] Boys' and girls' club members.

control production, and this is very difficult to effect under the present disorganized condition of the industry.

Three possible channels exist for bringing about controlled production. It may be enforced by law. Attempts at such control in other fields have usually aroused great antagonism and have entailed injustice and dissatisfaction. Our present method of allowing overproduction to dictate and effect underproduction may be allowed to continue its sway, with resultant hardships and unfortunate victims. But the logical step for an intelligent forward-looking people such as Americans is to voluntarily unite its effort in controlling the operation of an economic law which proves disastrous when allowed to work through the unenlightened psychological reactions of those concerned.

Table XII is submitted in evidence of effort that is being made in the right direction toward the end of improved quality and reduced unit production costs. Further work with particular stress upon the economic principles involved in producing and distributing the crop might well be entered upon, bearing in mind always that such effort must be directed at ends which the producer can and will put into practice if it is to be of any value. The true enlightenment of all interested parties is the surest course to sane volume of production.

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CHAPTER III

ACREAGE, PRODUCTION, AND YIELDS IN TENNESSEE

1. Acreage Trends in Tennessee as a Whole.
2. Acreage Distribution in Tennessee in 1924.
3. Acreage Trends in Tennessee Counties.
4. Trend of Yield and Production in Tennessee as a Whole, 1879-1924.
5. Trend in Yields in Tennessee Counties.
6. Quantity Produced by Counties.
7. Quantities Produced in Middle of 19th Century Compared with Recent Years.
8. Farms Reporting Sweet Potatoes Grown, 1909-1924.
9. Number of Acres per Farm Reporting Sweet Potatoes in 1924.

1. Acreage Trends in Tennessee as a Whole

Both census data and estimates of the United States Department of Agriculture are used to show a time series of acreage for a fifty-year period beginning with 1879. As shown in Table XIII and Chart 9, there was a downward trend from the 1879 census to the 1899 census. It is apparent that the greatest decline during this twenty-year period occurred from 1879 to 1889. The acreage decreased from 35,432 to 23,746, or approximately one-third. This decline was opposite to the upward trend in the United States as shown in Table XIII and a comparison of Charts 4 and 9. Table VIII shows an increase from over 33 million bushels to nearly 44 million bushels. With this situation in mind, one may inquire as to the reason for it. While an answer to the inquiry is not possible, with the available data, a knowledge of the situation prior to 1879 will probably be helpful. From 1849 to 1859 a similar reverse trend occurred, as shown by production in bushels - acreage data not being available. Tennessee's production at this time declined from about 2.8 millions to 2.6

million bushels, while the production in the United States increased from 38.3 millions to a little over 42.0 millions (see Table XXI on production). During the Civil War period, 1860 to 1870, both declined approximately 50%, which was due, undoubtedly, to the effects of the war. On the other hand, the production in both Tennessee and the United States increased during the 1869 to 1879 period following, the former from 1.2 million to almost 2.4 million bushels, and the latter from 21.7 to 33.4 million.

Thus, prior to 1879, and since 1849, the trends in Tennessee and the United States were in opposite directions during one period and in the same direction in the other two periods.

The acreage decline in Tennessee from 1879 to 1889 continued through the following ten-year period but at a diminished rate (see Chart 9). A downward trend also occurred in the United States.

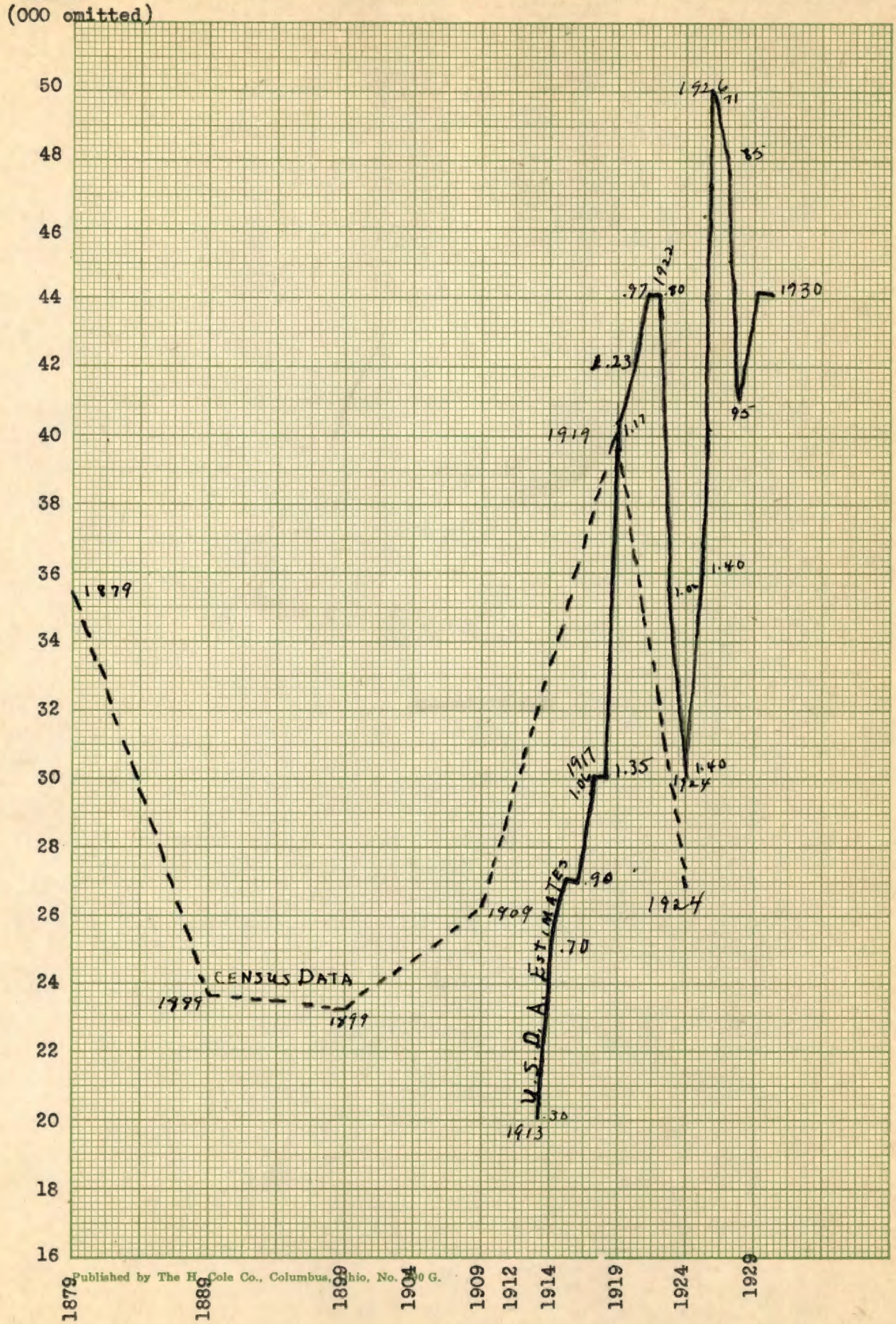
Table XIII

Acreage of Sweet Potatoes in Tennessee and the United States, 1879 - 1929

Year	Tennessee Acreage		Total United States
	Rank	Number	
1879 (Census)	7	35,432	444,817
1889 "	9	23,746	524,588
1899 "	9	23,374	537,312
1909 "	9	26,216	641,255
1913 (Estimates)	11	20,000	625,000
1914 "	9	25,000	603,000
1915 "	10	27,000	719,000
1916 "	10	27,000	774,000
1917 "	11	30,000	963,000
1918 "	10	30,000	922,000
(1919 "	(10	(40,000	(1,029,000
(1919 (Census)	(9	(39,645	(803,727
1920 (Estimates)	9	42,000	992,000
1921 "	9	44,000	1,066,000
1922 "	9	44,000	1,117,000
1923 "	10	35,000	993,000
(1924 "	(9	(30,000	(691,000
(1924 (Census)	(8	(26,832	(466,832
1925 (Estimates)	9	36,000	779,000
1926 "	7	50,000	819,000
1927 "	8	48,000	933,000
1928 "	9	41,000	810,000
1929 "	9	44,000	822,000

Chart 9.

Trend in Sweet Potato Acreage in Tennessee, 1879 - 1929.



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During the period from 1899 to 1919 the acreage trend in Tennessee was upward. The increase was continuous through two census periods, reaching a high point of 39,645 acres in 1919. The greatest increase was made from 1909 to 1919. This is best shown by Chart 9, which represents the annual acreage estimates, as well as the changes as reported in the census figures. From a low level of 20,000 acres in 1915 the number of acres increased continuously to 40,000 in 1918, and to 44,000 in 1921, where it remained in 1922. These were the highest acreages reported since 1879.

Acreages since 1923 have been more erratic than in the preceding ten-year period. The decrease to 30,000 acres in 1924 was followed by a continuous upward trend to the peak acreage of 50,000 in 1926. Two years of decreasing acreages followed. However, the estimate in 1928 was only 3,000 acres less than the second highest acreage reported, in 1921 and 1922. An examination of Chart 9 shows that the gain from 1928 to 1929 was exactly this amount, placing the acreage in 1929 at exactly the point reached in 1922, 44,000 acres. The preliminary estimate of July 1, 1930, was the same as for 1929.

The trend in this state since 1900 followed, fairly closely, that in the United States -- that is, upward from 1899 to 1922, downward to 1924, and then upward again. However, the peak production was reached in the United States in 1922, instead of 1926, as in Tennessee; and the highest production since 1922 occurred in the United States in 1927, one year later than the high production year in Tennessee (see Table XIII and Charts 4 and 5).

Apparently the continued increase in Tennessee from 1913 to 1919 was influenced to some extent by the increased demand for food products during the World War period. During the entire period since 1913, for which annual price data are available, acreage has responded to price in most years. In other words, low prices influence producers in general to decrease their acre-

age the year following, while, on the other hand, acreage is often increased the year following high prices. It is not the purpose of this section to make a detailed study of prices as affecting acreage; but it is significant to point out here the more obvious relations of acreage to price. For instance, on Chart 9 note the increase in acreage in 1919, following the high price of $1.35 in 1918. The prices were undoubtedly fairly satisfactory until 1921 and 1922, for production continued to increase. The high acreage and production the latter year brought a low price of 80¢, which apparently was a factor in the decline of acreage to 1924. Then conditions reversed. The high price of $1.40 in both 1924 and 1925 stimulated acreage, which resulted in the peak acreage of 1926. Again low prices existed, which undoubtedly influenced the decline in acreage in 1927 and 1928. This relation of price to acreage is well illustrated by the expansion of the sweet potato industry in some of the counties in the southern part of East Tennessee and the southeastern part of Middle Tennessee, following the high price in 1924 and 1925. New storage houses were filled in 1926 that have never been more than one-half full since - and some less than one-half. The low price in 1926 discouraged production.[1]

Acreage since 1922 has likely been affected by factors other than price - at least indirectly by the factors that affect price, such as, production, demand, and business conditions. Price might be termed as one of the immediate factors affecting acreage.

It is interesting to note that Tennessee's relative rank in acreage among the states has changed but little since 1879. According to Table XIII, its rank of seventh at that time was equalled only in 1926. Regardless of the fluctuations, the rank has been either ninth or tenth during most of the period. This indicates that the trends in the United States have followed closely those in Tennessee. As a matter of fact, this was true, as shown previously

[1] Results of survey made which is discussed more fully in Chapter VII.

by comparison of Chart 9 with Charts 4 and 5.

2. Acreage Distribution in Tennessee in 1924[2]

This crop is widely distributed throughout the state. In fact, in 1924 it was reported grown in every county except Lake. Five years prior it was grown in all of the counties. However, most of the acreage is concentrated in a relatively few counties. This is shown in Table XIV, and is illustrated in Map 20, in which the acreage for 1924 is inserted in each county. At that time, according to the table, only 5 counties reported more than 1,000 acres - one reporting over 3,000, two reporting from 2,000 to 3,000, and two reporting from 1,000 to 2,000. On the other hand, 60 counties grew from 100 to 500 acres, and 27 reported less than 100 acres.

Table XIV

Number and Percentage of Counties Having a Given Number of Acres in Sweet Potatoes in Tennessee, 1919-1924

Acreage Groups	1924		1919	
	Number of Counties	Percentage of Total Number	Number of Counties	Percentage of Total Number
Over 3000 acres	1	1.0	2	2.1
2000 - 3000 acres	2	2.1	1	1.0
1000 - 2000 "	2	2.1	4	4.2
500 - 1000 "	3	3.2	3	3.2
100 - 500 "	60	63.0	73	76.9
50 - 100 "	18	19.2	8	8.4
1 - 50 "	8	8.4	4	4.2
0 "	1	1.0	0	0.0
Total	95	100.0	95	100.0

Approximately 50% of the state's acreage, representing 13,241 acres, was in West Tennessee's 21 counties. This acreage was largely concentrated in 5 counties: Weakley, Henry, Shelby, Gibson, and Carroll. They reported

[2] No data available by counties since 1924.

10,304 acres, which was 77.7% of the West Tennessee total and 38.5% of the state total. Three of these counties, Weakley, Henry, and Shelby, had 8,115 acres, or nearly one-third of the total acreage in the state. Weakley County alone had 3,624 acres which was 13.5% of the state total and 27.5% of the West Tennessee total.

An examination of Map 20 shows that the other counties in West Tennessee had less than 500 acres and that 9 reported less than 200 acres. This is a further indication of the concentration within a few counties in this area.

Some of the factors that are favorable to production in this area are; soil, climate, and transportation facilities. Sweet potatoes produce best on sandy soils and those of a similar nature, and in areas where temperatures are high, both night and day, during the growing season. These soil and climatic conditions are found in this area (see pp. 3 and 54). It is served by a network of railroads which lead into Chicago -- one of the largest markets. The freight rates from West Tennessee to this mid-west market and others are more favorable than from many of Tennessee's leading competitors (see Chapter VI for further discussion).

A further study of Map 20 reveals that the acreages in each of the counties of East and Middle Tennessee in 1924 are relatively small, with the exception of that in Knox, Hamilton, and Rhea Counties in the eastern part, and Davidson in the central part of the state. The acreage in Knox, in Hamilton, and in Davidson Counties is undoubtedly influenced by their cities. The crop is grown largely for the local markets. In fact, the acreage in some of the adjacent counties is likewise affected by these city markets. Some of the farmers are producing sweet potatoes for these nearby markets as a side line to their general farm operations.

From the above discussion and illustrations, the great concentration,

yet wide distribution, of the crop is obvious. With the present distribution in mind, one is better able to follow the trends in acreage in these areas over a period of years. These trends are presented in the following section.

3. Acreage Trend in Tennessee Counties

It is the purpose of this section to show the shifts that have occurred in the principal producing areas since 1879. It will be shown that some areas, once leading in acreage, are now of minor importance; that a great expansion has occurred in the western part of the state; that the change in some city counties has been opposite to that in the present leading commercial areas; that there has been a recent expansion in some of the less important counties, as indicated by car-lot shipments; and that the majority of the counties have had only a comparatively small acreage in each census year, which provides potatoes largely for farm and local market consumption.

Acreage changes from 1879 to 1924 are shown by census data. The quantities produced in the principal areas mentioned are shown for the period from 1849 to 1879 as indicative of the trends in acreage during that time. Use is made of data on car-lot shipments, collected by the United States Department of Agriculture, and of field data to show probable trends since 1924. The census data for each census year are presented in Table XI and for each census year, 1849 to 1925, in the series of Maps Numbers 12 to 20. Since no early figures as to acreage are available, Maps 12 to 14 show production for the three census years, it being assumed that the concentration of production is at least an indication of concentration in acreage.

Table XV

Acreage of Sweet Potatoes, 1879 to 1924, Ranked by 1924 Data[a]

Counties	1924	1919	1909	1899	1889	1879
1. Weakley	3,624	5,957	279	198	196	530
2. Henry	2,476	2,295	284	259	255	478
3. Shelby	2,016	3,356	1,972	1,829	902	2,000
4. Gibson	1,280	1,434	379	453	391	536
5. Knox	1,141	1,482	1,518	852	538	660
6. Carroll	908	1,978	364	274	228	453
7. Rhea	578	201	188	169	169	143
8. Davidson	516	1,236	1,693	1,254	1,345	1,526
9. Hamilton	468	1,603	738	478	487	202
10. Madison	463	774	441	262	323	462
11. Haywood	401	209	285	182	348	413
12. Campbell	388	342	351	196	138	158
13. Wilson	368	410	486	422	361	898
14. Putnam	347	442	395	328	250	294
15. Lawrence	318	417	291	158	188	356
16. Obion	317	309	282	166	242	384
17. Sevier	315	392	433	422	295	264
18. Anderson	314	485	505	309	276	268
19. Franklin	311	380	310	288	316	798
20. Overton	302	413	341	326	335	491
21. Blount	297	467	386	389	284	350
22. Dickson	293	334	408	226	254	391
23. Hardeman	258	419	245	249	367	781
24. Hawkins	243	193	177	455	325	363
25. Warren	240	455	254	228	340	257
26. Scott	239	256	226	212	241	171
27. Jackson	238	249	263	252	340	392
28. Union	227	278	235	261	275	236
29. Macon	223	222	186	293	179	333
30. Fentress	216	273	166	149	148	164
31. Marion	212	234	215	186	252	241
32. Monroe	212	312	395	310	206	369
33. Lincoln	206	311	307	136	317	776
34. Roane	206	334	397	248	336	290
35. Coffee	204	303	215	219	285	270
36. Henderson	196	357	250	311	235	478
37. Grainger	194	179	223	261	197	335
38. McMinn	193	231	340	250	370	69
39. Morgan	195	276	274	241	189	168
40. Crockett	192	739	182	251	184	429
41. Fayette	186	385	292	357	477	907
42. Greene	179	234	156	477	287	384
43. Humphries	169	240	239	213	226	348
44. Hickman	166	276	247	217	258	386
45. White	166	316	310	208	216	351
46. Pickett	160	125	84	146	163	?

(continued)

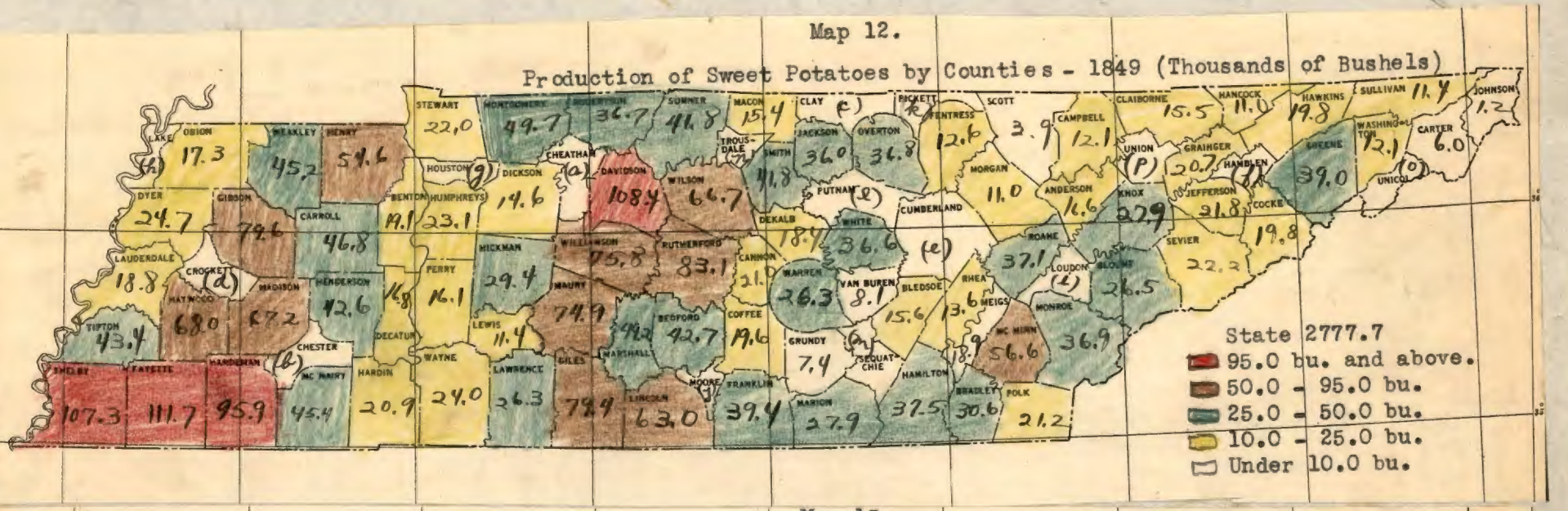
Table XV (continued)

Counties	1924	1919	1909	1899	1889	1879
47. Claiborne	159	274	253	359	213	417
48. Williamson	156	191	162	152	231	615
49. Tipton	150	358	313	266	181	342
50. Hamblen	143	223	239	158	143	193
51. Maury	143	265	371	159	249	830
52. McNairy	141	266	236	124	155	475
53. Robertson	139	128	158	165	218	352
54. Decatur	138	163	96	122	147	195
55. DeKalb	137	161	171	250	151	381
56. Clay	136	127	172	174	165	256
57. Bradley	133	44	300	227	364	156
58. Jefferson	130	134	166	301	314	211
59. Carmon	129	193	126	145	253	381
60. Loudon	125	197	236	150	103	261
61. Houston	124	129	100	97	104	100
62. Grundy	111	129	138	100	62	87
63. Polk	110	65	173	145	153	126
64. Wayne	105	135	152	112	202	283
65. Cumberland	104	195	148	112	102	154
66. Hancock	104	135	118	178	148	282
67. Washington	103	162	139	260	203	358
68. Sumner	102	203	206	220	203	491
69. Chester	97	184	172	109	141	not formed
70. Bedford	92	256	288	252	406	958
71. Smith	91	250	167	247	208	414
72. Carter	90	87	101	150	122	137
73. Cheatham	89	205	143	134	164	230
74. Dyer	84	281	209	142	160	454
75. Rutherford	84	240	371	337	559	829
76. Montgomery	83	397	365	308	601	632
77. Giles	79	275	325	193	396	647
78. Lauderdale	77	385	154	84	88	447
79. Cocke	73	193	193	279	224	260
80. Hardin	72	222	149	111	293	285
81. Sequatchie	68	84	77	71	92	45
82. Sullivan	66	136	105	237	175	354
83. Van Buren	64	94	65	48	68	54
84. Meigs	63	67	115	130	152	199
85. Stewart	59	128	147	133	154	187
86. Trousdale	55	41	16	48	62	182
87. Bledsoe	48	142	125	116	103	87
88. Lewis	48	132	68	56	45	64
89. Marshall	45	130	178	96	274	588
90. Perry	39	32	70	120	126	199
91. Benton	33	124	99	177	333	308
92. Johnson	33	50	56	110	41	95
93. Moore	12	69	24	79	88	189
94. Unicoi	7	51	38	39	41	36
95. Lake	0	17	16	22	32	75
State	26,832	39,645	26,216	23,374	23,746	35,432

[a] Source: Census of Agriculture.

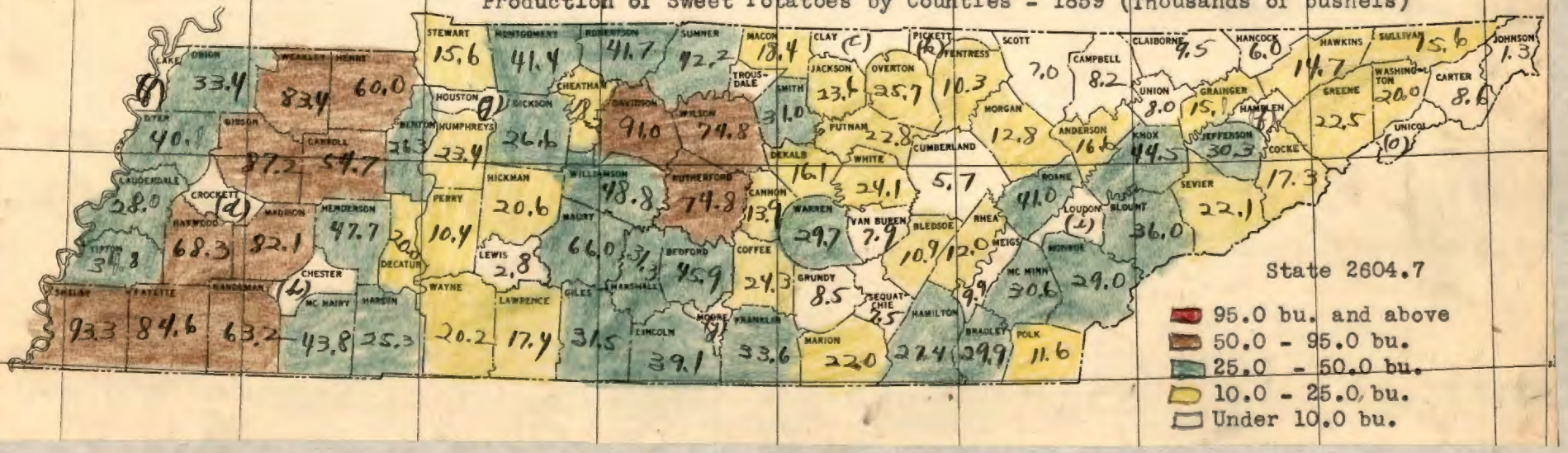
Map 12.

Production of Sweet Potatoes by Counties - 1849 (Thousands of Bushels)



Map 13

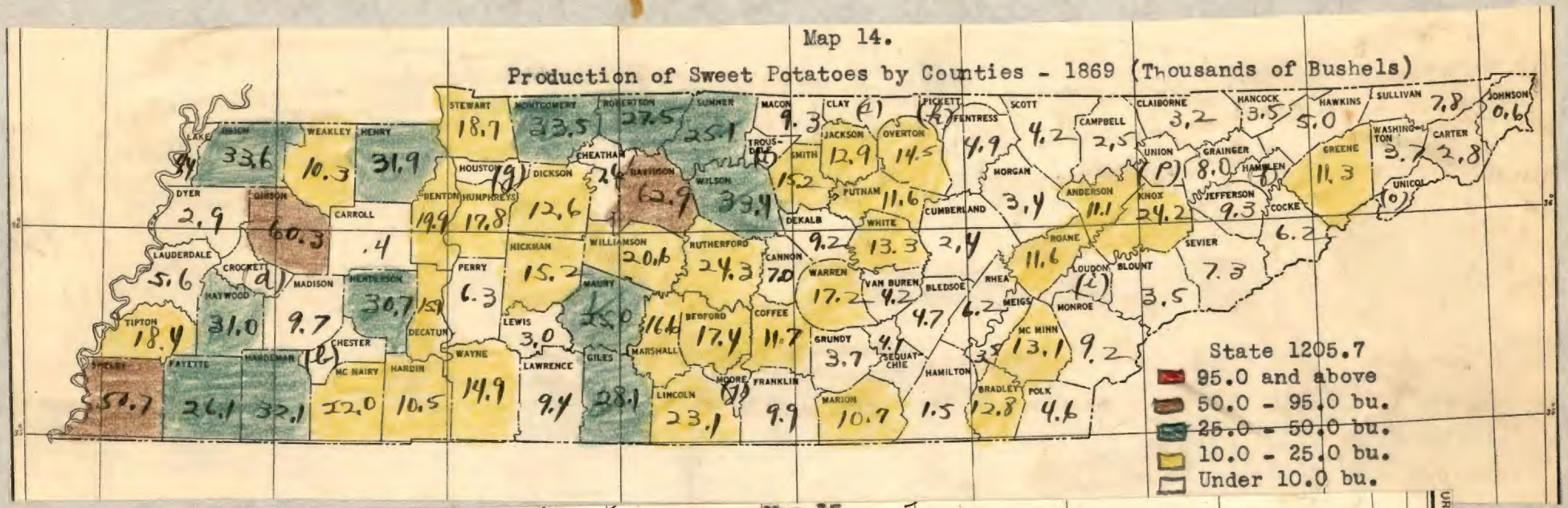
Production of Sweet Potatoes by Counties - 1859 (Thousands of bushels)



[a]Formed from Davidson, Dickson, Robertson, and Montgomery. [b]Formed from Madison, Henderson, McNairy, and Hardeman. [c]Formed from Overton and Jackson. [d]No data; formed 1845. [e]Formed from White, Van Buren, Bledsoe, Rhea, Roane, Putnam, and Morgan. [f]Formed from Grainger, Jefferson, and Hawkins. [g]Formed from Dickson, Humphreys, and Stewart. [h]Formed from Obion. [i]Formed from Roane, Monroe, and Blount. [j]Formed from Lincoln, Franklin, Coffee, and Bedford. [k]Formed from Overton and Fentress. [l]No data; formed 1842. [m]Formed from Hamilton. [n]Formed from Sumner, Macon, Smith, Wilson. [o]Formed from Washington and Carter. [p]Formed from Grainger, Claiborne, Campbell, Knox, and Anderson.

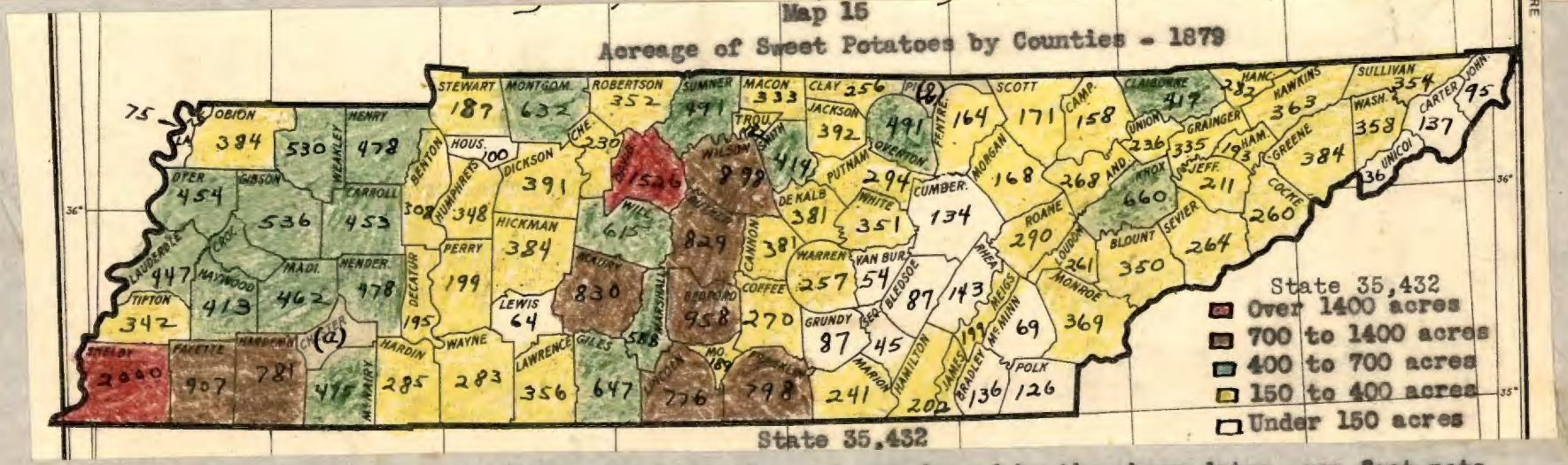
Map 14.

Production of Sweet Potatoes by Counties - 1869 (Thousands of Bushels)



Map 15

Acreage of Sweet Potatoes by Counties - 1879

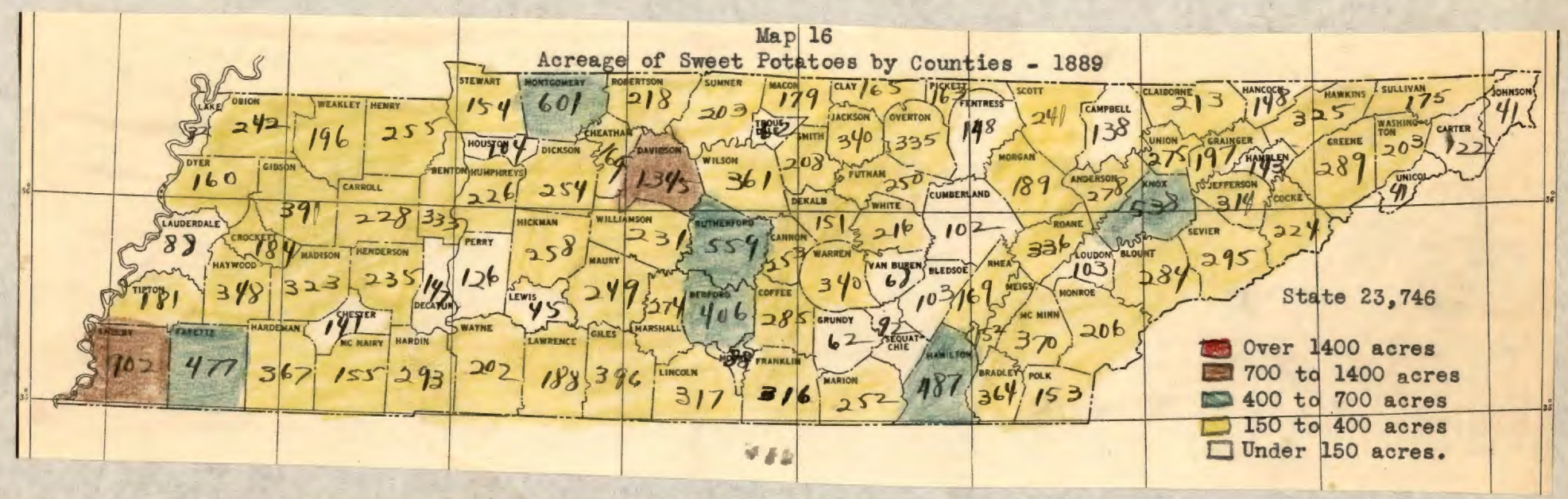


State 35,432

For information as to establishment of counties not yet formed by the above dates, see foot-note on page 76.

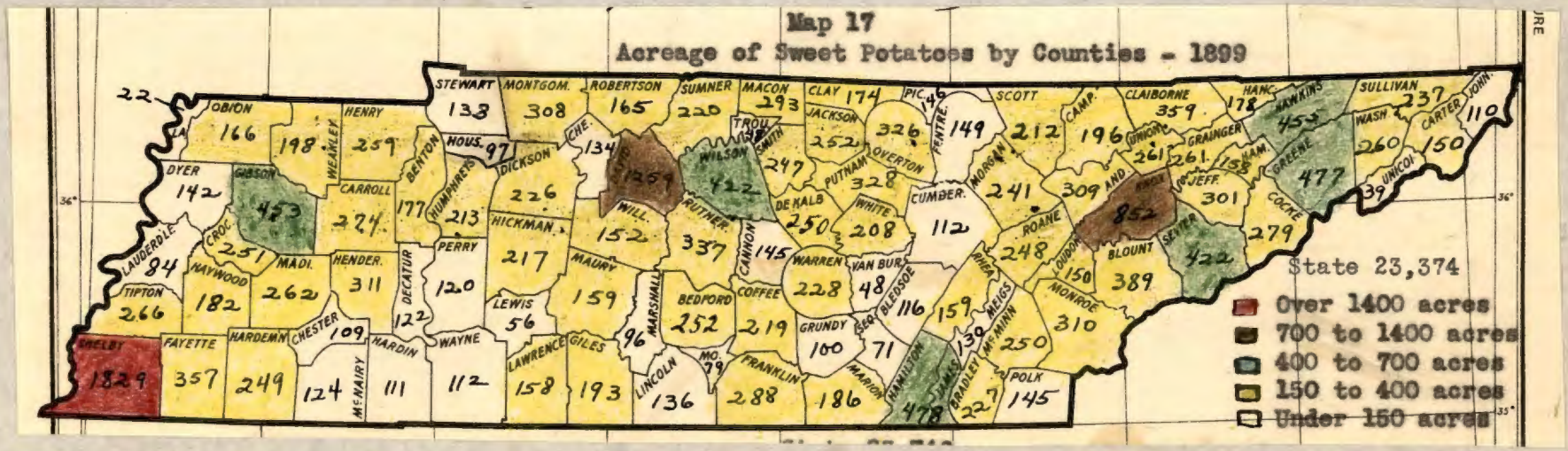
Map 16

Acreage of Sweet Potatoes by Counties - 1889



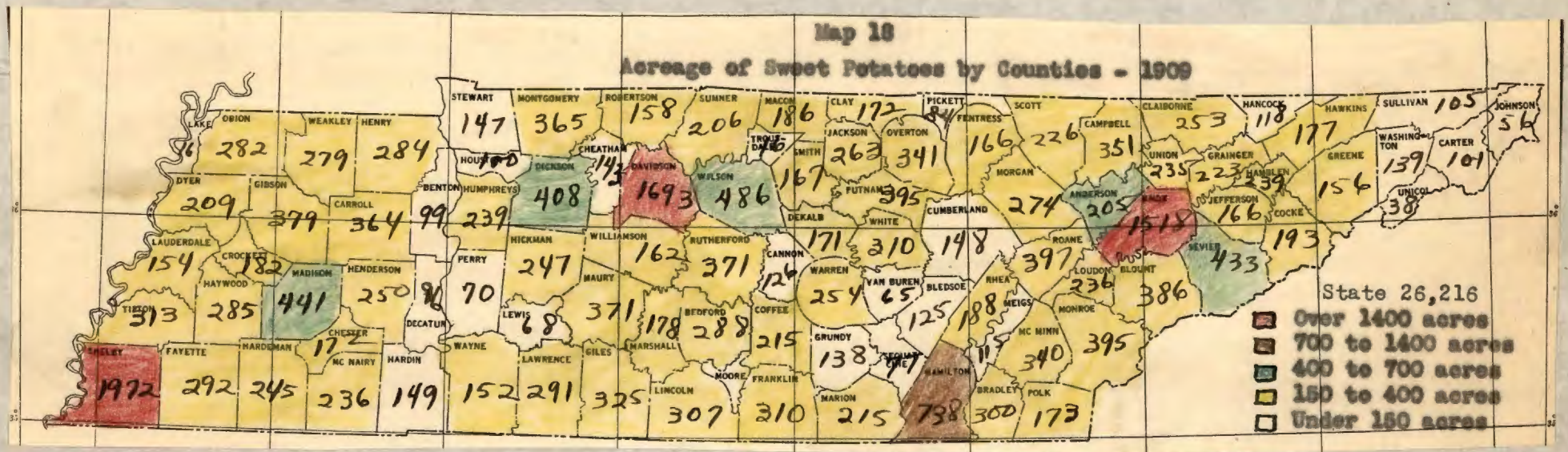
Map 17

Acreage of Sweet Potatoes by Counties - 1899



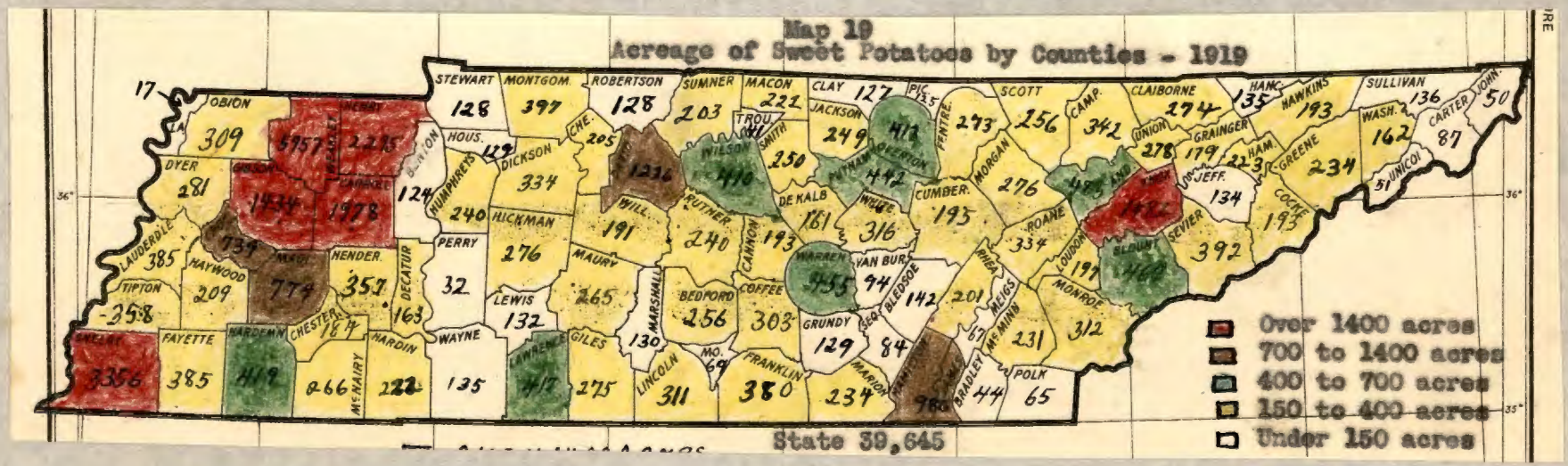
Map 18

Acreage of Sweet Potatoes by Counties - 1909



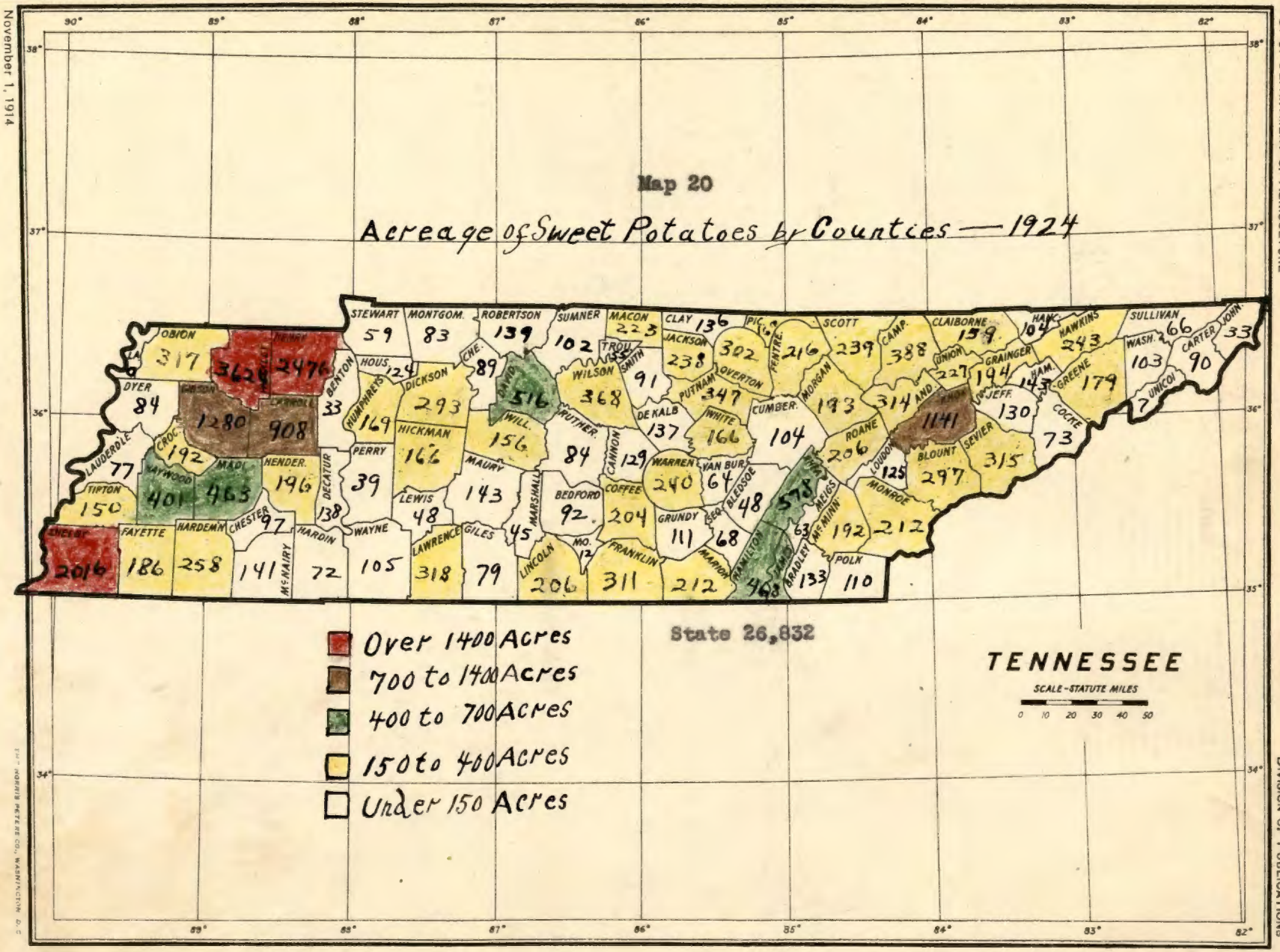
Map 19

Acreage of Sweet Potatoes by Counties - 1919



Map 20

Acreage of Sweet Potatoes by Counties — 1924



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From 1879 to 1899 - In 1879, as shown in Map Number 15, sweet potato acreage was concentrated largely in two areas -- Middle and West Tennessee. The leading counties in Middle Tennessee were located in the Central Basin and in the southeastern part of this area. The Central Basin counties were: Davidson, Wilson, Rutherford, Maury, Bedford, Williamson, and Marshall. Those of the southeastern section were: Franklin, Lincoln, and Giles.

The three leading counties in West Tennessee, Shelby, Fayette, and Hardeman[5], are located in the extreme southeastern part of the state. Shelby County ranked highest in the state with 2,000 acres. The map mentioned above shows that eleven counties in this section reported from 400 to 700 acres. The leading counties, almost one-half a century later, were in this group of eleven counties.

These Middle and West Tennessee areas were leaders prior to 1879 as indicated by data on the number of bushels produced, which is shown in Table XVI and Maps 12, 13, and 14. With very few exceptions, the high ranking counties in both sections had approximately the same rank in 1849, 1859, and 1869 as in 1879. This held true in 1869 even though a general decrease had occurred after 1859 in all of the counties except Obion and Stewart. During the Civil War period Weakley and Carroll Counties had the greatest decrease - the former from 83.4 million to 10.3 million bushels, and the latter from 84.8 million bushels to 371 bushels. This is significant in view of their great increase and high rank forty years later.

In 1879 only two East Tennessee counties had over 400 acres. They were Knox, with 660 acres, and Claiborne, with 417 acres. Hamilton reported only 202 acres. An examination of the last three columns in Table XXII showing the number of bushels from 1849 to 1869 will show that counties in this section of the state rank low in comparison to the leading counties of the middle

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[5]Chester County was not formed until 1879

and western sections.

There was a decrease in acreage in 74 counties from 1879 to 1899 - a period of decline in the state from 35,432 acres to 23,374 acres. An examination of Table XV and Maps 15 to 17 shows that nearly all of the decrease occurred during the first ten years of this period.

Approximately seventy-seven per cent of the decrease occurred in the two principal producing areas of West and Middle Tennessee. The decrease in each of the principal counties in these areas is shown in Table XVI.

Table XVI

Counties in Principal Producing Areas Showing a Decrease in Acreage, 1879 - 1899

	Acres in 1879	Acres in 1899	Acres Decrease
Middle Tennessee			
Davidson	1,526	1,254	272
Wilson	898	422	476
Rutherford	829	337	492
Williamson	615	152	463
Maury	830	159	671
Bedford	958	252	706
Lincoln	776	136	640
Franklin	798	288	510
Giles	647	193	454
Marshall	588	96	492
Maury	830	159	671
(1) Total	9,395	3,346	5,839
West Tennessee			
Shelby	2,000	1,829	171
Fayette	907	357	550
Hardeman	781	249	532
McNairy	475	124	351
Henry	478	259	219
Weakley	530	198	332
Carroll	453	274	179
Gibson	536	453	83
Dyer	454	142	312
Lauderdale	447	84	363
Haywood	413	182	231
Crockett	429	251	178
Madison	462	262	200
Henderson	478	311	167
(2) Total	8,843	4,975	3,868
Total decrease, (1)+(2)			9,707
State decrease			12,686

The four highest counties in 1899 were the city counties, Shelby, Davidson, Knox, and Hamilton. The first two ranked second and first respectively in 1889, and first and second respectively in 1879. However, the acreage for both declined for the twenty-year period. Both Knox and Hamilton had increased in rank to 1899. Their high rank during these early periods is significant in view of their lower relative rank in recent years (see p. 86).

Increases in acreage were reported in 19 counties, 17 of which were in East Tennessee. Knox, Hamilton, Sevier, Greene, and Hawkins Counties reported the largest increases to lead the East Tennessee counties. In fact, this section outranked, by one county, both Middle and West Tennessee in number of counties having more than 400 acres. This had not happened before, and has not happened since that time, according to the data shown in Table XV and Maps 12 to 20. The higher relative rank of some of the East Tennessee counties is due more to the decreases in the leading counties of the other sections than to their own/increases. As a matter of fact these latter/were small, as shown in Table XV.

With the available data, it is not possible to determine the reasons for the downward trend in the principal producing areas from 1879 to 1889. This is opposite to that of the United States, as mentioned previously.

From 1900 to 1920 - The trend in the state as a whole was upward during this twenty-year period, the greatest increase occurring from 1909 to 1919, as shown previously in Chart 9. An examination of Maps 17 to 19 will show that the greatest increase occurred in West Tennessee, and principally in the northwestern part, which includes Weakley, Henry, Gibson, and Carroll Counties. Shelby, Madison, and Crockett Counties also had substantial increases.

These gains were made during the 1909 to 1919 period, and probably since

1913, as shown by the state trend in Chart 9. Maps 17, 18, and 19 show the trend of acreage during the twenty-year period. The state as a whole increased less than 3,000 acres during the previous ten-year period, compared with more than a 12,000 acre increase from 1909 to 1919, as shown in Table XV. In fact, the increase made in Shelby, Weakley, Henry, Carroll, and Madison Counties during the 1899 to 1909 period amounted to only 528 acres; and Gibson and Crockett reported a loss of 143 acres. Thus there was a net gain for the group of only 385 acres.

This is an insignificant number in comparison with the 12,629 acre increase in the same counties from 1909 to 1919, as shown in Table XVII. This was approximately 94% of the state total increase of 13,429 acres.

Table XVII

Increase in Sweet Potato Acreage in Principal West Tennessee Counties, 1909-1919[a]

County	Acreage 1919	Acreage 1909	Increase in Acres, 1909-1919
Weakley	5,957	279	5,678
Shelby	3,356	1,972	1,384
Henry	2,295	284	2,011
Carroll	1,975	364	1,611
Gibson	1,434	379	1,055
Madison	774	441	333
Crockett	739	182	557
Total	16,530	3,901	12,629

[a] Source: Table XV, Acreage of Sweet Potatoes, 1879 to 1924.

Approximately one-half of the gain occurred in Weakley County, which had 5,678 acres more in 1919 than in 1909. This was an increase of about 20.31%. The major part of the increase for the group as a whole occurred in this and four other counties: Shelby, Henry, Carroll, and Gibson. The total gain for these five counties was 11,739 acres, or 93% of the total for the group. It also represents 87.4% of the state total increase.

It is significant that very little change occurred in the central and southern Middle Tennessee area from 1899 to 1919, as shown in Maps 17 to 19 and Table XVIII. It had not recovered from the decline that occurred following the 1879 census year, at which time (1879) it was one of the two high ranking areas (see Maps 15 and 16).

Table XVIII

Changes in Sweet Potato Acreage in Leading Middle Tennessee Counties, 1899 - 1919[a]

Counties	1919	1909	1899
Davidson	1,236	1,693	1,254
Wilson	410	486	422
Franklin	380	310	288
Lincoln	311	307	136
Williamson	191	162	152
Maury	265	371	159
Bedford	256	288	252
Rutherford	240	371	337
Giles	275	325	193
Marshall	130	178	96
Total	4,091	4,856	3,597

[a]Source: Table XV, Acreage of Sweet Potatoes, 1879 - 1924.

The ten principal counties, shown in Table XVIII, increased as a group from 1899 to 1909. However, there was an actual decline during the following ten-year period - the time when the West Tennessee area and the state as a whole were having large increases, as previously shown (see Maps 18 and 19). The trend, however, was upward, which was represented by a 14% increase for the twenty-year period.

Only Franklin, Lincoln, and Williamson Counties showed consistent increases during the entire period; and these were small. Davidson, the leading county in the area, had an actual decrease of 18 acres, and a decline in rank from second to seventh place. The fact that it just about maintained its acreage is due partly to the local market.

Is the decreasing importance of the crop in this area due to the competition with livestock farming? These counties are located in the blue grass area, with the exception of parts of Lincoln and Franklin; and, partly for this reason, they have become leading livestock producing counties. Again, it is probable that the land in general is not as well adapted to the production of sweet potatoes as that in the West Tennessee counties. This condition is indicated by their low rank in average yields per acre from 1879 to 1924. The rank for each was as follows, as shown in Table XXI on yields: Davidson 8th, Rutherford 14th, Wilson 28th, Marshall 39th, Giles 47th, Maury 55th, Lincoln 58th, Bedford 64th, Williamson 69th, and Franklin 88th. The rank of the five high ranking counties in West Tennessee, Weakley, Henry, Gibson, Shelby, and Carroll, show a great contrast, since they rank 1st, 2nd, 3rd, 5th, and 10th respectively.

However, there are parts of Lincoln and Franklin Counties which have loose red soils that are well adapted to the production of this crop. There is apparently some relationship between their consistent increase in sweet potato acreage and these soil conditions. At any rate, it was chiefly on these soils that the recent expansion of sweet potato growing occurred, largely in these counties. There are likely similar soil areas in the other central Tennessee counties mentioned above; but large-scale production is greatly affected by competition with some other farm enterprise, as well as by large areas of suitable soil.

The city counties, Shelby, Knox, Davidson, and Hamilton, each declined in relative rank from 1899 to 1919, With the exception of Davidson, which decreased 18 acres, these counties reported increases, as shown in Maps 17 and 19. The declining rank was due largely to the more rapid increase in acreage in the western part of the state. The acreage in Knox and Davidson was de-

creased slightly from 1909 to 1919, as shown in Table XV; but this was opposite to the state increases.

The changes in the less important counties, especially those having less than 400 acres, were negligible. Twenty-nine of the seventy-nine counties in this group in 1919 showed actual acreage decreases from 1909 to 1919, which was also opposite to the state trend. Many of these showed increases during the previous census period. Apparently, their trend follows that of the state less closely than does that of the principal producing counties. In the first place, their changes would have less effect on state trends than those of the more important counties; and in the second place, such factors as market demand and price would likely have less effect on their acreage. This is true because, in general, the farmers there are producing largely for home consumption, their surplus being sold in local markets.

From 1919 to 1924 - According to the census data by counties, shown in Maps 19 and 20, there was a decline in the state from 1919 to 1924. This decrease dates from 1922, as shown by the estimates of the United States Department of Agriculture presented in Chart 9. This is also indicated by car-lot shipments data, which shows 789 cars shipped in 1924 compared with 1448 cars in 1922 and 1472 in 1923.[4] Decreases in car-lot shipments were reported in each of the principal shipping counties in 1924.

Map 20 and Table XV show that all counties, except sixteen, declined in acreage during this five-year period. All of the principal producing counties showed a decrease, except Henry, which reported an increase of 182 acres. Weakley County's acreage decreased from 5957 to 5624; Shelby's, from 3356 to 2016; and Carroll's, from 1978 to 908. The acreage in each county is shown in columns 1 and 2 of Table XV.

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[4] These are calendar year shipments.

This decline, as previously mentioned, was likely largely a reaction to the low prices received in 1922, which in turn was partly the result of the state's large acreage of 44,000 (see p. 69). It was also very likely a reaction due to the general period of deflation following the World War.

Trend Since 1924, as Indicated by Shipments - As stated previously, the state acreage trend was upward, reaching the peak in 1926. As indicated by calendar year car-lot shipments, the principal increase occurred in the high producing counties in West Tennessee. Approximately 80% of the increase in car-lot shipments from 1925 to 1927 was in eight of these counties - Weakley, Obion, Madison, Henry, Gibson, Crockett, Benton, and Carroll. The largest increase in shipments were in Weakley and Henry, the two high ranking counties. The former increased from 811 to 2286 cars, and the latter from 301 to 1052 cars. (see Table on car-lot shipments).

Apparently West Tennessee is yet, as in 1924, the principal sweet potato section in the state, from the standpoint both of acreage and of number of car-lot shipments. There are some indications of probable increase in acreage in some of the less important counties. In fact, apparently there has been a development of commercial production in new areas since 1924. This is signified by recent car-lot shipping data and, in some instances, checked by a recent field trip (see Chapter VII). It is probable that some had shipped prior to 1920, but no data are available.

At any rate, personal investigations show that there has been a recent development in the following counties. Bradley, Bledsoe, Sequatchie, Marion, Franklin, Coffee, Putnam, and White. These are located on or near the border of East and Middle Tennessee. The dates of their first shipments, since data have been available, are: Bledsoe 1926, Bradley 1927, Coffee 1927, Franklin 1924, Lincoln 1924, Marion 1927, Putnam 1926, Rhea 1925, and White 1927. The

fact that shipments were made does not necessarily mean an increase in total acreage in each of these counties, but it is quite likely acreage did increase when shipping began. From available information, these counties have experienced a decline in acreage following the large crop in 1926.[5] This was the natural reaction to the low prices received for that crop. Many also became discouraged because of storage losses and shrinkage. However, in the spring of 1930 there was some talk of continuing the small acreage increase which has characterized the state trend of this crop since 1928 (see Chart 9).

4. Trend of Yield and Production in Tennessee as a Whole, 1879 - 1924

The changes in acreage have been presented above. It is the purpose here to show the trend in both production and yield, and the relationship between acreage, yield, and production. This is presented graphically in Chart 10. This chart was prepared by the same method as Chart 4, which shows similar data for the United States (see p. 37 for explanation of the method of preparation). The line XX' represents the average for each, acreage, production, and yield. The variation from this average is shown by the three graphs representing each respectively.

The trend of production has been always in the same direction as that of acreage, as shown in this chart. This was downward from 1879 to 1899, upward from 1899 to 1919, and again downward to 1924. However, production and acreage do not follow each other very closely at all times, as an examination of Chart 10 will reveal. This is due to the wide variation in yields. With yields remaining the same, the acreage and production, of course, would fluctuate in the same proportion. Variations from the average result in fluctuations in different proportions. The increase in yield in 1889, to near the

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[5] The shipments listed as 1927 were largely potatoes grown in 1926.

average for the period, lessened the distance between the acreage and production lines. On the other hand, wide differences are noted in both 1899 and 1919, when the yields fluctuated greatly. Had the yield in 1899 remained near the average, as in 1889, instead of decreasing far below the average, the acreage and production would have followed each other closely. In 1919 the yield had increased to far above the average, which resulted in the greatest interval between the acreage and production lines. The yield declined to near the average in 1924. At that time, there was very little difference between acreage and production.

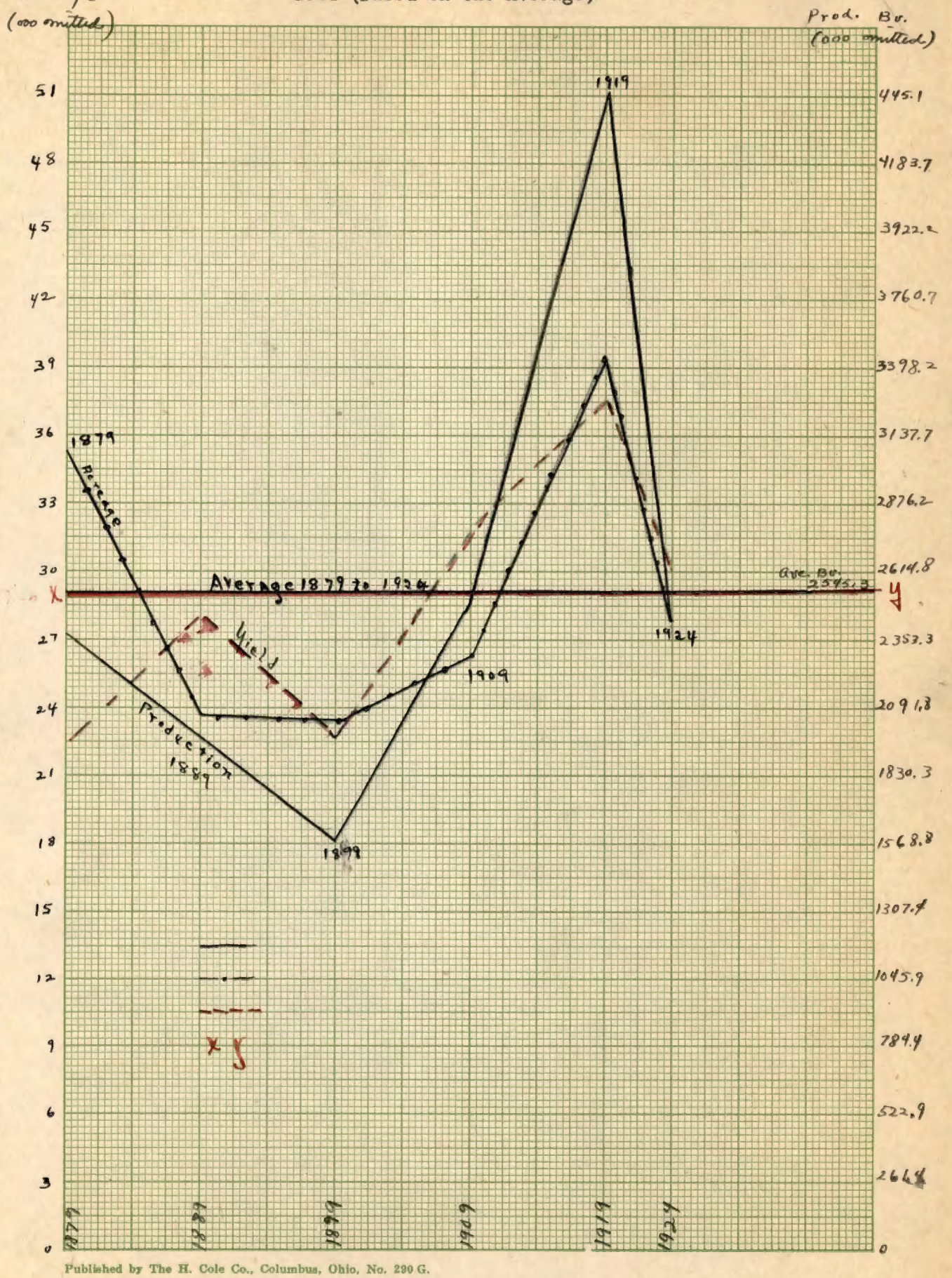
Insofar as weather conditions affect yields, it is probable that there would be less variation between the acreage and production trend lines in the United States, as a whole, than in any of its political divisions. This is because, in larger areas, differences in weather conditions in different areas tend to neutralize each others' effects. In other words, there is less likelihood of having bad or good weather in all sections in one year.

The trend of yield has followed those of acreage and production except in the period from 1879 to 1889. During that time the yield increased but both acreage and production declined. In other words, with one exception, the yield has moved upward when acreage has moved upward and downward when acreage has moved downward.

Why should there be an increase in yield when acreage is high and vice versa? As has been shown previously, acreage in a general way follows price. Low acreage often follows low price and high acreage follows high price. Apparently, this affects the cultural and fertilization practices of the sweet potato producers. During these years of high acreages, following high prices, more attention is likely to be given to those practices that will produce high yields. The opposite apparently happens in years of low

Chart 10

Relation of Acreage, Yield, and Production in Tennessee from 1877 to 1924 (Based on the Average)



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acreage, following low prices. It is recognized that weather conditions also affect yields. This might explain, partially at least, the increase in yield in 1889, at the time when a decline in acreage occurred. As a matter of fact, weather was certainly one of the factors that affected yields at each census year shown in Chart 10.

5. Trend in Yields in Tennessee Counties

Wide Variations in Yields - As shown previously, in Chart 10, there have been wide fluctuations in yields since 1879. Average state yields have varied from 66.9 bushels in this year to 112.3 bushels in 1919. An examination of Table XIX shows that these fluctuations have been greater in some of the counties than in the state. For instance, the yields in Johnson County varied from 25 bushels in 1879 to 116.6 bushels in 1909; in Franklin, from 31 bushels in 1879 to 109.4 in 1919; and in Hawkins, from 37.7 bushels to 105.2 bushels during the same period. Many similar fluctuations have occurred in other counties as shown in this table.

These wide fluctuations are indicated further by data on the rank of counties in yields presented in Table XXI. An examination of this table shows that some counties have varied in rank from a very low to a very high relative position. This has been true, particularly, of Anderson, Bledsoe, Davidson, Franklin, Lauderdale, Moore, and Rutherford Counties. In fact, Rutherford County has varied in rank from 1st to 93rd.

Table XIX

Average Yield per Acre of Sweet Potatoes, 1879-1924.

County	Average Yield per Acre 1879-1924	1924	1919	1909	1899	1889	1879
1. Weakley	117.24	121.1	122.2	127.3	66.7	77.6	64.0
2. Henry	116.89	115.0	141.9	106.0	67.2	80.8	59.1
3. Carroll	116.70	122.2	137.2	105.9	87.7	90.4	65.9
4. Warren	99.39	69.7	118.8	116.5	65.1	88.3	120.9
5. Shelby	98.78	83.7	123.0	90.3	76.9	97.0	102.5
6. Pickett	98.52	77.0	146.5	149.2	67.1	84.8	(a)
7. Knox	95.57	91.9	126.1	100.3	80.0	83.6	52.3
8. Davidson	94.66	66.1	94.5	102.0	80.4	92.9	109.5
9. Madison	94.12	105.2	116.8	86.9	66.5	73.1	82.6
10. Gibson	94.06	97.6	107.3	91.5	67.7	73.9	81.9
11. Overton	94.02	91.2	139.6	118.8	74.1	87.5	57.9
12. Dyer	93.77	111.1	123.5	114.3	83.1	90.9	67.1
13. Sequatchie	93.07	38.6	149.2	112.1	69.8	86.7	87.6
14. Rutherford	92.79	86.0	100.8	119.8	48.8	104.5	89.1
15. Chester	91.90	73.1	117.0	92.2	72.6	86.7	(a)
16. Hamblen	91.18	121.1	115.7	83.1	76.9	103.8	52.9
17. Obion	90.27	83.7	133.1	113.7	64.8	82.2	55.8
18. Houston	90.05	66.9	135.4	95.6	77.6	91.1	65.6
19. McMinn	89.78	85.8	116.9	89.2	76.7	84.1	91.2
20. Marion	88.45	101.5	120.3	92.6	73.2	88.1	54.6
21. Morgan	87.87	72.6	107.4	104.0	76.5	87.4	64.0
22. Coffee	87.38	49.0	119.8	112.2	69.4	83.0	79.4
23. White	86.85	77.5	116.8	98.9	59.8	88.5	68.6
24. Lewis	86.70	79.7	112.6	84.7	60.5	91.0	60.5
25. Cumberland	86.68	83.2	105.0	113.1	68.3	85.7	49.7
26. Blount	85.06	83.3	119.6	93.9	70.5	81.1	50.1
27. Dickson	84.86	86.1	138.6	79.0	67.2	81.2	56.7
28. Wilson	84.86	73.1	107.6	96.2	61.1	95.2	80.2
29. Grundy	84.86	72.0	116.4	93.2	73.7	69.9	64.8
30. Tipton	84.30	96.8	108.3	95.2	68.1	71.8	62.6
31. Stewart	84.18	80.3	106.4	95.3	69.4	87.2	69.5
32. Putnam	83.91	62.9	107.0	95.8	74.4	96.2	58.2
33. Cheatham	83.73	79.4	109.0	89.4	59.7	82.3	74.3
34. Clay	83.01	79.4	124.0	94.9	65.7	86.2	66.2
35. Van Buren	82.73	65.0	102.3	100.3	69.4	79.6	64.2
36. Lawrence	82.55	87.9	108.8	85.2	54.8	78.0	59.6
37. Hardin	82.23	66.0	86.8	104.4	60.4	81.4	80.5
38. Hickman	82.11	88.8	120.8	86.2	70.4	78.1	58.1
39. Marshall	81.44	88.9	96.2	121.5	48.2	83.6	71.4
40. Humphreys	81.33	85.1	107.9	81.4	69.3	87.4	64.1
41. Henderson	81.07	79.2	106.5	106.0	59.5	88.0	60.2

(continued)

Table XIX (continued)

County	Average Yield per Acre 1879-1924	1924	1919	1909	1899	1889	1879
42. Rhea	80.83	79.9	105.0	86.4	70.7	77.0	59.5
43. Benton	80.74	69.6	131.2	135.2	64.1	78.3	56.3
44. Bledsoe	80.45	94.9	13.8	83.5	56.7	86.6	71.0
45. Hamilton	80.37	75.8	94.1	69.8	72.2	83.1	75.0
46. Haywood	80.15	53.2	114.6	92.3	76.4	93.3	71.2
47. Giles	79.95	58.8	105.0	83.1	54.3	82.5	76.4
48. Lauderdale	79.82	64.0	90.8	90.1	81.1	84.5	68.4
49. Robertson	79.81	78.6	109.7	111.6	50.8	74.5	72.0
50. McNairy	79.58	90.9	109.7	85.2	63.4	81.2	60.2
51. Campbell	79.45	76.5	93.7	88.0	70.1	87.2	41.6
52. Fentress	78.88	71.0	98.7	101.0	64.8	78.8	46.8
53. Roane	78.87	78.9	106.9	86.9	56.6	77.0	56.8
54. Jefferson	78.78	77.1	115.4	103.6	64.9	82.4	51.5
55. Maury	78.49	64.8	91.1	68.1	62.5	87.2	81.9
56. Lake	78.48	0	107.7	131.2	68.2	80.9	62.6
57. Decatur	78.21	72.8	104.1	97.4	59.7	81.1	60.4
58. Lincoln	77.82	55.1	106.2	99.5	47.4	87.9	65.1
59. Hardeman	77.75	71.1	92.8	92.4	64.0	84.2	68.6
60. Cannon	76.92	66.6	104.2	100.3	61.9	84.4	59.6
61. Wayne	76.63	84.5	112.3	79.9	60.6	87.5	53.5
62. Montgomery	76.51	73.9	110.9	76.0	60.1	64.3	75.2
63. Union	76.49	88.7	86.4	101.2	66.5	77.4	38.5
64. Bedford	76.38	63.4	103.2	102.2	61.4	90.3	60.1
65. Bradley	76.12	79.9	130.4	83.2	71.8	74.9	52.9
66. Fayette	75.89	82.2	97.5	64.5	69.1	76.1	71.6
67. Anderson	75.41	83.2	75.1	85.2	72.4	73.4	54.1
68. Sullivan	75.35	88.1	95.4	128.9	64.8	92.8	48.0
69. Williamson	74.86	62.3	79.9	88.7	55.6	77.2	76.7
70. Smith	74.77	70.0	76.9	93.3	63.4	80.7	70.9
71. DeKalb	74.52	70.1	94.9	129.6	57.3	75.3	53.7
72. Sevier	74.41	71.6	84.3	93.5	61.9	74.1	52.2
73. Crockett	73.64	116.1	63.6	93.6	68.3	79.7	64.1
74. Scott	73.13	56.0	100.3	88.9	72.9	61.1	41.7
75. Polk	73.02	76.9	107.9	75.2	66.8	73.4	55.3
76. Macon	72.44	58.3	86.4	114.1	65.5	73.2	54.9
77. Loudon	72.05	74.1	84.8	79.8	65.6	93.4	49.7
78. Grainger	72.00	74.2	86.9	106.6	58.1	83.0	44.2
79. Washington	71.68	74.6	106.0	122.2	54.7	75.1	46.0
80. Jackson	71.28	46.1	97.3	84.1	62.1	82.1	57.9
81. Carter	71.12	69.0	92.1	101.1	58.2	76.4	46.5
82. Sumner	71.06	62.5	81.3	101.5	56.1	79.2	59.2
83. Greene	71.02	69.8	82.8	140.5	57.8	78.5	47.0
84. Perry	70.81	74.6	84.7	88.8	60.7	71.0	64.6
85. Hawkins	70.71	68.8	105.2	122.4	58.2	77.9	37.7
86. Meigs	70.62	65.3	107.3	83.8	60.0	82.4	50.4
87. Monroe	70.19	54.7	93.3	78.9	63.9	83.6	49.1
88. Franklin	68.36	67.9	109.4	98.8	74.5	78.4	31.0
89. Claiborne	68.00	86.1	80.4	95.1	62.4	67.1	41.8
90. Cocke	67.54	74.4	72.7	92.4	57.2	76.1	47.1
91. Moore	67.00	65.8	77.8	124.1	49.3	79.1	57.6
92. Johnson	63.90	64.5	95.4	116.6	51.4	76.8	25.0
93. Trousdale	62.49	36.9	79.3	119.6	55.8	76.5	58.4
94. Unicoi	60.81	71.0	57.4	84.8	54.5	71.3	33.2
95. Hancock	56.68	73.4	69.5	87.8	52.8	60.6	31.8
State	87.16	89.4	112.3	95.5	67.2	83.1	66.9

[a] No data.

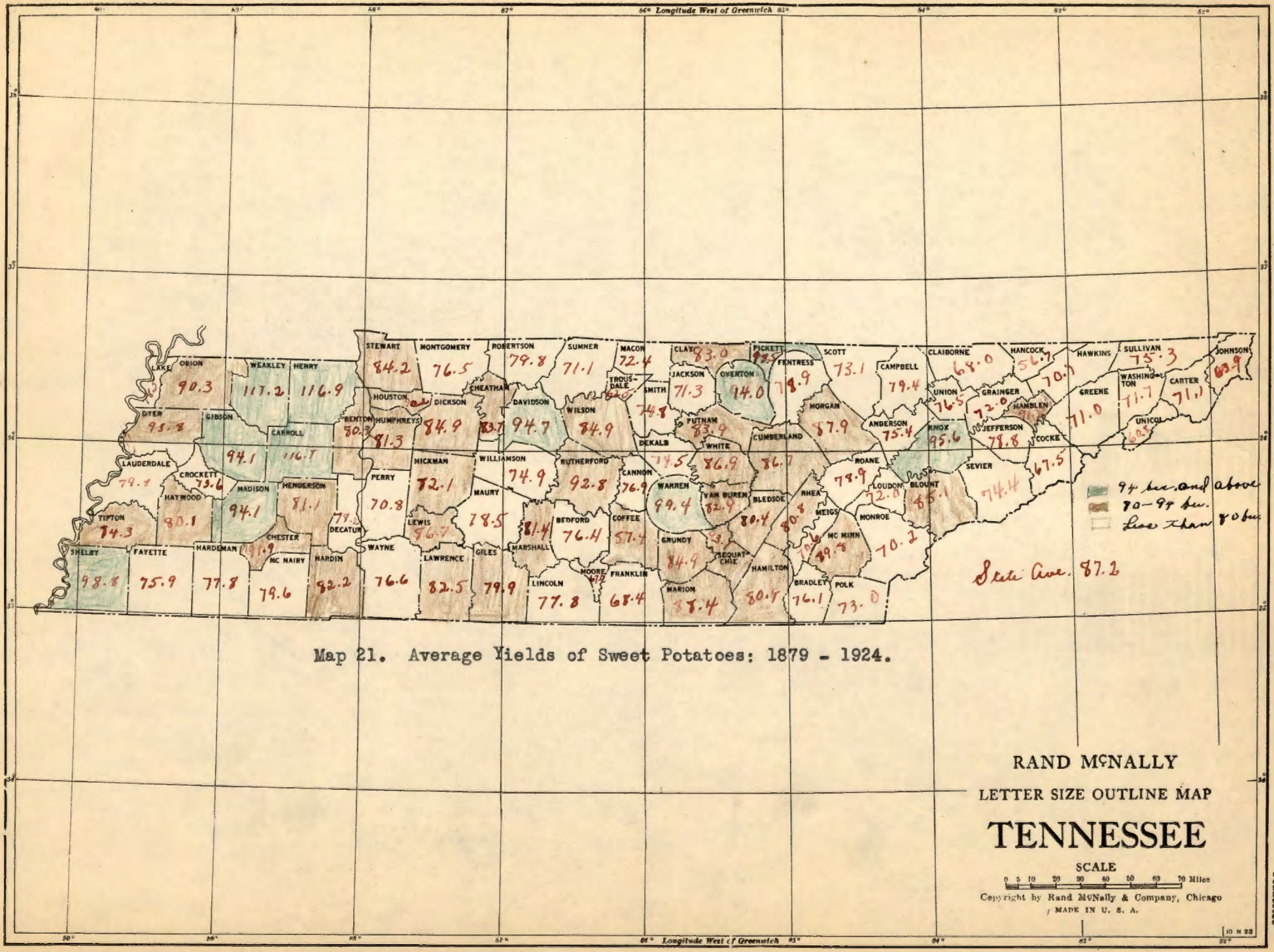
Areas of High and Low Yields - In general, there is a fairly close relationship between the number of acres of sweet potatoes and the yield produced; that is, the largest yields are produced in the counties with the largest acreage, and vice versa. With the exception of Rhea and Hamilton Counties,[6] the ten highest ranking counties in acreage had an average yield of more than 94 bushels from 1879 to 1924, as shown in Table XX and Map 21. Weakley, Henry, and Carroll had more than 115 bushel yields. Their high rank in yield is noticeable also in 1919 and 1924, years of relatively large acreages. Approximately 38% of the state total acreage was in the first counties, Weakley, Henry, Shelby, Gibson, and Carroll, as shown previously. This indicates their importance as producing counties. It is noticeable, particularly from Map 21, that the three large city counties, Knox, Davidson, and Shelby, had higher yields than adjacent counties.

Table XX
Yields per Acre of Sweet Potatoes in Principal Producing Counties, 1879 - 1924

	Average 1879-1924	1924	1919	1909	1899	1889	1879
Weakley	117.2	121.1	122.2	127.3	66.7	77.6	64.0
Henry	116.9	115.0	141.9	106.0	67.2	80.8	59.1
Shelby[a]	98.8	83.7	123.0	90.3	76.9	97.0	102.5
Gibson	94.1	97.6	107.3	91.5	67.7	73.9	81.9
Knox[a]	95.6	91.9	126.1	100.3	80.0	83.6	52.3
Carroll	116.7	122.2	137.2	105.9	87.2	90.4	65.9
Rhea[b]	80.8	79.9	105.0	86.4	70.7	77.0	59.5
Davidson[a]	94.6	66.1	94.5	102.0	80.4	92.9	109.5
Hamilton[a,b]	80.4	75.8	94.1	69.8	72.2	83.1	75.0
Madison	94.1	105.2	116.6	86.9	66.5	73.1	82.6
State ave.	87.1	89.4	112.3	95.5	67.2	83.1	66.9

[a] City counties.
[b] Relatively small producers.

[6] Neither Rhea nor Hamilton County's production approaches that of any of the high producing West Tennessee counties.



Map 21. Average Yields of Sweet Potatoes: 1879 - 1924.

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Their high yields apparently are due mainly to two factors - better soil conditions and more attention to cultural and fertilization practices. The first has been referred to previously. The second factor is assumed, since it is highly probable that producers growing a crop commercially will, in general, follow those practices that will improve their yields. Their income depends more upon good yields than that of producers in the non-commercial areas, where production is largely for home consumption.

The above discussion has been based on averages for the 45-year period; what about their yields at each census year? Table XIX shows that more of the commercial production counties have been above the state average for the respective year in the two census years with the highest acreage, namely 1919 and 1924. Especially was this true in 1919, the year of peak production. Apparently, their yields were relatively lower in the earlier periods, when production was on a much smaller scale. This is noticeable to some extent in the rank of Weakley, Henry, Carroll, and Knox in 1919 and 1924, as shown in Table XXI. None of these counties ranked lower than 15th in either year, while in earlier periods each ranked much lower, with the exception of two instances, when Carroll ranked 1st and Knox 5th in 1899.

Table XXI

Rank of Counties in Sweet Potato Yields Per Acre, 1879-1924

	Average Rank, 1879-1924	Rank in 1879	Rank in 1889	Rank in 1899	Rank in 1909	Rank in 1919	Rank in 1924
Weakley	1	39	69	41	7	15	3
Henry	2	51	58	38	26	3	5
Carroll	3	30	13	1	27	6	1
Warren	4	1	16	47	15	20	66
Shelby	5	3	3	8	62	14	26
Pickett	6	(a)	32	39	1	2	42

(continued)

Table XXI (continued)

	Average Rank, 1879-1924	Rank in 1879	Rank in 1889	Rank in 1899	Rank in 1909	Rank in 1919	Rank in 1924
Knox	7	70	37	5	38	11	12
Davidson	8	2	8	4	32	68	73
Madison	9	7	87	42	71	24	7
Gibson	10	8	83	36	61	43	9
Overton	11	56	20	14	14	4	13
Dyer	12	28	12	2	17	13	6
Sequatchie	13	6	28	26	22	1	93
Rutherford	14	5	1	93	12	59	22
Chester	15	(a)	27	18	60	21	53
Hamblen	16	69	2	7	85	26	2
Obion	17	61	47	50	19	8	25
Houston	18	31	10	6	46	7	71
McMinn	19	4	36	9	65	22	23
Marion	20	64	17	16	56	17	8
Morgan	21	38	23	10	29	42	56
Coffee	22	12	41	27	21	18	91
White	23	26	15	70	41	23	40
Lewis	24	42	11	66	79	29	35
Cumberland	25	75	31	33	20	52	29
Blount	26	74	52	23	51	19	27
Dickson	27	59	50	37	89	5	20
Wilson	28	11	5	63	44	41	54
Grundy	29	33	91	15	55	25	57
Tipton	30	41	88	35	48	37	10
Stewart	31	24	26	28	47	48	31
Putnam	32	53	4	13	45	45	82
Cheatham	33	17	46	71	64	35	36
Clay	34	29	30	44	50	12	37
Van Buren	35	35	58	29	39	58	77
Lawrence	36	48	66	85	76	36	18
Hardin	37	10	49	67	28	78	74
Hickman	38	54	65	24	74	16	15
Marshall	39	20	38	94	11	64	64
Humphreys	40	36	22	30	86	38	21
Henderson	41	45	18	73	25	47	34
Rhea	42	49	71	22	73	54	33
Benton	43	60	64	52	3	9	67
Bledsoe	44	22	29	80	81	71	11
Hamilton	45	16	40	20	93	69	45
Haywood	46	21	7	11	59	28	90
Giles	47	14	43	88	84	53	85
Lauderdale	48	27	33	3	63	76	80
Robertson	49	18	81	91	23	33	39
McNairy	50	44	51	55	77	32	14
Campbell	51	87	24	25	69	70	44
Fentress	52	81	61	49	36	61	60

(continued)

Table XXI (continued)

	Average Rank, 1879-1924	Rank in 1879	Rank in 1889	Rank in 1899	Rank in 1909	Rank in 1919	Rank in 1924
Roane	53	58	72	81	72	46	38
Jefferson	54	72	44	48	30	27	41
Maury	55	9	25	57	94	75	78
Lake	56	40	54	34	4	40	95
Decatur	57	43	53	72	43	56	55
Lincoln	58	32	19	95	40	49	88
Hardeman	59	25	35	53	58	73	59
Cannon	60	47	34	60	37	55	72
Wayne	61	67	21	65	87	30	24
Montgomery	62	15	94	68	91	31	51
Union	63	88	69	43	34	80	16
Bedford	64	46	14	62	31	57	81
Bradley	65	68	80	21	83	10	32
Fayette	66	19	77	31	95	62	30
Anderson	67	65	84	19	75	91	28
Sullivan	68	78	9	51	6	66	17
Williamson	69	13	70	84	68	87	84
Smith	70	33	56	56	54	90	63
DeKalb	71	66	78	78	5	67	62
Sevier	72	71	82	61	53	83	58
Crockett	73	37	57	32	52	94	4
Scott	74	86	92	17	66	60	87
Polk	75	62	85	40	92	39	43
Macon	76	63	86	46	18	79	86
Loudon	77	76	6	45	88	81	50
Grainger	78	84	42	76	24	77	49
Washington	79	83	79	86	10	50	47
Jackson	80	55	48	59	80	63	??
Carter	81	82	75	74	35	74	68
Sumner	82	50	59	82	33	85	83
Greene	83	80	62	77	2	84	65
Perry	84	34	90	64	67	82	46
Hawkins	85	89	67	75	9	51	69
Meigs	86	73	45	69	82	44	76
Monroe	87	77	39	54	90	72	89
Franklin	88	92	63	12	42	34	70
Claiborne	89	85	93	58	49	86	19
Cocke	90	79	76	79	57	92	48
Moore	91	57	60	92	8	89	75
Johnson	92	93	73	90	16	65	79
Grousdale	93	52	74	83	13	88	94
Unicoi*	94	90	89	87	78	95	61
Hancock	95	91	95	89	70	93	52

* No data

That yields are comparatively low in the low acreage areas is clearly shown in Table XIX and Map 21. Only a few counties in these areas have relatively high rank - particularly Pickett, Overton, and Warren. Apparently, soil conditions

are more favorable there than in most of the other non-commercial areas. A comparison of the low ranking counties in yields, shown in Table XIX, with their acreage, as shown in Table XV, indicates a fairly close correlation between low acreage and low yields.

This relationship is not perfect, as indicated above in the case of Rhea and Hamilton Counties of the high acreage group, and Pickett and Overton of the low acreage group. A study of Table XIX will reveal other counties with low acreage and relatively high yields and vice versa. Soil is undoubtedly an important factor in these counties that do not show a close correlation. In fact, it is known that the soils of Rhea and Hamilton are not as well adapted to sweet potato production as are those of the other counties in the high yielding group shown in Table XX. Favorable markets rather than good soils encourage production where yields are low. However, is there not more chance for error in obtaining data on acreage and production in the less important producing counties? If so, this would to some extent affect the reported yields, causing them to be lower, or higher, than actual yields.

6. Quantities Produced by Counties

Quantity Distribution Compared With Acreage Distribution - The distribution of the sweet potato crop within the state has been shown by acreage data at different periods from 1879 to 1924. As one would expect, the distribution between areas based on production corresponds closely to that based on acreage. This is shown by a comparison of the 1924 ranks of acreage and production in each county as presented in Table XXII. With a few exceptions, they correspond closely. For the first four counties they are the same. The highest ten counties in acreage are also the ten leading counties in production, although the acreage and production ranks differ in each of five of the counties, Carroll, Knox, Madison, Rhea, and Davidson. A further study of the table shows that, in

general, the acreage rank varies but little from the production rank. There are very few counties, however, in which the two ranks are exactly the same. These few are: Weakley, Henry, Shelby, Gibson, and Hamilton Counties, in the high ranking group; and Loudon, Washington, Hardin, Moore, Unicoi, and Lake Counties, of the low ranking group.

On the other hand, the rank in acreage differs greatly from the rank in production in a few counties. These are, Crockett, with a rank of 40th in acreage and 20th in production; Hamblen, with a rank of 50th and 27th respectively; Jackson, with a rank of 27th and 49th respectively; and Dyer, with a rank of 74th and 58th respectively. In other words, Crockett, Hamblen, and Dyer ranked much higher in production than in acreage, while the opposite was true of Jackson County.

Differences in yields are responsible for these conditions. As is well known, the acreage and production ranks would be the same for each county if the yields were the same in all of the counties. This is true because production is a product of acreage and yield. In the counties mentioned above that had much higher production rank than acreage rank, the yields were as follows: Crockett 116.1 bushels, Hamblen 121.1 bushels, and Dyer 111.1 bushels. Jackson County's yield was only 46.1 bushels, which explains its low rank in production in comparison to its acreage rank.

Acreage data does not show the concentration of the sweet potato industry in West Tennessee in 1924, to the extent that it is shown by the number of bushels produced. For instance, approximately 50% of the state's acreage was in this area, as compared with 56.8% of the total production. Weakley County alone produced 438,720 bushels, or 18.2% of the state total. It had only 13.5% of the total acreage. There were approximately 1,128,190 bushels, or 47.02%, in the 5 leading West Tennessee counties, Weakley, Henry, Shelby, Gibson, and Carroll. Only 38.5% of the total acreage was in these counties. Consequently one

Table XXII

Production of Sweet Potatoes, 1849 - 1924; Showing Acreage and Production Ranks in 1924

Acreage Rank in 1924	Production Rank in 1924	County	1924 (hundreds of bu.)	1919 (hundreds of bu.)	1909 (hundreds of bu.)	1899 (hundreds of bu.)	1889 (hundreds of bu.)	1879 (hundreds of bu.)	1869 (hundreds of bu.)	1859 (hundreds of bu.)	1849 (hundreds of bu.)
1.	1.	Weakley	4387.2	7277.7	355.3	132.0	152.1	339.3	102.8	834.3	451.8
2.	2.	Henry	2848.3	3256.4	300.9	174.2	206.1	282.5	318.8	599.8	545.5
3.	3.	Shelby	1687.7	4127.7	1780.2	1405.8	875.3	2050.6	507.5	933.2	1073.3
4.	4.	Gibson	1248.8	1538.1	346.8	306.8	289.1	477.6	602.7	872.3	796.0
6.	5.	Carroll	1109.9	2714.2	385.5	240.3	206.2	251.0	3.7	577.5	468.1
5.	6.	Knox	1048.1	1868.9	1522.8	681.7	449.9	345.1	242.4	445.2	278.7
10.	7.	Madison	487.2	902.6	383.1	174.3	236.1	381.6	97.2	821.4	672.4
7.	8.	Rhea	462.1	211.1	162.5	119.5	130.2	85.0	61.8	120.3	136.2
9.	9.	Hamilton	355.0	1391.4	515.6	345.0	404.5	151.6	14.8	273.9	375.3
8.	10.	Davidson	341.1	1167.9	1727.3	1007.6	1250.2	1671.6	628.5	910.0	1083.5
12.	11.	Campbell	296.8	320.5	308.9	137.4	120.4	65.7	24.5	82.2	120.6
15.	12.	Lawrence	279.5	453.5	248.0	86.6	146.7	212.2	262.6	174.1	93.9
20.	13.	Overton	275.4	576.5	405.2	241.7	293.0	284.1	367.9	256.6	145.1
13.	14.	Wilson	268.9	441.3	467.4	257.8	343.7	720.2	667.3	748.4	333.6
16.	15.	Obion	265.3	411.2	320.5	107.6	198.9	214.1	336.0	333.7	173.0
18.	16.	Anderson	261.2	364.0	430.2	223.8	202.5	145.0	110.6	165.7	165.8
22.	17.	Dickson	252.3	462.9	322.2	151.8	206.3	221.8	125.5	266.0	145.7
21.	18.	Blount	247.5	558.5	362.4	274.1	230.3	175.5	35.2	360.1	265.3
17.	19.	Sevier	225.5	330.3	404.9	261.3	218.5	137.8	73.1	220.5	221.8
40.	20.	Crockett	222.8	469.7	170.3	171.4	146.6	274.8	(a)	(a)	(a)
14.	21.	Putnam	218.4	472.8	378.6	244.1	240.4	171.0	115.8	227.6	(a)
31.	22.	Marion	215.1	281.4	199.1	136.1	220.0	131.6	106.6	220.5	279.3
11.	23.	Haywood	213.2	239.4	263.0	139.0	324.7	293.9	310.4	683.3	679.7
19.	24.	Franklin	211.0	415.5	306.2	214.6	247.8	247.6	99.1	336.3	394.1
28.	25.	Union	201.4	240.2	237.8	173.5	213.0	90.8	(a)	(a)	(a)
23.	26.	Hardeman	183.4	389.1	226.3	159.3	309.1	535.8	321.4	632.1	958.5
50.	27.	Hamblen	173.2	268.1	198.7	121.5	148.4	102.2	(a)	(a)	(a)
25.	28.	Warren	167.4	540.7	295.9	148.4	300.1	310.8	171.5	297.4	263.5

(Continued)

Table XXII (continued)

Acreage Rank in 1924	Production Rank in 1924	County	1924 (hundreds of bu.)	1919 (hundreds of bu.)	1909 (hundreds of bu.)	1899 (hundreds of bu.)	1889 (hundreds of bu.)	1879 (hundreds of bu.)	1869 (hundreds of bu.)	1859 (hundreds of bu.)	1849 (hundreds of bu.)
24.	29.	Hawkins	167.2	203.1	216.4	264.9	253.2	136.8	49.6	147.3	198.0
38.	30.	McMinn	165.6	270.0	303.3	191.8	311.0	62.9	131.0	306.4	565.6
34.	31.	Roane	162.6	357.0	345.1	140.3	258.7	164.6	116.1	410.5	371.5
36.	32.	Henderson	156.3	380.3	264.9	185.1	206.7	287.9	307.4	476.7	426.1
30.	33.	Fentress	153.4	269.4	167.7	96.5	116.6	76.7	49.0	103.0	125.6
41.	34.	Fayette	153.0	375.4	188.2	246.8	362.9	649.8	260.8	845.8	1117.0
44.	35.	Hickman	147.4	333.4	213.0	152.7	201.5	223.1	152.3	206.1	294.0
43.	36.	Humphreys	145.5	258.9	194.5	147.7	197.5	223.0	178.3	234.0	231.5
49.	37.	Tipton	145.2	387.7	297.9	182.2	130.0	214.1	183.8	348.5	434.3
37.	38.	Grainger	144.0	155.5	237.6	151.5	163.5	148.0	80.4	150.7	207.1
39.	39.	Morgan	140.2	296.3	284.9	184.3	165.2	107.5	34.1	127.7	110.1
47.	40.	Claiborne	136.9	220.4	240.6	223.9	142.9	174.2	31.5	95.2	154.8
26.	41.	Scott	133.8	256.6	200.9	154.5	166.5	71.3	42.0	69.9	39.4
29.	42.	Macon	130.1	191.9	212.3	192.1	131.0	182.9	93.4	185.6	154.2
45.	43.	White	128.6	369.2	306.6	124.3	191.2	240.8	133.0	241.3	366.0
52.	44.	McNairy	128.1	291.8	201.2	78.6	125.8	286.2	220.3	437.6	454.7
42.	45.	Greene	124.9	193.7	219.2	275.9	225.4	180.4	113.3	224.8	389.8
46.	46.	Pickett	123.2	183.1	125.4	98.0	138.3	(a)	(a)	(a)	(a)
32.	47.	Monroe	115.9	291.1	311.5	198.1	172.2	177.4	92.1	289.7	369.1
33.	48.	Lincoln	113.4	330.4	305.6	64.4	278.5	505.3	231.0	396.6	630.4
27.	49.	Jackson	109.8	242.4	221.2	156.5	279.1	227.0	128.6	235.6	360.9
53.	50.	Robertson	109.2	140.5	176.3	83.8	162.5	253.5	274.5	416.6	366.5
56.	51.	Clay	108.0	157.5	163.3	114.3	142.3	69.5	(a)	(a)	(a)
57.	52.	Bradley	106.3	57.4	249.7	163.0	272.8	82.5	128.1	298.9	306.4
54.	53.	Decatur	100.4	169.6	93.6	72.8	119.2	117.7	159.1	207.5	168.5
58.	54.	Jefferson	100.2	154.6	171.9	195.2	258.8	108.7	92.8	302.8	218.5
35.	55.	Coffee	100.0	363.1	241.3	151.9	236.5	214.4	117.3	242.8	196.2
48.	56.	Williamson	97.1	152.7	143.7	84.5	178.3	471.8	205.5	487.5	757.9
55.	57.	DeKalb	96.0	152.8	221.7	143.4	113.7	204.6	91.6	161.3	184.2
74.	58.	Dyer	93.3	347.1	238.8	118.0	145.5	304.4	29.3	401.1	246.6
51.	59.	Maury	92.7	241.4	252.8	99.4	217.1	679.6	249.6	660.1	748.9
60.	60.	Loudon	92.6	167.1	188.4	98.4	96.2	129.6	(a)	(a)	(a)
64.	61.	Wayne	88.7	151.6	121.5	67.9	176.7	151.5	149.3	202.0	239.7
65.	62.	Cumberland	86.5	204.7	167.4	76.5	87.4	66.6	23.7	57.4	(a)

(continued)

Table XXII (continued)

Acreage Rank in 1924	Production Rank in 1924	County	1924 (hundreds of bu.)	1919 (hundreds of bu.)	1909 (hundreds of bu.)	1899 (hundreds of bu.)	1889 (hundreds of bu.)	1879 (hundreds of bu.)	1869 (hundreds of bu.)	1859 (hundreds of bu.)	1849 (hundreds of bu.)
59.	63.	Cannon	86.0	201.1	126.4	89.8	213.5	227.1	70.4	138.7	209.9
63.	64.	Polk	84.6	70.2	130.0	96.9	112.3	69.7	45.7	116.2	212.3
61.	65.	Houston	83.0	174.7	95.6	75.2	94.7	65.6	(a)	(a)	(a)
62.	66.	Grundy	79.9	150.2	128.6	73.7	43.4	56.3	36.5	85.0	74.2
67.	67.	Washington	76.9	171.7	169.9	142.3	152.6	164.8	36.6	199.5	121.2
66.	68.	Hancock	76.3	93.8	103.6	94.0	89.8	89.7	34.9	59.6	109.8
75.	69.	Rutherford	72.2	241.9	444.6	164.4	584.0	738.3	243.0	748.5	831.2
69.	70.	Chester	70.9	215.2	158.6	79.1	122.3	(b)	(a)	(a)	(a)
75.	71.	Cheatham	70.7	223.4	127.9	80.0	135.0	171.0	76.1	182.0	(a)
68.	72.	Sumner	63.8	165.1	209.0	123.4	160.7	290.5	250.7	422.2	417.9
71.	73.	Smith	63.7	192.1	155.8	156.7	168.0	293.4	151.6	309.7	418.2
72.	74.	Carter	62.1	80.2	102.1	87.4	93.2	63.7	27.8	86.3	60.1
76.	75.	Montgomery	61.3	440.1	277.3	185.2	386.2	475.4	334.9	414.0	497.2
70.	76.	Bedford	58.3	264.2	294.4	154.7	366.7	581.9	174.1	458.7	426.7
82.	77.	Sullivan	58.2	129.7	135.3	153.6	161.6	170.0	78.4	156.4	113.7
79.	78.	Cocke	54.3	140.3	178.4	159.5	170.5	122.3	62.2	173.5	197.9
78.	79.	Lauderdale	49.3	349.4	138.8	68.1	74.4	305.7	56.0	280.3	188.3
80.	80.	Hardin	47.5	192.7	155.5	67.1	238.5	229.4	104.7	252.6	208.6
85.	81.	Stewart	47.4	156.2	140.0	92.3	134.3	129.9	187.5	155.8	220.5
77.	82.	Giles	46.4	288.8	269.9	104.9	326.6	494.4	280.7	315.1	794.3
87.	83.	Bledsoe	45.6	132.9	104.4	65.8	89.2	61.8	47.1	109.1	156.0
83.	84.	Van Buren	41.6	96.1	65.2	33.3	54.2	34.7	42.2	78.9	80.7
84.	85.	Meigs	41.1	71.9	96.1	78.1	125.3	100.3	35.0	98.5	189.0
88.	86.	Lewis	38.3	148.6	57.6	33.9	40.9	38.7	30.0	27.5	114.3
89.	87.	Marshall	31.4	125.0	216.3	46.3	229.0	419.6	165.6	312.6	491.9
90.	88.	Perry	29.1	27.1	62.2	72.9	84.5	128.5	62.5	104.3	160.5
81.	89.	Sequatchie	26.2	125.3	86.3	49.6	79.8	39.4	41.0	74.8	(a)
91.	90.	Benton	23.0	162.7	138.9	113.4	260.7	173.6	199.3	262.8	191.3
92.	91.	Johnson	21.3	47.7	65.3	56.5	31.5	23.8	6.4	12.7	11.9
86.	92.	Trousdale	20.3	32.5	19.1	26.8	47.4	106.3	(a)	(a)	(a)
93.	93.	Moore	7.9	53.8	29.8	39.0	69.6	108.8	(a)	(a)	(a)
94.	94.	Unicoi	500	29.3	32.2	21.2	29.2	12.0	(a)	(a)	(a)
95.	95.	Lake	0.0	18.3	21.0	15.0	25.9	47.0	(a)	(a)	(a)
		State Total	23,993.5	44,528.8	25,044.9	15,715.8	19,736.3	25,698.0	12,056.8	26,046.7	27,777.0

[a] County not formed.

[b] County formed that year.

should know the quantities produced as well as the acreage in determining the distribution of the crop, and in making comparisons between areas. However, production data should be used with care in making comparisons between areas, since yields vary so greatly. Such variations often cause severe fluctuations in quantities produced in different years, even with approximately the same acreage.

7. Quantities Produced in Middle of 19th Century Compared With Recent Years

In the State - The per capita production in Tennessee has decreased since 1849. At that time, 2,777,710 bushels were produced, or 2.7 bushels per capita. In 1924 a production of 2,399,350 bushels was reported, or only 0.9 of a bushel per capita. In fact, in only one census year during this period has the per capita been lower - 0.77 per capita in 1899. This per capita was equalled in 1869, at which time the lowest production of the seventy-five year period was reported. It should be mentioned that in 1919, the peak production year, the per capita production was 1.9 bushels, which was the highest since the 2.3 bushel per capita production of 1859.

According to Table XXII, the total production in 1849 and in 1859 was greater than that in 1924. Only the production of 4,452,883 bushels in 1919 was greater than that of these early years, according to the census reports. However, the annual estimates of the United States Department of Agriculture show that, in 1926, 6,150,000 bushels were produced. This was a per capita of 2.5 bushels, or 0.2 bushels less than that of 1849. By 1930 this had declined to 1.5 bushels, as calculated from the estimated production of 4,004,000 bushels on July 1st of this year.

It is apparent from the above that the per capita production has not been

as great, either in recent or in intervening years, as in 1849; though it was nearly equalled in 1926. In comparing the early data with those for 1924, it should be remembered that the lowest production from 1919 to 1930 was reported in 1924.

From data available, it appears that no conclusive reasons for the higher per capita production in 1849 can be offered. It might have been an unusually good crop year, but there are no data available, either on weather conditions or on acreage and yields, to indicate it. There are other possibilities, such as greater demand for the crop, both as a livestock feed and as food for human consumption.

At any rate, more complete data would be necessary on production during these early years for thorough study. It would be desirable to have such data by years instead of by ten-year periods.

This is offered here to present the problem and at the same time to make the following discussion on production by counties more easily understood.

In the Counties - All counties, with the exception of 19, actually produced fewer bushels of sweet potatoes in 1849 than in 1924. The counties reporting increases are shown in Table XXIII.

The principal increase occurred in six counties, Weakley, Henry, Shelby, Gibson, Carroll, and Knox. The recent concentration of both acreage and production in the first five counties has been discussed previously.

An examination of the production in these six counties, as shown in Table XXII, will reveal that the peak production occurred in 1919, and that actual decreases occurred in 1924.

Table XXIII

Counties Showing An Increase in Sweet Potato Production, 1849-1924

County	1849 (hundreds of bushels)	1924 (hundreds of bushels)
Houston	74.2	79.9
Carter	60.1	62.1
Johnson	11.9	21.3
Scott	39.4	133.8
Fentress	125.6	153.4
Sevier	221.8	225.5
Dickson	145.7	222.2
Anderson	165.8	261.2
Obion	173.0	265.3
Overton	145.1	275.4
Lawrence	93.9	279.5
Campbell	120.6	296.8
Rhea	136.2	462.1
Knox	278.7	1048.1
Carroll	468.1	1109.9
Gibson	796.0	1248.8
Shelby	1073.3	1687.7
Henry	545.5	2848.3
Weakley	451.8	4587.2
State total	27,777.1	23,993.5

During the period 1849-1924, there was an actual decrease in the state's production from 2,777,710 bushels to 2,399,350 bushels. With the large increases in the above counties, there must have been some large decreases in other counties. As stated above, all counties except 19 reported some decline. The principal decreases, however, occurred in a relatively few counties. These are shown in Table XXIV, in which their production is given for 1849, 1919, and 1924. The data for 1919 is presented to show that there was also a decrease in production at that time in all but two of these counties, despite the increase in the state as a whole and in the majority of the counties, as shown in Table XXII.

Table XXIV

Counties Showing the Largest Decreases in Sweet Potato Production, 1849-1924

Counties	Approximate Bushels 1845	Approximate Bushels 1919	Approximate Bushels 1924
Rutherford	83,123	24,190	7,220
Wilson	33,360	44,130	26,890
Williamson	75,800	15,270	9,710
Marshall	49,200	12,500	3,140
Maury	74,900	24,140	9,270
Bedford	42,700	26,420	5,830
Franklin	39,400	41,550	21,100
Lincoln	63,000	33,040	11,340
Giles	79,400	28,880	4,640
Smith	41,820	19,210	6,370
Fayette	111,700	37,540	15,340

With the exception of Fayette County, these counties are located in Middle Tennessee. It was shown, in connection with the discussion on the distribution of acreage, that these counties were among the leading counties from 1849 to 1879. The data presented here shows the extent of the decline in the quantities produced in recent years. Some have decreased from approximately 75 millions of bushels to less than 10 millions, from 1849 to 1924. These are, Rutherford, Williamson, Maury, and Giles. Fayette County, in West Tennessee, decreased from 111,700 bushels to only 15,340 during this period. Several of the others shown here decreased in about the same proportion.

These counties had also a smaller production in 1919 than in 1849, except Wilson[7] and Franklin. On the other hand, most counties reported increases during that period. In other words, these Middle Tennessee counties have never regained their commanding position in the sweet potato industry that they once held.

[7] This county had its highest production of 74.8 thousands of bushels in 1859.

8. Farms Reporting Sweet Potatoes Grown, 1909-1924

In the state, the trend in the number of farms reporting this crop follows the trend in the acreage. According to Chart 9, previously shown, the acreage trend was upward from 1909 to 1919, and downward from 1919 to 1924. Table XXV shows that the number of farms reporting sweet potatoes was 89,361 in 1909, 99,550 in 1919, and 53,905 in 1924. However, the acreage increased more rapidly than farms reporting from 1909 to 1919. The percentage increase in acreage was 51.2, compared with 11.5 for the number of farms reporting sweet potatoes. The acreage per farm had increased from 0.29 to 0.40. During the next five years there was a decrease of 45.8% in the number of farms reporting sweet potatoes. The decrease in acreage was only 32.3%. The acreage per farm had increased further to about 0.50.

Table XXV

Number of Farmers Reporting Sweet Potatoes, 1924, 1919, 1909, Ranked by 1924 Data

		1924	1919	1909			1924	1919	1909
1.	Weakley	1,701	2,686	1,424	23.	Hickman	758	1,248	1,055
2.	Overton	1,631	2,320	1,660	24.	Monroe	734	1,295	1,372
3.	Gibson	1,599	1,651	1,109	25.	Decatur	719	875	462
4.	Lawrence	1,407	1,423	1,079	26.	Pickett	715	703	552
5.	Putnam	1,308	2,115	1,576	27.	Robertson	711	746	1,087
6.	Hawkins	1,214	1,358	1,425	28.	DeKalb	688	973	1,163
7.	Macon	1,203	1,209	1,252	29.	Henderson	684	1,517	1,377
8.	Henry	1,160	1,394	1,081	30.	Humphries	679	865	1,051
9.	Knox	1,110	2,278	1,880	31.	Hancock	672	841	892
10.	Greene	1,084	1,840	1,581	32.	Madison	668	1,415	892
11.	Sevier	982	1,792	2,091	33.	Pentress	660	1,023	657
12.	Warren	919	2,039	1,247	34.	Wilson	659	1,341	1,228
13.	Dickson	915	1,130	1,465	35.	Clay	656	675	837
14.	Grainger	899	971	1,331	36.	McMinn	650	873	1,257
15.	Blount	868	1,651	1,392	37.	Union	647	1,128	1,005
16.	Jackson	867	1,370	1,185	38.	Marion	639	695	533
17.	Campbell	859	1,222	1,135	39.	Hamilton	632	1,339	1,059
18.	Shelby	853	3,166	1,415	40.	Franklin	608	1,519	1,115
19.	Anderson	843	1,025	1,334	41.	Wayne	589	813	842
20.	Carroll	766	1,708	1,407	42.	Washington	578	1,229	1,073
21.	Haywood	761	509	1,047	43.	Coffee	577	1,511	1,111
22.	White	759	1,448	1,172	44.	McNairy	576	1,363	1,090

(continued)

Table XXV (continued)

		1924	1919	1909			1924	1919	1909
45.	Scott	567	1,026	787	72.	Giles	314	1,682	1,355
46.	Hardeman	564	1,142	941	73.	Stewart	312	725	689
47.	Claiborne	524	1,565	1,013	74.	Grundy	303	432	379
48.	Morgan	515	879	830	75.	Lincoln	288	859	1,212
49.	Cannon	510	983	707	76.	Sumner	284	1,109	1,147
50.	Rhea	499	474	304	77.	Houston	271	513	351
51.	Obion	492	561	907	78.	Perry	260	112	447
52.	Tipton	453	940	1,300	79.	Sullivan	252	806	788
53.	Smith	445	703	904	80.	Johnson	235	477	542
54.	Cocke	415	1,190	1,353	81.	Meigs	233	378	541
55.	Carter	414	586	650	82.	Rutherford	233	1,529	1,484
56.	Maury	402	841	627	83.	Montgomery	216	1,685	1,127
57.	Williamson	400	621	712	84.	Dyer	213	1,056	654
58.	Cheatham	387	823	633	85.	Van Buren	207	363	264
59.	Fayette	381	1,624	913	86.	Bledsoe	195	563	497
60.	Roane	378	1,001	1,010	87.	Marshall	160	538	1,081
61.	Loudon	374	657	504	88.	Trousdale	122	285	157
62.	Chester	362	711	769	89.	Lauderdale	118	1,104	683
63.	Crockett	359	1,063	664	90.	Sequatchie	90	276	266
64.	Cumberland	359	746	636	91.	Benton	66	354	710
65.	Hamblen	359	793	778	92.	Moore	42	318	230
66.	Hardin	359	1,163	1,012	93.	Lewis	40	308	227
67.	Davidson	351	737	663	94.	Unicoi	31	203	266
68.	Jefferson	342	769	790	95.	Lake	0	69	65
69.	Polk	337	317	630					
70.	Bedford	333	1,372	1,320	Tennessee County		53,905	99,550	89,361
71.	Bradley	333	250	846	Tennessee Average		567	1,048	941

The sweet potato is not grown as widely as are some other farm crops. In 1925, 21.3% of the farms reported growing it, compared with 86.2% for corn, 54.8% for apples, 48.7% for hay, 47.4% for peaches, and 32.3% for Irish potatoes.

Counties vary greatly in the percentage of farms that grow sweet potatoes, as shown in Table XXVI. In 1924, Pickett County reported 73.1% and Lake none, these two ranking highest and lowest respectively. In ten counties less than one farm out of ten reported growing the crop. Only four counties reported more than one-half of their farmers growing sweet potatoes. However, further study of the table will show that the percentages were, with but a few exceptions, higher in each county in 1909 and in 1919 than in 1924.

Table XXVI

Percentage of Total Number of Farms Reporting Sweet Potatoes, 1924, 1919, and 1909

		1924	1919	1909			1924	1919	1909
1.	Pickett	73.1	76.2	62.4	50.	Henderson	21.1	46.1	43.9
2.	Overton	68.7	85.5	70.0	51.	Perry	21.1	9.1	33.7
3.	Fentress	57.6	84.3	64.5	52.	Bradley	20.2	13.6	51.6
4.	Marion	53.4	67.0	50.2	53.	Carroll	19.3	41.2	34.3
5.	Anderson	50.3	61.1	71.8	54.	McNairy	19.3	41.8	36.0
6.	Van Buren	48.5	84.0	68.8	55.	Green	18.9	34.6	33.7
7.	Grundy	47.3	76.7	67.9	56.	Washington	18.1	42.9	39.4
8.	Decatur	42.9	48.3	24.4	57.	Robertson	17.6	18.6	27.8
9.	Clay	42.7	42.1	55.3	58.	Hardeman	17.2	32.3	26.1
10.	Campbell	42.2	64.6	52.1	59.	Haywood	16.9	11.7	23.3
11.	Putnam	41.8	70.9	57.2	60.	Claiborne	16.3	51.8	31.3
12.	Morgan	41.4	70.3	70.1	61.	Wilson	15.9	32.4	32.5
13.	Hickman	40.6	64.7	53.3	62.	Madison	15.6	31.7	22.3
14.	Scott	39.6	76.3	52.8	63.	Smith	15.3	24.2	31.2
15.	Lawrence	39.3	39.6	49.0	64.	Carter	14.9	21.6	26.8
16.	Humphries	38.7	47.9	60.4	65.	Cocke	14.9	42.5	51.0
17.	Wayne	38.5	49.2	47.6	66.	Jefferson	14.5	34.8	39.2
18.	Grainger	38.0	43.0	55.9	67.	Johnson	14.1	28.5	33.1
19.	White	37.7	71.4	59.0	68.	Stewart	13.7	27.8	33.7
20.	Hancock	37.6	46.2	49.1	69.	Hardin	13.3	40.0	32.3
21.	Houston	35.9	70.9	45.4	70.	Trousdale	12.7	32.5	20.0
22.	Dickson	34.7	44.4	57.8	71.	Obion	12.5	16.6	23.8
23.	Warren	34.7	74.0	51.3	72.	Sequatchie	12.2	81.4	52.8
24.	Weakley	34.5	53.2	26.7	73.	Williamson	12.1	18.5	23.6
25.	Hawkins	33.3	41.0	41.5	74.	Shelby	12.0	38.6	17.8
26.	Jackson	33.1	57.0	46.8	75.	Tipton	11.3	17.8	24.3
27.	Union	32.6	54.8	50.2	76.	Bedford	10.8	41.1	39.3
28.	Polk	32.4	33.3	59.3	77.	Crockett	10.6	34.3	21.9
29.	Rhea	31.5	39.5	22.1	78.	Maury	10.3	22.6	15.5
30.	Henry	31.3	32.5	28.4	79.	Davidson	8.9	24.2	19.9
31.	Sevier	30.3	51.9	60.3	80.	Fayette	7.7	27.6	16.6
32.	Bount	29.8	63.5	56.6	81.	Sullivan	7.5	24.3	25.7
33.	Monroe	29.6	52.3	55.6	82.	Lincoln	7.4	19.2	30.3
34.	Loudon	28.6	47.1	44.3	83.	Macon	7.1	44.1	47.2
35.	Franklin	27.3	68.1	47.4	84.	Lewis	6.7	57.4	42.2
36.	Cannon	27.1	49.3	35.9	85.	Giles	6.5	31.7	26.3
37.	Knox	27.0	57.4	44.3	86.	Sumner	6.3	24.2	31.4
38.	McMinn	26.2	32.9	50.6	87.	Marshall	5.9	21.0	39.9
39.	Cumberland	25.7	58.9	53.1	88.	Dyer	5.6	26.9	16.3
40.	Meigs	25.7	40.4	62.5	89.	Montgomery	5.4	40.9	28.4
41.	Hamilton	24.9	54.0	46.0	90.	Moore	5.4	37.6	27.2
42.	Coffee	24.8	65.3	52.5	91.	Unicoi	4.3	25.0	32.1
43.	DeKalb	24.2	34.8	45.8	92.	Rutherford	4.0	29.0	30.4
44.	Hamblen	24.0	50.7	54.6	93.	Benton	3.5	17.9	33.2
45.	Bledsoe	23.8	53.1	53.2	94.	Lauderdale	3.2	32.4	44.3
46.	Cheatham	23.4	56.8	42.8	95.	Lake	0	8.1	7.9
47.	Gibson	22.3	25.1	16.8					
48.	Chester	21.6	42.7	44.8		Tennessee			
49.	Roane	21.2	59.3	50.3		County Average	21.3	39.4	36.3

The high producing counties have not ranked highest in the percentage of farms growing sweet potatoes. In fact, tabulation XXVII shows that, while they have ranked above the average in most cases, some have ranked far below it, notably, Shelby and Davidson in 1924 and 1909, Gibson in 1909, and Davidson and Gibson in 1919. The sweet potato acreages per farm were greater in these high producing counties, as will be shown later in Table XXVIII.

Table XXVII
Percentage of Farms Reporting Sweet Potatoes in Eight Principal Producing Counties

	1924	1919	1909
Weakley	34.5	53.2	26.7
Henry	31.3	32.5	28.4
Gibson	22.3	25.1	16.8
Carroll	19.3	41.2	34.3
Shelby	12.0	38.6	17.8
Davidson	8.9	24.2	19.9
Knox	27.0	57.4	44.3
Hamilton	24.9	54.0	46.0
State Average	21.3	39.4	36.3

The geographical distribution of the high and low ranking counties in 1924 is shown in Map 22. The majority of the 28 high ranking counties are located on the Highland Rim, both eastern and western, and in the northern part of East Tennessee. Weakley County is the only one of this group that can be classified as one of the principal producing counties. Production for home consumption and local markets is the apparent objective of the producers in the other high ranking counties.

The 36 low ranking counties are located largely in the extreme western part of the state, from Shelby and Fayette Counties at the south to Obion and Lake Counties at the north; in practically all of the sections of the Central Basin of Middle Tennessee; and in the northeastern part of the state. These counties are among the low producing group, with the exceptions of Shelby, Davidson, and Madison.

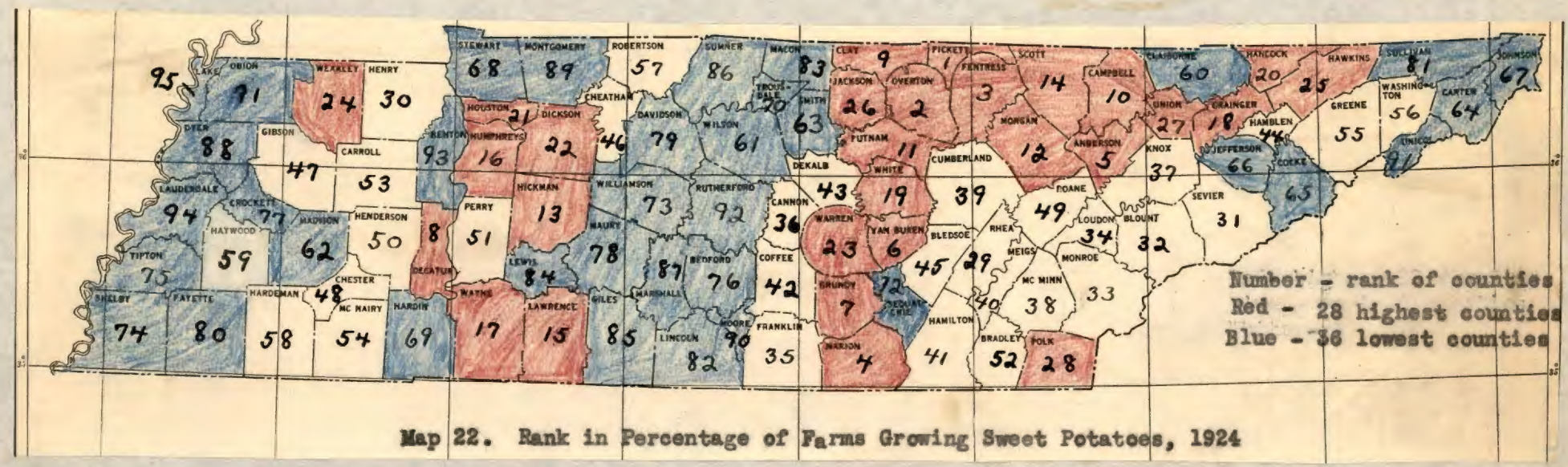
These high and low ranking counties have had about the same rank, in 1909 and 1919 as in 1924, with a few exceptions. This is shown in Maps 23 and 24. In other words, the low ranking areas have been consistently low at each of the three census years; and the high ranking areas have been consistently high.

None of the four city counties, Shelby, Davidson, Knox, and Hamilton, have been in the high ranking group. In fact, Shelby and Davidson have been consistently in the low group.

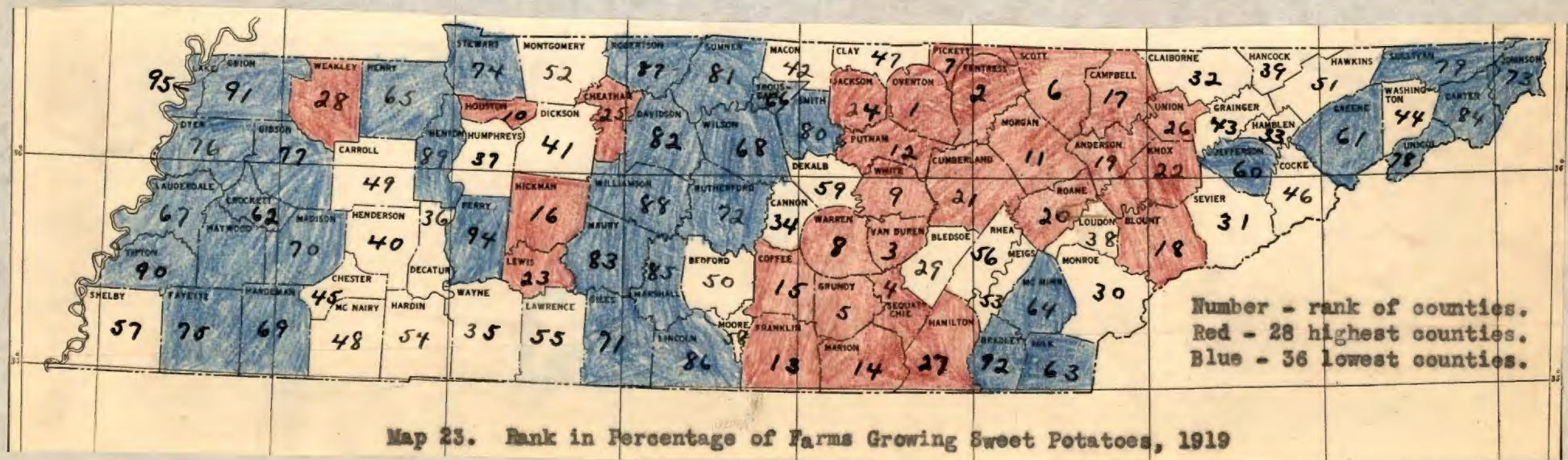
An investigation of the factors that are involved in the geographical distribution of these counties should prove enlightening; but insufficient time and available data are limiting factors. However, some of the probable factors involved and the additional data needed are mentioned below. This will provide a starting point for further research in this connection.

The low rank of the West Tennessee group of counties might be due partly to the lack of home gardens among the cotton croppers. Data on the number of gardens in each county are needed. Unfortunately, such data by counties are not available in census reports. Then, these counties have relatively low ranks in acreage of this crop, which might be considered as one of the contributing factors. However, the low rank of the Central Basin and the northeastern East Tennessee counties cannot be explained by the lack of home gardens.

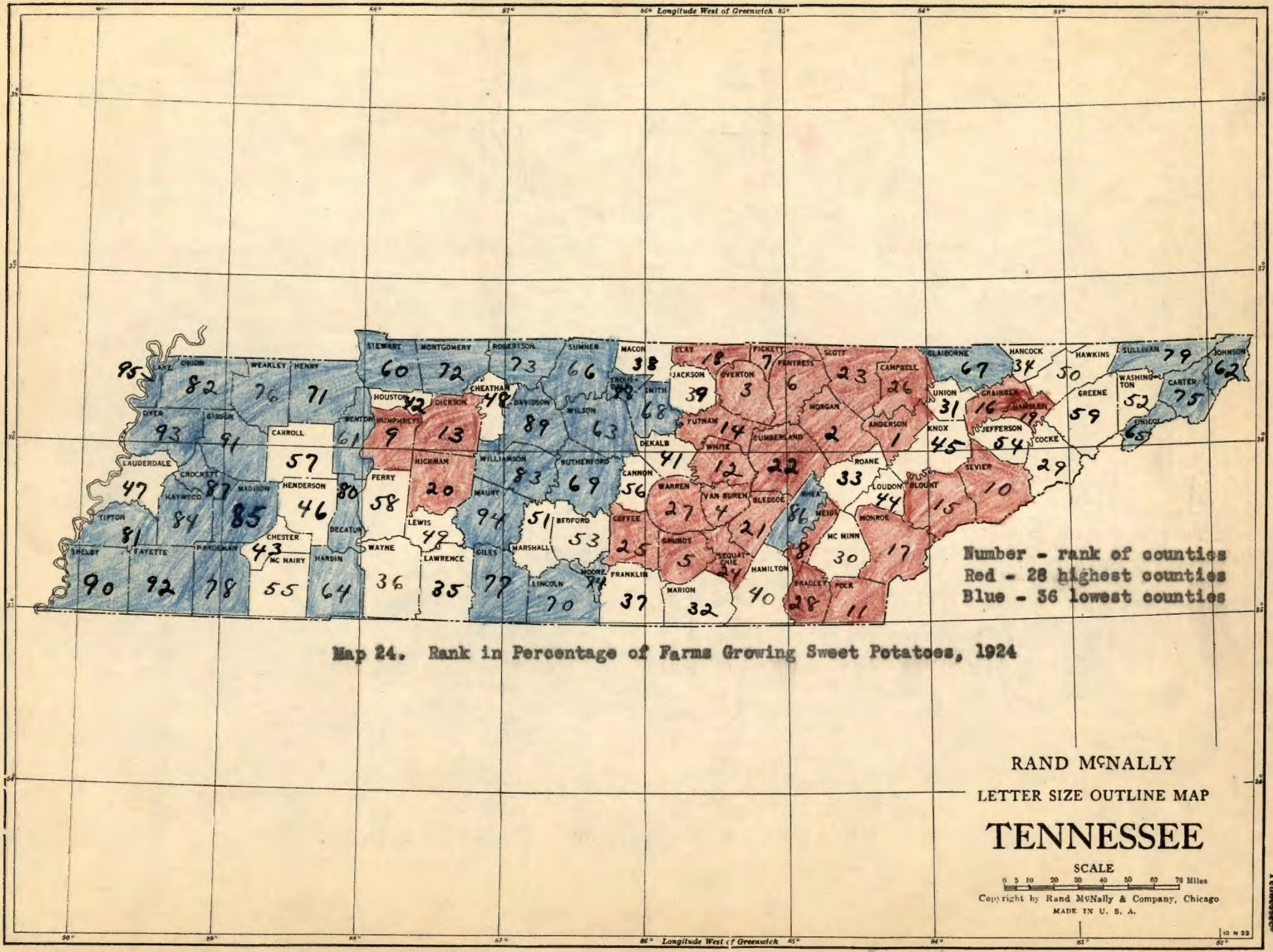
Nevertheless, according to Table XV, these counties rank low in acreage in this crop. Could this be a contributing factor? One may expect low producing areas to have a small percentage of the farmers growing the crop. This is not necessarily true, since production is largely for home consumption, and a relatively small acreage may be grown by a large percentage of the farmers. In fact, this appears to be the case in many of the Highland Rim counties and in a few of the Cumberland Plateau counties, which rank low in production but high in the percentage of farmers who reported this crop grown. Therefore



Map 22. Rank in Percentage of Farms Growing Sweet Potatoes, 1924



Map 23. Rank in Percentage of Farms Growing Sweet Potatoes, 1919



Map 24. Rank in Percentage of Farms Growing Sweet Potatoes, 1924

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there appears to be no correlation between high acreage and high percentage of farmers reporting.

Furthermore, there appears to be practically no correlation between yield and percentage of farms growing this crop, as is shown by an examination of Table XIX on yields per acre and Table XXVI on the percentage of farms growing sweet potatoes. There are about as many counties with high yields that report small percentages of farmers growing sweet potatoes as there are that report large. Counties with low yields report both high and low percentages.

The number of farms that are reported as growing sweet potatoes may not be large enough. This would depend upon whether small garden patches were enumerated by the census enumerators.

9. Number of Acres Per Farm Reporting Sweet Potatoes in 1924

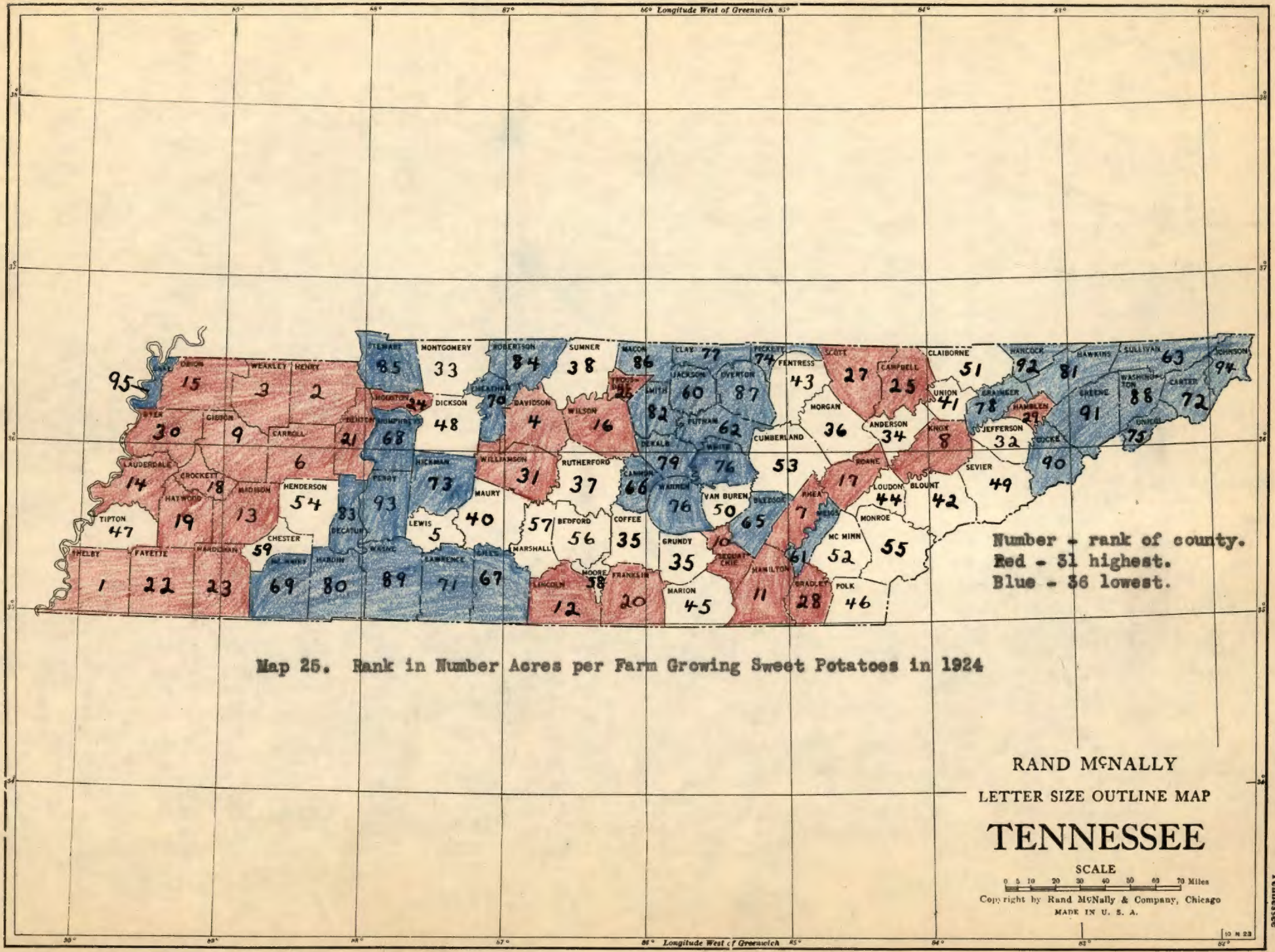
With a few exceptions, the largest acreages per farm are grown on the farms in the principal shipping area of West Tennessee and in the city counties. Weakley, Henry, Carroll, and Gibson Counties, which largely comprise the shipping area, ranked 2nd, 3rd, 6th, and 9th respectively, as shown in Table XXVIII and Map 25. The acreage per farm was 2.13 in both Henry and Weakley Counties. Carroll and Gibson had 1.18 and 0.80 acres per farm respectively.

Among the city counties, Shelby ranked highest of all counties with 2.36 acres per farm. Davidson, Knox, and Hamilton Counties ranked 4th, 8th, and 11th in the state respectively. Davidson had 1.47 acres; Knox 1.03 acres; and Hamilton, 0.74 acres.

Table XXVIII

Number Acres per Farm Growing Sweet Potatoes, 1925; Number Acres Sweet Potatoes, 1925; and Percentage Farmers Growing Sweet Potatoes, 1925

	Counties	No. Acres per Farm Growing Sweet Potatoes	Acres in 1925	Percentage Farmers Growing S. Potatoes		Counties	No. Acres per Farm Growing Sweet Potatoes	Acres in 1925	Percentage Farmers Growing S. Potatoes
1.	Shelby	2.38	2,016	12.0	50.	Van Buren	0.31	64	48.5
2.	Henry	2.13	2,476	31.3	51.	Claiborne	0.30	159	16.3
3.	Weakley	2.13	3,624	34.4	52.	McMinn	0.30	193	26.2
4.	Davidson	1.47	516	8.9	53.	Cumberland	0.29	104	25.7
5.	Lewis	1.20	48	6.7	54.	Henderson	0.29	196	21.1
6.	Carroll	1.18	908	19.3	55.	Monroe	0.29	212	29.6
7.	Rhea	1.16	578	31.4	56.	Bedford	0.28	92	10.8
8.	Knox	1.03	1,141	27.0	57.	Marshall	0.28	45	5.9
9.	Gibson	0.80	1,280	22.3	58.	Moore	0.28	12	5.3
10.	Sequatchie	0.75	68	12.2	59.	Chester	0.27	97	21.6
11.	Hamilton	0.74	468	24.9	60.	Jackson	0.27	238	33.0
12.	Lincoln	0.71	706	7.4	61.	Meigs	0.27	63	25.7
13.	Madison	0.69	463	15.6	62.	Putnam	0.26	347	41.8
14.	Lauderdale	0.65	77	3.2	63.	Sullivan	0.26	66	7.5
15.	Obion	0.64	317	12.5	64.	Warren	0.26	240	34.7
16.	Wilson	0.56	368	15.9	65.	Bledsoe	0.25	48	23.8
17.	Roane	0.54	206	21.2	66.	Cannon	0.25	129	27.1
18.	Crockett	0.53	192	10.6	67.	Giles	0.25	79	6.5
19.	Haywood	0.53	401	16.9	68.	Humphries	0.25	169	38.7
20.	Franklin	0.51	311	27.3	69.	McNairy	0.24	141	19.3
21.	Benton	0.50	33	3.5	70.	Cheatham	0.23	89	23.4
22.	Fayette	0.49	186	7.7	71.	Lawrence	0.23	318	39.2
23.	Hardeman	0.46	258	17.2	72.	Carter	0.22	90	14.9
24.	Houston	0.46	124	35.9	73.	Hickman	0.22	166	40.6
25.	Campbell	0.45	388	42.2	74.	Pickett	0.22	160	73.1
26.	Trousdale	0.45	55	12.7	75.	Unicoi	0.22	7	4.3
27.	Scott	0.42	239	39.6	76.	White	0.22	166	37.7
28.	Bradley	0.40	133	20.2	77.	Clay	0.21	156	42.7
29.	Hamblen	0.40	143	24.0	78.	Grainger	0.21	194	38.0
30.	Dyer	0.39	84	5.6	79.	DeKalb	0.20	137	24.2
31.	Williamson	0.39	156	12.1	80.	Hardin	0.20	72	13.3
32.	Jefferson	0.38	130	14.5	81.	Hawkins	0.20	243	33.3
33.	Montgomery	0.38	83	5.4	82.	Smith	0.20	91	15.3
34.	Anderson	0.37	314	50.3	83.	Decatur	0.19	138	42.9
35.	Grundy	0.37	111	47.3	84.	Robertson	0.19	139	17.6
36.	Morgan	0.37	193	41.4	85.	Stewart	0.19	59	13.7
37.	Rutherford	0.36	84	4.0	86.	Macon	0.18	223	42.1
38.	Sumner	0.36	102	6.3	87.	Overton	0.18	302	58.7
39.	Coffee	0.35	204	24.8	88.	Washington	0.18	103	18.1
40.	Maury	0.35	143	10.3	89.	Wayne	0.18	105	38.5
41.	Union	0.35	227	32.6	90.	Cocke	0.17	73	14.8
42.	Blount	0.34	297	29.8	91.	Greene	0.16	179	18.9
43.	Fentress	0.33	216	57.6	92.	Hancock	0.15	104	37.6
44.	Loudon	0.33	125	28.6	93.	Perry	0.15	39	21.0
45.	Marion	0.33	212	53.4	94.	Johnson	0.14	33	14.1
46.	Polk	0.33	110	32.4	95.	Lake	0	0	0
47.	Tipton	0.33	150	11.3					
48.	Dickson	0.32	293	34.7		State	0.50	28,832	21.3
49.	Sevier	0.32	315	30.3					



Map 25. Rank in Number Acres per Farm Growing Sweet Potatoes in 1924

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The smaller producing counties all had less than 1 acre per farm, except Rhea and Lewis. In fact, more than three-fourths of them had less than one-half acre, and over one-third had less than one-fourth acre. No acreage was reported for Lake County.

Production in the counties having the largest acreage is largely for sale, with the possible exception of Houston County. Rhea County's acreage, while not large in comparison to the other high ranking counties, is devoted to commercial production more than that of some of the other relatively unimportant counties. This is due to its nearness to the Chattanooga market. This apparent relation between high total acreage and high acreage per farm would be expected, in view of the commercial motive back of production in these high producing counties.

The producers in the counties that have a small total acreage apparently grow only a small acreage for home consumption and for their local markets, which are limited greatly in the quantities that they can absorb.

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PART II. CONSUMPTION

CHAPTER IV

THE SWEET POTATO AS A HUMAN FOOD

1. Food Value and Economy.
2. Flavor.
3. Methods of Serving.
4. Season of Consumption.
5. Salient Points Developed by Interviews at Knoxville Public Eating Places.
6. Conclusion.

From the earliest periods recorded man has recognized the food value of the sweet potato in those regions to which it was native. Later, it was cultivated in new areas, some of which were outside its climatic optimum. A still later development was the utilization of a part of the annual crop by those living where its production was unknown. But it was not until recently that scientific studies were perfected which developed the true value of the sweet potato as a human food and assigned it to a particular position among other food crops in respect to each factor of dietary importance.

1. Food Value and Economy

Calorific and Protein Value - That the sweet potato is of high food value among vegetables, considered from the standpoint of energy supplied, is illustrated by Table XXIX, adapted from Rose (1, Rose, Feeding the Family, pp. 346-348), which gives the number of ounces of various common vegetables as eaten required to furnish 100 calories. (One calorie is the amount of heat energy required to raise 1 kilogram of water 1 degree centigrade.)

Inspection of this table shows the relatively small bulk and weight of sweet potato required to furnish 100 calories. Thus, half of a medium-sized baked sweet potato furnishes as many calories as: 2¼ cups of string beans; 4 beets, 2 inches in diameter; 5 cups of shredded cabbage; 4 or 5 carrots,

Table XXIX

Weight of 100-Calorie Portions of Vegetables as Eaten

Vegetable	Measure	Weight Oz.	Vegetable	Measure	Weight Oz.
Asparagus, fresh	2/3 serving	15.9	Onions, raw	3-4 medium	7.2
Asparagus, on toast	1/3 cup	4.6	Scalloped	1/3 cup	2.5
Beans, baked, canned	1/3 cup	2.7	Parsnips, stewed	7 pieces 3 1/3 in. x 1½ in. x 1/3 in.	5.8
Lima, fresh	1/2 cup	2.8	Peas, canned	⅔ cup (drained)[a]	4.4
Lima, buttered	1/4 cup	1.7	Creamed	½ cup (scant)	2.7
Lima, dried	1/8 cup	1.0	Green, shelled	⅔ cup	3.5
String	2¼ cups of 1 in. pieces	8.5	Peppers, stuffed I	1 pepper	4.7
Beets	4 beets 2 in. diam. (1 1/3 cups sliced)	7.7	Stuffed II	1 pepper	7.0
			Stuffed III	2/3 pepper	2.5
Cabbage, shredded	5 cups	11.2	Potatoes, sweet, raw	1/2 medium	3.6
Carrots	4-5 young carrots 3-4 in. long	10.1	Sweet, baked	1/2 medium	3.0
			Sweet, glazed	1/2 small	2.1
Cauliflower	1 very small head	11.5	White, baked	1 medium	3.8
Celery	4 cups of ½ in. pieces	19.1	White, boiled	1 medium	3.6
			White, chips	8-10 large pieces	0.6
Corn a la Southern	1/3 cup	3.4	White, creamed	2/5 cup	2.7
Canned	1/3 cup	3.6	White, mashed	1/2 cup (scant)	3.1
Fresh	1/2 cup	3.5	White, raw	1 medium	5.3
On cob	2 ears 6 in. long	9.0	White, scalloped	5/8 cup	3.5
Cucumbers	2⅛ cucumbers 7 in. long	23.5	Radishes	3 doz. red button	12.0
			Spinach, boiled,		
Kidney bean stew	1/2 cup	4.9	Chopped	2 1/2 cups	21.0
Lentils, baked	1/4 cup (scant)	1.6	With egg	4/5 cup	7.6
Dried	2½ tbsp.	1.0	A la creme	3/5 cup	4.1
Lentil meat loaf	slice 1¾ in. x 2½ in. x ⅜ in.	1.1	Succotash, canned	1/3 cup	5.5
			Tomatoes, canned	1 3/4 cups	15.6
Lettuce	2 large heads	18.5	Fresh	2-3 medium	15.5
Mushrooms, fresh	22 mushrooms 1 in diameter	7.9	Stuffed	1 tomato	4.0
			Turnips, creamed	1/2 cup	1.4
Stewed	3/5 cup	2.3	Raw	2 cups ½ in. cubes	9.0

[a] Water drained off estimated as 30 per cent can contents.

3 to 4 inches long; 2½ cucumbers, 7 inches long; 22 mushrooms, 1 inch in diameter; 3 dozen radishes; or a medium-sized baked Irish potato. Considered on a wight basis, not a single vegetable in the table, outside the bean and lentil groups, except baked Irish potatoes and possible stewed mushrooms, equals the baked sweet potatoes' low record of 3 ounces for 100 calories, unless it is enriched with a more concentrated food by creaming, stuffing, frying, buttering, or some other method. If such a method is used on the sweet potato and it is glazed, only 2.1 ounces are required to furnish 100 calories; and this is less than is required of any vegetable outside the bean and lentil groups, no matter how prepared, except creamed turnips. The contrast with 15.9 ounces of asparagus, 19.1 ounces of celery, 23.5 ounces of cucumber, 18.5 ounces of lettuce, and 15.6 ounces of canned or 15.5 ounces of fresh tomatoes is striking. Since the cost of sweet potatoes per pound is less than of beans and much less than of meats and other foods high in energy, it follows that they constitute one of our most valuable sources of food from the standpoint of economy.

The advantageous position of the sweet potato in furnishing food economically was recognized during the World War and great pressure was exerted to increase production. At that time, the United States Department of Agriculture studied the relative value of many crops and of various livestock enterprises in the production of human food per acre utilized, and published a bulletin in which it called attention to the virtue of the sweet potato in this respect, (2, Cooper and Spillman, Human Food From an Acre of Staple Farm Products, pp. 6-7.) In this bulletin was also published (2, Ibid. p. 4) a table showing the yield per acre, calories per pound, pounds of digestible protein per acre, and calories per acre furnished by the crops and livestock enterprises studied. This table is here reproduced as Table XXX, and shows that sweet potatoes easily

Table XXX

A Comparison of the Food Produced Annually by an Acre of Land When Utilized in the Production of Various Food Crops and Livestock Products

Food products	Yield per Acre		Calories per lb.	Lbs. protein per acre (digestible)	Calories per Acre
	Bu.	Lbs.			
Food crop:					
Corn	35	1,960	1,594	147.0	3,124,240
Sweet potatoes	110	5,940[a]	480	53.5	2,851,200
Irish potatoes	100	6,000	318	66.0	1,908,000
Rye	20	1,200	1,506	118.8	1,807,200
Wheat	20	1,200	1,490	110.4	1,788,000
Rice, unpolished	40	1,154	1,460	55.4	1,684,840
Rice, polished	-	1,086	1,456	50.0	1,581,216
Soy beans	16	960	1,598	294.7	1,534,000
Peanuts	34	524	2,416	126.2	1,265,018
Oats	35	784[b]	1,600	89.4	1,254,400
Beans	14	840	1,337	157.9	1,123,080
Cowpeas	10	600	1,421	116.4	852,600
Buckwheat	24	600[c]	1,252	34.5	751,800
Dairy products:					
Milk	-	2,190	325	72.3	711,750
Cheese	-	219	1,950	56.7	427,050
Butterfat	-	98.55	3,605	1.0	355,273
	Live (lbs.)	Dressed (lbs.)			
Meat:					
Pork	350	273	2,465	22.7	672,945
Mutton	205	113	1,215	14.7	137,295
Beef	216	125	1,040	18.5	130,000
Poultry:[d]					
Meat	103	66	1,045	12.7	68,970
	Doz.	Lbs.			
Eggs	73.8	110.7	720	14.8	79,704
Total	-	-	-	27.5	148,674
	Live (lbs.)	Dressed (lbs.)			
For poultry meat alone	267	171	1,045	33.0	178,695
	Doz.	Lbs.			
For eggs alone	122.4	183.6	720	24.6	132,192

[a] 54 lbs. per bushel. [b] Hulled kernals. [c] Flour. [d] The first section under "poultry" assumes that poultry are kept under ordinary poultry-farm conditions, pullets being raised and old hens and young males being used for meat. Eggs not needed for hatching purposes used for food. Data for "poultry meat alone" assume purchase of day-old chicks, grown to a 4-lb. weight and utilized as food. The data for "eggs alone" assume purchase of hens and their utilization for the production of eggs alone.

(Table from Farmers' Bul. 877)

outrank every other food product studied, except corn, in the economical utilization of land for the production of human food. It clearly places the sweet potato far down the scale, however, as a producer of protein, the beans, peas, and most of the cereals being more economical in this respect. Milk and cheese also outrank the sweet potato in production of protein per acre utilized, though it, in turn, outranks eggs and meats. Though meat is a concentrated form of protein, it is expensive when the quantity produced per acre is considered.

The rank of corn and sweet potatoes shown in this table is outstanding. The assumed yield of corn is given as 35 bushels per acre and of sweet potatoes 110 bushels. While both of these yields are considerably above the average for Tennessee, which, in 1924, was 21 bushels of corn per acre, and 89.4 bushels of sweet potatoes, it will be noticed that the Tennessee sweet potato yield approaches the assumed yield more closely than does its corn yield; in other words 110 is only 23% more than 89.4, but 35 is about 35% more than 26. Thus, taking the actual yields secured by Tennessee farmers, the following results are obtained:

Corn: 21 bushels @ 56# per bushel, and 1594 calories per pound = 1,874,544 cal. per acre

Sweet potatoes: 89.4 bushels @ 54# per bushel, and 480 calories per pound = 2,317,248 cal. per acre

Irish potatoes: 69.5 bushels @ 60# per bushel, and 318 calories per pound = 1,326,060 cal. per acre

From the above it is seen that, when the actual yields of these three principal crops for Tennessee are taken, sweet potatoes make a much better showing than that indicated by Spillman and Cooper in the table referred to above.

As a matter of fact, taking the yields of corn and sweet potatoes actually received for the United States as a whole in 1924, sweet potatoes make the better showing. The average yield of corn was 22.2 bushels, which gives the number of calories produced per acre as 1,981,661; while the number of bushels per acre of sweet potatoes was 80.2, which gives 2,078,784 calories per acre.

Now, using the average yields of various crops for the years 1921 to 1925 for Tennessee and for the United States, we find sweet potatoes easily in the lead, in the former, in calories produced per acre, followed by corn and Irish potatoes. In the latter, corn leads sweet potatoes slightly and these are followed by Irish potatoes. Thus these three crops are the most economical in the production of heat energy per acre of land utilized (see Table XXXI and Chart 11). It is of further interest to note from Chart 11 that in Tennessee peanuts very nearly equal Irish potatoes in calories produced per acre. Inspection of Table XXX shows that peanuts have a calorific value per pound equal to approximately five times that for sweet potatoes but that a sweet potato yield of over eleven times as many pounds per acre has been used. Peanuts, being relatively high in production of protein, yield 126.2 pounds of that important food constituent per acre, while the sweet potato yields but 53.5 pounds. The combination of these crops on many southern farms is, thus, rather fortunate, the one acting to supplement the other.

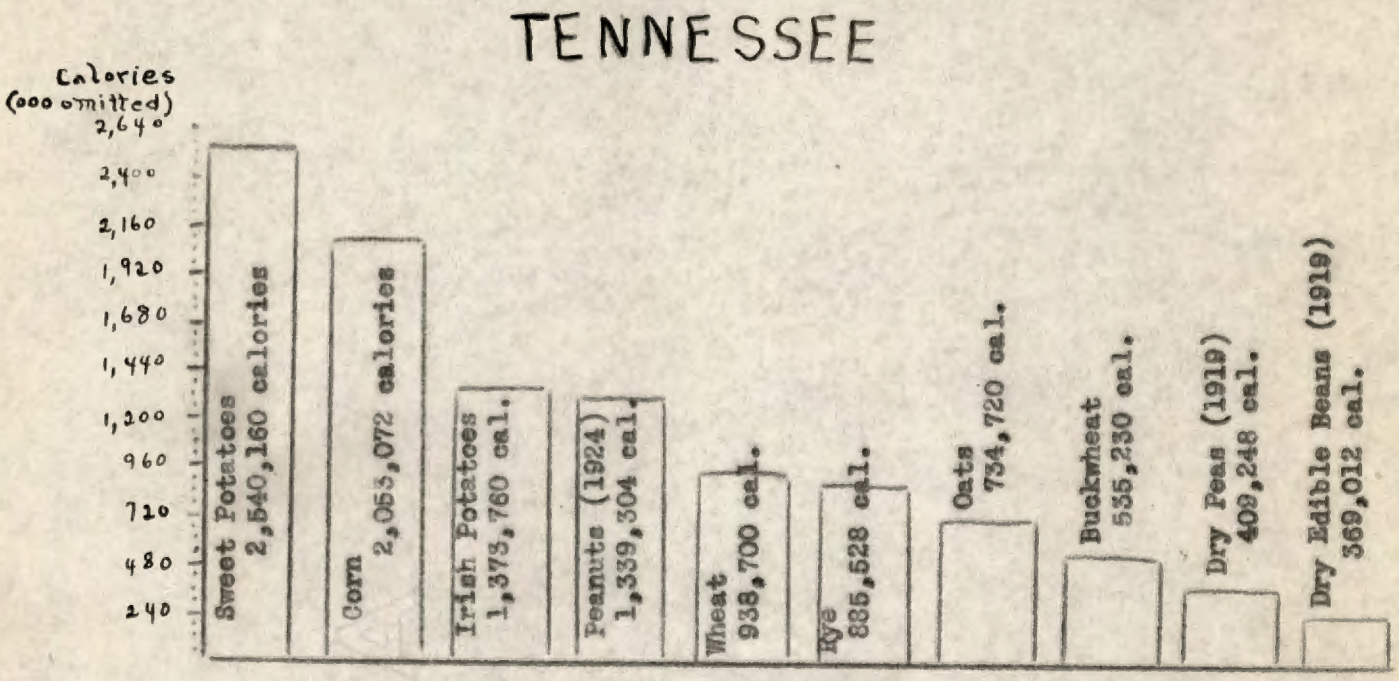
Table XXXI

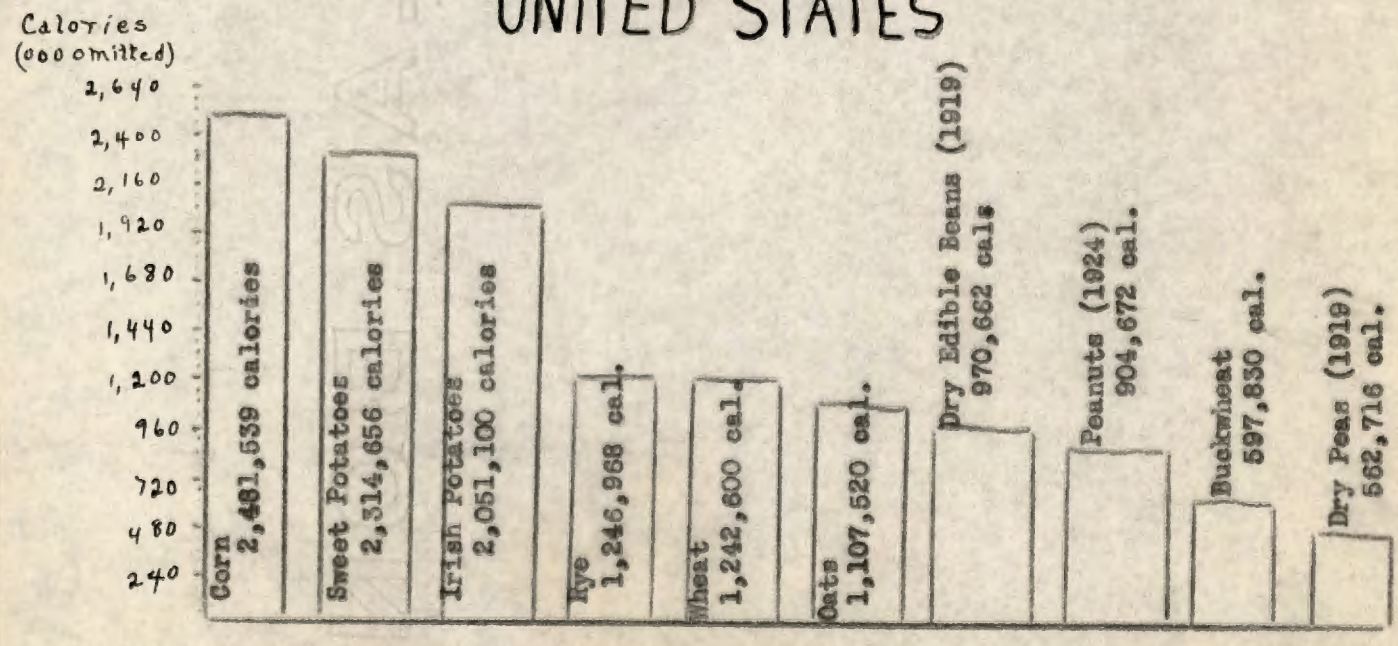
Number Calories per Acre for Important Crops, Based on Average Yield 1921-1925 (Except as Noted)

	Tennessee		United States	
	Pounds	Calories	Pounds	Calories
Corn	1,288	2,063,072	1556.8	2,481,539.2
Sweet potatoes	5,292	2,540,160	4822.2	2,314,656.0
Irish potatoes	4,320	1,373,760	6450.0	2,051,100.0
Rye	588	885,528	828.0	1,246,968.0
Wheat	630	938,700	834.0	1,242,660.0
Peanuts (1924 yield)	554.4	1,339,304	374.2	904,672.0
Oats	459.2	734,720	692.2	1,107,520.0
Dry peas (1919 yield)	288.0	409,248	396.0	562,716.0
Buckwheat	427.5	535,230	477.5	597,830.0
Dry edible beans (1919 yield)	276.0	369,012	726.0	970,662.0

Chart 11.

Number Calories per Acre for Important Crops, Based on Average Yield, 1919-1925 (Except as Noted)





Vitamins - According to a recent Pennsylvania Extension Publication (3, Jefferds, The Canning of Fruits, Vegetables, and Meats in the Home, p. 5), sweet potatoes contain a fair amount of vitamin A, B, and C.

Among 30 vegetables and fruits listed as containing vitamin A only one (carrots) is said to contain larger quantities of this vitamin than do sweet potatoes; and 21 contain less.

Among 40 vegetables and fruits listed as containing vitamin B only two (asparagus and beans) contain more than sweet potatoes; and 20 contain less.

Among the 34 vegetables and fruits listed as containing vitamin C only three vegetables (raw cabbage, raw carrots, and tomatoes); and only three fruits (grapefruit, lemons, and oranges) are listed as containing more than sweet potatoes, while 20 contain less.

Vitamins D, E, F, and G are not mentioned in this bulletin.

According to this publication sweet potatoes do not contain iron, calcium, or phosphorous - the blood, bone, and teeth building materials. Irish potatoes are said to have iron and phosphorus, no calcium, a trace of vitamin A, a fair amount of vitamin B, and a fair amount of vitamin C.

In a recent study published by the United States Department of Agriculture appears a table of the relative distribution of vitamins A, B, and C, which gives general backing to the data in the Pennsylvania bulletin already mentioned, though its method is qualitative rather than quantitative. It is noteworthy that in this table sweet potatoes that have been autoclaved are listed as not possessing either vitamin B or vitamin C, while raw sweet potatoes are indicated as a good source for vitamins A, B, and C. (4, Smith, Vitamins in Food Materials, p. 10.) Cooking under high steam pressure as in an autoclave apparently destroys vitamins B and C. The ordinary cooking process does not entirely remove vitamins B and C, though boiling would be apt to dissolve the water-soluble vitamin B; but sacrifices some part of the vitamins for palatibility.

Sweet vs. Irish - It has already been mentioned in an earlier chapter that sweet and Irish potatoes are interchangeable in the diet of a certain class of consumer. In the North, the Irish potato is the chief staple among vegetables and its consumption vastly outranks that of the sweet potato. In some sections of the South the sweet potato is a basic part of the fare of nearly all classes, and is sometimes eaten in much greater quantities than the Irish potato by the laboring man, especially by the negro of country districts. It is commonly considered to replace bread in the fare by the southern laborer. The greater fuel value of the sweet potato, 560 calories per pound of the edible portion compared to 375 for the Irish potato (see Table XXXII), would seem to give it a distinct advantage in the diet. However, the taste of the great mass of the population has not yet been adjusted to the sweet potato as a staple, and its narrower area of production and less thorough distribution has kept it a poor second to the Irish potato in quantity produced. Thus, in 1928, there were produced 465,350,000 bushels of Irish potatoes, but only 77,661,000 bushels of sweet potatoes.

Aside from that relatively small portion of the population which takes the attitude that the two commodities are practically of equal value in the diet, and that price should be the basic determining factor in choosing between them, an attitude which is scientifically correct, the tendency is to regard them in different categories. The different taste tends to prevent competition. In the north, the lack of familiarity with the sweet potato and its higher cost combine with its sweet flavor to cause it to be regarded as a side dish, along with other vegetables, and as more or less a luxury.

The Irish potato possesses several distinct advantages over the sweet potato which tend to offset the greater economy of the latter in heat energy production: On many areas in the south two crops of the farmer may be raised

within a given year, while, usually, but one crop of sweet potatoes is possible; the Irish potato is considered better for children and invalids; people tire of Irish potatoes less quickly than of sweet; the former more commonly appear as the main dish in a meal; they are more often served two and three times daily than are the sweet; more different ways of preparation are known for their use by the major portion of the people; and particularly does their wide use in salads give them high consumption among the middle and upper classes. While it may be maintained that several of these advantages apply principally to the North at present and may be overcome; yet it must be remembered that even the South imports large quantities of Irish potatoes at the same time that it is exporting sweets. In effect, it appears that, though the two commodities are scientifically, and to some extent actually, interchangeable; still they will come to supplement each other and offer variety in the diet in both North and South, rather than to supplant one another in the respective areas in which one or the other is available to the consumer at a distinct price advantage. If this proves to be the outcome, the present narrower quantity distribution of the sweet potato should place it in line for the greater expansion of the two industries, as consumption becomes adjusted.

Table XXXII presents a comparison of the average composition of sweet and white, or Irish, potatoes. The publication from which it is taken (5, Langworthy, Potatoes, Sweet Potatoes, and Other Starchy Roots as Food, pp. 18-19) calls attention, in addition to the greater calorific value of the sweet potato, to the fact that it contains about 9 per cent less water and 9 per cent more carbohydrates than the Irish potato. The increase from 1.8 per cent of protein, 0.7 per cent fat, and 560 calories per pound in the uncooked state to 3 per cent, 2.1 per cent, and 90.5 calories per pound respectively after being cooked is noteworthy and might be considered a compensation, in different kind,

for the loss of vitamins B and C in cooking referred to previously. The higher rank of these three factors in cooked sweet potatoes than in the canned product is interesting. It may be partly accounted for by water added in the canning process, but water is not added in sufficient quantity to cause so great a variation. It is possible that this difference in composition and calorific value may be related to the prevalent unfavorable comment upon the flavor of canned sweet potatoes.

Table XXXII

Average Composition of Sweet and White Potatoes

Kind of potato	Refuse	Water	Protein	Fat	Carbohydrates.		Ash	Fuel value per pound
					Sugar, starch, etc.	Crude fiber		
	%	%	%	%	%	%	%	Calories
Sweet potato (edible portion)	-	69.6	1.8	0.7	26.1	1.3	1.1	560
Sweet potato (as purchased)	20.0	55.2	1.4	0.6	21.9		0.9	450
Sweet potato (cooked)	-	51.9	3.0	2.1	42.1		0.9	905
Sweet potato (canned)	-	55.2	1.9	0.4	40.6	0.8	1.1	800
White potato for comparison (edible portion)	-	78.3	2.2	0.1	18.0	0.4	1.0	375
White potato for comparison (as purchased)	20.0	62.6	1.8	0.1	14.7		0.8	305

2. Flavor

Flavor is, as in the case of all other food products, one of the chief bases of demand for the sweet potato. That the flavor is not always the same is well known to those familiar with the commodity. In addition to methods of preparation for the table, several influences have bearing upon the variation in flavor: geographic location in which the crop is grown, changes during curing, changes with the season, effects of disease, changes in canning, and varietal differences.

Geographical - In commenting upon characteristics of the sweet potatoes,

the bulletin referred to (5, Ibid, p. 19) says:

> "As would be guessed from their flavor, they contain considerable quantities of sugar, part of which is cane sugar and part invert sugar or glucose. The proportion of sugar and starch varies with the climate. The warmer the place in which the plant is grown, the greater the proportion of food laid by in the form of sugar. Tropical sweet potatoes sometimes contain almost equal quantities of sugars and starch. Those grown in New Jersey, on the other hand, probably do not average more than 5 or 6 per cent of sugar, or about a fifth of their total carbohydrates."

It is natural that the potatoes grown in the warmer climates and possessing greater amounts of sugar should be much sweeter, and, therefore, more unlike the Irish potato than those of lower sugar content. A taste, once acquired, for a certain type is not readily changed, as evidenced by the strong preference for the sweeter varieties in the South and the equally strong adherence to those less sweet in the North.

Curing and Season - In curing the sweet potato crop, storage houses are heated to a temperature of 80 to 95 degrees Farenheit for a period of 10 days to three weeks. During this period there is a rapid decrease in the percentage of water and a rapid change of starch to sugar. Thus the cured potato is sweeter and contains less moisture than the freshly dug potato. The appearance when cooked, however, is opposite to that which the moisture content would lead us to expect. In this regard, Thompson (6, Thompson, Vegetable Crops, p. 329) states: "Freshly dug sweet potatoes are dry when cooked, while stored potatoes are more moist." He quotes Hasselbring and Hawkins (6, Ibid, pp. 328-329. Quoted from Hasselbring and Hawkins, "Physiological Changes in Sweet Potatoes During Storage"; in Jour. Agr. Res. 4, 1915) to the effect that there is a gradual disappearance of starch during the first of the season (October to March) and probably a re-formation of starch accompanied by a disappearance of cane sugar during the latter part of the season (March to June); and that, "'the changes in starch and cane sugar appear to be in a general way correlated

with the seasonal changes in the temperature'". The poorer quality of sweet potatoes noticed late in the season may thus be, in part, due to this change in composition as well as to the diseased condition which often develops.

Disease - The prevalence of black rot and other diseases affecting sweet potatoes in storage is so wide-spread that those familiar with the commodity have almost certainly, at one time or another, noted the dark appearance and disagreeable taste of certain potatoes. Various diseases cause various changes in flavor, but, needless to say, a diseased potato is not conducive to improving the consumer's opinion of the sweet potato. It is unfortunate that so many cooks allow diseased tubers to slip by them in preparation, sometimes, no doubt, with a mistaken view to economy.

Canning - In interviews with twenty-two managers and chefs of restaurants, boarding houses, and hotels in Knoxville, Tennessee, upon the size of canned sweet potatoes, it was found that twelve did not use them at all while ten used them in varying quantities. Among those buying canned sweet potatoes, the majority used them sparingly and in very few instances was favorable comment made upon their quality. Most of those using them gave the diminished waste, the convenience in buying, and preparation, or the scarcity of fresh stock as reasons for their purchase. In only two instances were they used regularly when fresh stock could be readily obtained, and there was almost unanimous complaint as to their flavor. This phase of consumption would seem to offer fertile ground for further investigation, since the canned product assuredly offers great advantage in ready distribution and diminished waste, could its flavor be put on par with that of fresh potatoes.

Varietal Differences - The variation in flavor and eating qualities generally recognized on the market is the distinction between moist- and dry-fleshed varieties, commonly grown in the southern and northern producing areas respectively. The early introduction of the dry type to northern markets es-

tablished a liking for them among northern consumers which is difficult to overcome. However, in southern markets the moist-fleshed type is in almost exclusive demand. Interviews with thirty-four managers and chefs of restaurants, boarding houses, and hotels, in Knoxville, failed to disclose a single preference for the dry-fleshed type (see Table XXXIII).

Table XXXIII

Varieties of Sweet Potatoes Preferred by Those Responsible for Food Purchases in 34 Eating Places in Knoxville, Tennessee.

Variety	No.	Variety	No.
Nancy Hall	20	Nancy Hall and Porto Rico	1
No preference	5	Nancy Hall and Southern Queen	1
Porto Rico	3	Red and White	1
Yellow Cuban	2	Kentucky ?	1

Northern people, accustomed chiefly to Irish potatoes, have tended to use the same standards for judging sweet potatoes. An Irish potato that is moist, or soggy, is of poor quality, and, judged by this standard, a sweet potato of the varieties grown in the South would be of poor quality, while one of the dry type grown in the North, and especially in the northeastern producing area, would be of good quality.

The reason for the moist-fleshed and dry-fleshed characteristics of the two types are hardly what the terms themselves would lead one to expect. In discussing these characteristics Thompson (6, Thompson, Vegetable Crops, p. 329) states: "The so-called dry-fleshed varieties have a lower sugar content than the moist-fleshed varieties ..... All of the so-called moist-fleshed varieties are high in sugar. The moisture content of the two types is practically the same"; and in a table adapted from Hasselbring and Hawkins (6, Ibid., p. 327. Quoted from Hasselbring and Hawkins, "Physiological Changes in Sweet Potatoes During Storage", in Jour. Agr. Res. 4, 1915) shows the moisture con-

tent of the Big Stem Jersey, one of the so-called dry-fleshed varieties, to be consistently higher, throughout the season than that of the Southern Queen, a moist-fleshed variety.

The dry-fleshed type are poor keepers and lose quality as the season advances. This is tacitly recognized by growers of that type in their policy of marketing in fall and early winter. The moist type keep well, and some varieties actually improve in quality late in the season. The northern markets are partial to the dry type early in the season, but in late winter, spring, and early summer the southern-grown sweets increase in popularity and this has been particularly true during the last few years.

3. Methods of Serving

A possible explanation for the increased demand which the moist type of sweet potato has lately enjoyed is the gradual dissemination of information as to methods of cooking these sweeter varieties. Formerly practically the only known method of preparing sweet potatoes for the table in the North was baking. This preparation is better suited to the dry than to the moist type, especially in the eyes of the northerner who looks for dryness or mealiness as the evidence of highest quality in a baked potato. The common method of cooking Irish potatoes, by peeling and boiling them is not suited to the sweet potato, and frying sweet potatoes and their use in pies were then, and are yet, practically unheard of in the North, as are the common southern customs of eating them raw, and of seeking a cold cooked sweet potato as a lunch, between meals. More recently, the custom of candying sweets has spread to northern restaurants and homes and has largely solved the problem of how to prepare the moist type.

Watery sweet potatoes are never desirable and the dry varieties should be mealy when cooked, a characteristic which, as with Irish potatoes, is

largely dependent upon the plant food supply and the type of soil which the crop is grown.

In the South, many ways of serving are widely known. Table XXXIV is a summary of common methods of serving at the 34 Knoxville eating places mentioned above, and shows the decided preference for serving candied, a preference probably directly reflecting consumer demand.

Table XXXIV

Methods of Serving Sweet Potatoes at 34 Eating Places in Knoxville, Tennessee

Candied	24	French fried	1
Pie	10	Fried	1
Baked	6	Grilled	1
Mashed	2	Souffle	1
Pudding	2	Stewed	1

Sweet potato pie and baking occupied second and third places respectively. The proprietress of one restaurant catering to a clientele of people of leisure, largely women, mentioned that she had fifteen methods of preparing sweet potatoes, but that it was difficult to get that type of women to eat potatoes in any form. She described potatoes, sweet and Irish, as always the cheapest food she could serve.

4. Season and Consumption

The proprietress mentioned further stated that she always stops serving sweet potatoes with the first warm days. In this, she touched upon a phase which is of great importance to all interested in the sweet potato industry, since, correct or incorrect, the belief that sweet potatoes are a cold weather food is widely held, as illustrated by Table XXXV, which is a summary of the replies received in the 34 interviews, including, 5 at boarding houses for white people, 2 at boarding houses for colored, 4 at colored restaurants, 3 at restaurants serving both colored and white, 6 at white restaurants serving an ordinary or low class of trade, 7 at white restaurants catering to

high class of customer, 4 at white cafeterias, and 3 at well known white hotels. It shows the actual practices followed in the period during which sweet potatoes are served at these eating places and the opinions of the managers or chefs as to when they are most readily consumed, together with the approximate number of meals served daily by each group.

Table XXXV

Time of Year at Which Sweet Potatoes Are Served, Period of Greatest Consumption, and Total Number of Meals Served, by Groups, 34 Eating Places in Knoxville

Answers of:	1. Time Served			2. Period of Greatest Consumption		3. Approximate Total Meals Served Daily by Groups
	All year	8-10 mo. in fall, winter, & spring	6 mo. or less in fall or winter	All year	Cold weather	
5 white boarding houses	1	4		2	3	850
2 colored boarding houses		1	1		2	15
4 colored restaurants		2	2	2	2	270
3 restaurants serving colored and white	2	1		1	2	1500
[a,b] 6 white restaurants serving ordinary and low class trade	3	1	1	2	2	1500
7 white restaurants catering to high class of customer	4	2	1	3	4	3100
4 white cafeterias	2	2		1	3	900
Total 34	13	15	5	11	21	11,260

[a] One serves no sweet potatoes at any time.
[b] Two were uncertain as to period of greatest consumption.

The prevalence of regarding sweet potatoes as a food for cold weather is evidenced by the opinions of those responsible for buying food to furnish approx

approximately 11,260 meals daily throughout most of the year summarized in the double column of answers in the middle of the table of answers. While 11 of those interviewed could see no change in consumption with the season, provided that good sweet potatoes were available, 21 believed that their customers eat this vegetable more freely in cold weather. There was very little difference of opinion among groups upon this matter, the majority in all cases but two considering consumption in cold weather greater, while the idea that it shows little variation throughout the year if good potatoes are offered had support in all groups but two.

Those expressing the opinions discussed had been previously questioned upon the actual period during which sweet potatoes were served in their respective places of business. The summary in the first three columns in the table shows that 13, or approximately 40%, of the 33 eating places serving sweet potatoes continue to serve them in some form throughout the year. In nearly all cases it was stated that the quantity served in summer is much less; but the reason given for this was often that it is difficult to get good stock through the summer months. Fifteen, or about 45%, of the places at which interviews were held stop serving sweet potatoes for a period of from two to four months through the warm weather. Many of these would serve throughout the year if good sweet potatoes were available at a reasonable price; but poor quality stock, with heavy waste, high price, and dissatisfaction, are responsible for the cessation in serving them with considerably over half of these eating places. Of the 33 only 5, or about 12%, serve sweet potatoes for a period of six months or less through the fall and winter months. The two reasons expressed for serving for so short a time were, lack of call for sweet potatoes on the part of customers, and high price. The latter reason, when considered in contrast with prices of other foods, appears to be a mistaken idea. The single restaurant serving no sweet potatoes at any time is distinctly out of type, since it is

situated on the same street as several of the others interviewed and between two of them. The reason given for not serving sweet potatoes was that customers never called for them.

Analysis by groups of the answers as to the period during which sweet potatoes are served discloses some variation. In the first place, it is contrary to expectations to find that, of the eight groups, only the colored boarding houses and colored restaurants failed to show any served throughout the year, and that 3 of the 5 places serving sweet potatoes for 6 months or less occur in these groups. The groups and the number of meals served is small; but the reasons given for cessation or short periods of serving were, lack of call on the part of customers, high price, and lack of availability, though the proprietor of the largest restaurant expressed the belief that his trade would use them throughout the year. He was unaware that canned sweet potatoes could be purchased.

The restaurants serving both colored and white are run by enterprising business men, at least two of them apparently of foreign parentage, and seem to have the greater part of the colored trade. Two serve sweet potatoes all the year in some form and their managers all agree that the colored trade calls for more sweet potatoes than the white trade. It seems probable that the opinions of these men are more dependable than those of proprietors of the colored eating places, which have a much smaller patronage and are in some instances indifferently managed. Price is not an important factor with the group serving both colored and white. The problem is to obtain good sweet potatoes.

Extensive use is made of sweets in the five white boarding houses, all of which serve 125 meals or more daily, and whose customers are largely workers in offices and stores, students, and possibly a few laborers. The use is here

limited, to some extent, by price. The regular charge for meals is 25 cents; and sweet potatoes are served largely because of their low cost. In seasons when they are high in price and waste in preparation is great, four of the five boarding houses discontinue their use, substituting summer squash and other vegetables which are in season; though proprietors stated that they would use many more if they were readily available in summer.

There is distinct contrast within the group of six white restaurants serving ordinary and low class trade. One of these serves no sweet potatoes at all, one serves only a few during two or three months. The other four serve considerable quantities, and three of these extend their use throughout the year. The complaint was repeated that good stock is not obtainable in summer.

Of the 11,260 meals served by the eating places covered in the table, over 55% were sold at the 7 white restaurants catering to a high class of patronage and the 4 white cafeterias. These two groups serve approximately 6,225 meals daily. In the former group falls the restaurant referred to earlier as serving a clientele of women of leisure. Four of the remaining six serve sweet potatoes throughout the year; two serve none through the summer. One, a popular restaurant with a large number of customers, lists sweet potatoes in the menu and serves them only upon customers' orders. Very few are called for, not over three or four orders per week. Another, having large custom among students, serves them occasionally as part of the regular meal but does not list them in the short order menu. It serves but 10 bushels per year. Three others serve a moderate quantity, 2 bushels per week to 1 bushel daily when in season. The sixth finds them a very popular dish, has several ways of preparing them, and states that they are eaten equally well whenever served. This group is less limited by the price, those pushing sweet potatoes being willing to pay the necessary price to obtain them for their trade.

The cafeteria group is evenly divided between serving throughout the year and ceasing through the summer. One of the latter would serve throughout the year if good stock were available and this group and three of the group just discussed agree that it is difficult to obtain sweet potatoes in summer. Two of the restaurants can always get them at the market house by paying the price. Since people choose their foods in cafeterias, and yield largely to what appears appetizing, it is interesting to note that the weight of opinion is in favor of serving throughout the year. It is also interesting that all four cafeterias find candied sweets the best method of serving. One proprietress states that they are not popular baked because people do not like to peel them. The superintendent of a large southern chain of cafeterias states that there is no turning of taste from sweet potatoes in hot weather, but that they will be constantly consumed if a good quality is served. The local member of this chain serves the largest number of meals of any establishment interviewed, about 1860 per day. The manager is eager to get good sweet potatoes, but said he would not serve as often if they sold at $2.25 or more per bushel.

The three hotels, with a patronage from those able to pay for good food, serve large quantities of sweets and are not limited by the price. One serves throughout the year; two do not serve in summer. All find the candied form most popular and agree that people eat them better in winter.

5. Salient Points Developed by Interviews at Knoxville Public Eating Places

(1) Consumption of sweet potatoes in public eating places is largely dependent upon the attitude of chefs and managers toward serving them.

(2) Where merely placed on menus and served only when called for, few are consumed; where well prepared and served as part of a regular meal, or placed on the cafeteria counter, consumption is much greater.

(3) The preference of the eating places interviewed and especially of the higher class of trade, is for the Nancy Hall variety and for serving in the candied form.

(4) Canned sweet potatoes are not consumed in important quantities in these eating places and little is known about them. (Two managers, one colored and one white, did not know they were on sale; and one of these expressed an intention to try them.)

(5) Two chief objections to canned sweet potatoes are raised:

(a) There is a common prejudice against serving canned goods when avoidable.

(b) There is strong complaint against the flavor.

(6) The total quantity of sweet potatoes served diminishes greatly in summer, because of difficulty in obtaining good stock, because of lessened demand by consumers, and because of high price and risk of loss by decay.

(7) The opinion here prevails that sweet potatoes are eaten more readily in cold weather.

(8) Most of these managers would buy sweet potatoes throughout the year if good ones were available.

(9) In order to increase consumption in public eating places those interested should:

(a) Induce managers to serve them more frequently.

(b) Make a high quality of sweet potato available on the market throughout the summer.

6. Conclusions

From the foregoing, it may be gathered that as a cheap source of energy the sweet potato is unexcelled, and that it constitutes a valuable source of

vitamin A, and of vitamins B and C if eaten raw. Cooking may lessen the content of the two latter. Supplemented with foods of higher protein content, it becomes an important staple in economical diet, a condition which is clearly recognized by the southern people. Realization of the economy of the sweet potato as a food has been hampered in the North by the costs of transportation and distribution, and by the heavy losses through decay. Whereas the great consumption of sweet potatoes in the South has been as a poor man's staple, in the North this commodity has, until recently, been regarded as a luxury. Even in the South, heavy losses from decay due to improper storage, has often doubled the cost. The modern development of scientifically constructed storage houses, of more rapid and complete distribution facilities, and of small quantity buying by the consuming public all tend toward lowered waste and consequent lower cost to the consumer. Continued advance along these lines, availability throughout the year by supplementing dry-fleshed varieties with the better-keeping southern varieties late in the season, and the further dissemination of knowledge of southern culinary methods for the moist-fleshed southern sweets, emphasizing those which render the vegetable most palatable in warm weather, should gradually bring the sweet potato to be regarded as a staple on northern tables throughout the year.

To aid in bringing the sweet potato to this status in the North, to increase sales on local southern markets, and by these two strategic moves to increase the value of his crop, the southern farmer should regard the preferences of his markets as to variety, and if he is not so situated that he can profitably produce the variety preferred, he should store, grade, and pack that variety which he can profitably produce in such a manner that it may become more popular with the consumer. If near a consuming center he can grow enough of an early variety to advantage by the early marketsdemand; and one important step which each can take is to grow sufficient sweets for abundant

use on the home table, thus reducing the amount paid out to distant growers and intermediate distributors for foods which, in many cases, have less food value.

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CHAPTER V

QUANTITY CONSUMPTION AND MARKET PREFERENCE

1. Changing Food Habits in the United States.
2. Per Capita Consumption of Leading Vegetables Compared.
3. Portions Served.
4. City Consumption and Receipts.
5. Market Preferences.
6. Conclusions

The actual quantity of sweet potatoes consumed, either in total or upon a per capita basis, is exceedingly difficult to determine. Among the factors responsible for this difficulty might be mentioned the large and undetermined quantities fed to livestock upon farms where the crop is grown, the heavy and extremely variable losses in primary storage, and the further losses and waste in distribution and preparation for the table. Several attempts have been made, and various methods used, to arrive at the actual consumption for limited areas and for the country as a whole; and some conclusions have been drawn. However, the figures arrived at in most cases fail to account for one or more of the variable factors involved; and their chief value lies in their utility for purposes of comparison rather than in their absolute accuracy.

In general, it may be said that the American people are outstandingly greater consumers of sweet potatoes than are Europeans. It is said that the latter consider sweet potatoes "too sweet for vegetables and not sweet enough to take the place of cakes, sweet fruits, etc." (1, Langworthy, Potatoes, Sweet Potatoes, and Other Starchy Roots as Food, p. 17.) A further example might be cited in the case of the reply of a wholesaler in Victoria, British Columbia, Canada, who was asked to fill out a questionnaire concerning market preferences and quantities consumed. In a letter accompanying the questionnaire he comments: "This is not a sweet potato town owing to the very large

percentage of English people we have who are not consumers of the tuber."

1. Changing Food Habits in the United States

Despite the relatively high consumption of sweet potatoes by Americans, however, the trend of national food habits in the United States has for the past few years been none too encouraging for growers of this vegetable. The railways have given ready response to the increasing demand for fresh vegetables resulting from education of the public as to the healthfulness of such foods. Transportation facilities have so improved that it has become possible to quickly supply all important consuming centers in the country with fresh vegetables from areas favorable to their production at various seasons. Growers in these areas have likewise been quick to respond to demand; so that a supply of those vegetables which were formerly a brief summer luxury is now, in many places, continuously available. Such fresh vegetables include tomatoes, lettuce, asparagus, and the like; and their increasing importance has already been discussed on pages 17 and 19 and is illustrated by Chart 1, page 18.

Since the total consumption of vegetable foods has a distinct elastic limit, increases in consumption of one vegetable or class of vegetables is almost certain to be at the expense of others. While it has already been shown, in Chapter IV, that sweet potatoes constitute one of the most economical sources of supply for heat energy in human food, this characteristic is of secondary importance in the mind of a public which has acquired a taste for fresh vegetables and which possesses the necessary funds to secure the latter. As this statement implies, not the least important factor in the change of national food habits has been the relatively advantageous position of the wage earner in regard to purchasing power since the World War. What

effect an unfavorable trend in purchasing power of the consumer will have upon demand can only be conjectured; but unless there has been a fundamental change in the attitude of man to wealth, it seems logical to expect that he will compromise with his food likes and dislikes in order to conserve a part of his income for the purchase of other comforts and necessities. If this be true, there appears to be good reason to believe that consumption may swing back toward the cheaper foods.

However, this swing would very likely not carry consumption of individual products entirely back to their relative positions existing before the new food habits were incurred, nor would it have the elements of permanency. True food and health values will ultimately determine the diet; therefore, if the modern movement increasing the use of fresh vegetables to promote healthfulness is well founded, the prospect of greatly increasing sweet potato consumption in regions where it is now a staple is not bright. Expansion must rather come from expansion of its use in the balanced diet in those areas now consuming it only as a luxury.

2. Per Capita Consumption of Leading Vegetables Compared

Comparison of Census Divisions - The situation acquires a more favorable aspect when viewed from the standpoint of sweet potato consumption in relationship to that of other vegetables. Table XXXVI, taken from figures obtained by the United States Bureau of Labor Statistics in a study made in 1918-19, shows a comparison of consumption of sweet potatoes and the four other leading vegetables in point of quantity consumed, together with that of corn meal. This comparison is rendered by United States Census divisions, or combinations of them, and for the country as a whole. It shows a marked contrast between these divisions in consumption of corn meal and of sweet

Irish potatoes. That of the other three vegetables, tomatoes, onions, and cabbage, is more uniform.

Table XXXVI

Annual Per Capita Consumption of Sweet Potatoes Compared With That of Irish Potatoes, Tomatoes, Onions, Cabbage, and Corn Meal in Cities and Towns - 1918-19

Vegetable	North Atlantic States	South Atlantic States	North Central States	South Central States	Western States	United States
	lb.	lb.	lb.	lb.	lb.	lb.
Sweet Potatoes	3.68	36.04	3.71	34.12	3.63	10.92
Irish Potatoes	155.58	95.41	170.71	98.40	146.76	144.73
Sweet and Irish Potatoes	159.26	131.45	174.42	132.52	150.39	155.65
Tomatoes	18.74	21.82	23.33	20.12	17.35	20.40
Onions	14.34	11.59	12.92	15.78	12.43	13.57
Cabbage	12.84	11.61	14.79	11.06	11.67	12.88
Corn Meal	6.02	34.45	9.46	35.96	8.24	14.16

According to this estimate, the South Atlantic States are the heaviest consumers of sweet potatoes, using 36.04 pounds per capita, followed closely by the South Central States with 34.12 pounds. The other three groups, North Atlantic, North Central, and Western, are all below the United States average of 10.93 pounds and vary but little, each using a little over 3½ pounds per capita. It is thus shown that, in 1918-19, consumption of the sweet potato as a staple was largely confined to the groups of states where it is produced in abundance.

On the other hand, with the United States average consumption of Irish potatoes at 144.73 pounds per capita, the three divisions mentioned as low consumers of sweet potatoes are found to be above this average in consumption of Irish potatoes. The North Central States rank highest, using 170.71 pounds

per capita. Those two groups found to lead in consuming sweet potatoes are found to be well below the United States average in consumption of Irish potatoes, the lowest division being the South Atlantic States, with 95.41 pounds per capita. This group is highest in sweet potato consumption.

Thus it appears that these two vegetables replace each other in the diet. A combination of the two, showing consumption per capita of sweet and Irish potatoes, naturally places the North Central States in the lead as potato consumers, since they outrank all groups in Irish potato consumption and outrank all but the two southern groups in sweet potato consumption. It is striking that these southern groups, heavy in consumption of sweet potatoes, are the smallest users of sweet and Irish potatoes combined. With the United States average at 155.65 pounds per capita, the North Central and North Atlantic groups are above, using 174.42 pounds and 159.28 pounds respectively; the Western states drop a little below, with 150.39 pounds, and the South Central and South Atlantic groups are well below this average, consuming 132.52 pounds and 131.45 pounds respectively. It is possible that the greater concentration of food material in sweet potatoes is a reason for this lower per capita use; it is also possible that the relatively high price of Irish potatoes in the southern states and the extensive use of corn as a staple are largely responsible for this relationship.

The similarity in consumption of corn meal and of sweet potatoes among the census divisions is of great importance. It is seen that more pounds of corn meal than of sweet potatoes are consumed per capita in the North, while the quantities of each used in the two southern divisions are about equal. Both are staples in the South; neither is a staple on most northern tables.

The family consumption data from which these figures were computed was obtained in industrial centers, from great cities to towns of a few thousand. Thus the picture of consumption rendered probably would not be typical of the

whole consuming populace. However, it may be concluded from these data that city consumption, even in the South, is much greater for Irish than for sweet potatoes; yet there is a note of encouragement for the sweet potato grower when it is considered that cities and towns in the North Atlantic, the North Central, and the Western States then consumed approximately fifty to sixty times as many Irish as sweet potatoes, while in southern cities and towns sweet potatoes constituted over one-third of the total potato consumption. To bring the northern consumption relationship of the two commodities closer to that existing in the South would appear to be a worthy objective for southern growers and their organizations.

Comparing quantitatively the tabulated figures for consumption of tomatoes, onions, and cabbage with those for sweet potatoes and all potatoes, it is found that in the northern and western states these vegetables are, on the average, approximately from three to five times as important in the diet as are sweet potatoes. In the South, their importance ranges from only about one-third to less than two-thirds that of sweet potatoes. Their consumption in proportion to total potato consumption is greater in the South than in the North because of the lower consumption of all potatoes combined in the former.

State Consumption Studies - Studies made in various states differ as to the per capita consumption. Results are not strictly comparable because of different methods used in arriving at consumption figures. They are given here for whatever value they may possess in illustrating contrasts between sections and between consumer groups.

In 1924, the New Jersey Department of Agriculture published a bulletin in which appear tables showing estimated family requirements of various foods. (2, Waller and Weiss, The Production and Consumption of Food in New Jersey,

pp. 273-274.) In these tables, the estimated requirement of sweet potatoes for a New Jersey urban family is 1 peck, or 13.5 pounds, while that of Irish potatoes is 78 pecks, or 1170 pounds. It appears that the average urban family was taken as equivalent to 3.35 adult males. Dividing, it is found that urban sweet potato consumption per adult male unit would be 4.03 pounds, and a similar figure for Irish potato consumption would be 349.25 pounds. The estimated requirement of sweet potatoes for a New Jersey rural family is 103.2 pounds, and of Irish potatoes 33.5 bushels or 2010 pounds. Then the rural family eats approximately twenty times as many Irish potatoes as sweet potatoes, while for the average urban family the consumption of Irish potatoes is 78 times as great as of sweet potatoes. The average New Jersey rural family was taken as equivalent to 4.8 adult males. Again dividing, it is found that rural sweet potato consumption would be 21.5 pounds per adult male unit, or more than five times as great as the urban consumption, and that rural Irish potato consumption would be 418.75 pounds, or approximately one-fifth greater than the urban.

A Mississippi bulletin published in 1927 makes an interesting comparison in a table on the average number of pounds of the most common foods used per family per two weeks, which is taken from data gathered through records kept by rural housewives. (3, Dickins, A Study of Food Habits of People in Two Contrasting Areas of Mississippi, p. 28.) This comparison for sweet and Irish potatoes is shown in Table XXXVII.

Table XXXVII
Comparison of Sweet and Irish Potato Consumption by Seasons for Mississippi Rural Families

	Sweet Potatoes Pounds	Irish Potatoes Pounds
Two weeks in February	13.62	3.16
Two weeks in May	0.56	4.22
Two weeks in August	3.54	4.62
Two weeks in November	25.39	3.50

It is of interest to note that in the two warmer periods the consumption of Irish potatoes exceeded that of sweet potatoes, while the opposite was true in the two colder periods. The consumption of Irish potatoes is more uniform through the year.

Now, if it is considered that these figures are typical of the quarters of the year in which they occur respectively, it would be possible to compute a yearly figures by: (1) dividing each by 2 to reach a weekly basis, (2) multiplying each by 13 to arrive at a quarterly basis, and (3) adding these quarterly results to form a yearly basis. Performing these computations, one reaches a yearly consumption of 280.22 pounds for sweet potatoes per family and of 100.75 pounds for Irish potatoes. It being a dietary study, from which these figures are taken, the average male units per family was computed separately for energy and for protein and mineral. The former was taken as 5.004 and the latter as 5.562. Using the round number 5 for our purposes, and dividing, we find a per capita consumption for the year of 56.05 pounds of sweet potatoes and of 20.15 pounds of Irish potatoes. Such a dominance of the sweet potato is to be expected in a region where sweet potatoes are produced easily and Irish potatoes with difficulty.

A surprising contrast between sweet potato consumption in negro and white families is set forth in a later Mississippi publication. (4, Dickins, A Nutrition Investigation of Negro Tenants in the Yazoo Mississippi Delta, p. 29.)

Figures are here given for one month, in consumption per adult male unit. Of sweet potatoes, the negro families consumed 1.73 pounds per adult male unit, while white families consumed 5.74 pounds per adult male unit. For Irish potatoes, the figures were 0.24 of a pound and 1.33 pounds respectively. The whites families were greater consumers of both kinds of potatoes. This survey covered 180 families, including 888 people - 360 negroes and 528 whites. It was started in February, 1927, and lasted for one month. Could these figures be

considered typical for the year, we might arrive at an annual consumption figure by multiplying each of these quantities by 12. This process gives the per adult male unit colored consumption of sweet potatoes as 20.76 pounds and of Irish potatoes as 2.88 pounds; white consumption thus computed is 68.88 pounds of sweet and 15.96 pounds of Irish potatoes. As seen from the previous study, consumption for the year is not uniform; and the above figures doubtless are too high for sweet potatoes and too low for Irish potatoes. It has often been stated that negroes are greater consumers of sweet potatoes than are white people. The results of this study would contradict this opinion. However, they do not constitute conclusive evidence.

The Ohio Agricultural Experiment Station studied 47 farm families in that state and publishes a table of foods consumed per adult male unit for the year 1926 from data accumulated in accounts kept by rural families. (5, McKay, Food Consumption of Farm Families, p. 20.) In this table, the consumption of sweet potatoes per adult male unit is given as 7.8 pounds, while that of Irish potatoes is placed at 218.6 pounds, or nearly thirty times as much.

A study covering 695 rural persons in South Georgia and 628 rural persons in North Georgia gives total figures on consumption of various vegetables. (6, Mathews, Food Habits of Georgia Rural People, p. 29.) The data were taken from complete records kept throughout the period of a year. According to these data, the southern group consumed 3605 pounds of sweet potatoes and 1589 pounds of Irish potatoes. The figures for the northern group were 4134 pounds and 1586 pounds respectively. Only the edible portion of the potatoes was weighed. In this study, it is again found that computation by adult male units has been computed for individual food constituents and by families; so that the total number of adult male units does not appear. Dividing the total figures by the number of persons in the respective groups, the consumption of sweet potatoes and Irish potatoes per capita are found to be 5.19 pounds.and 2.29 pounds re-

spectively for the southern group, and 6.58 pounds and 2.53 pounds respectively for the northern group. Thus the northern Georgia families studied consume a few more potatoes, both sweet and Irish, than do those studied in South Georgia; but neither group used a large quantity of potatoes of either kind. In fact, these consumption figures are so small as to arouse doubt of accuracy. It is to be expected that sweet potatoes will lead Irish potatoes in country districts where the former are more easily produced than the latter. This study bears out the expectation, as did the Mississippi publication previously referred to.

One further comment upon sweet potato consumption by a state publication may be cited. An Idaho bulletin (7, Talbott, Food Consumption and Food Expenditures in Relation to Standards of Requirements and Family Income, p. 10) in subdividing vegetables and fruits into groups as studied defines the first group as, "Potatoes, including sweet potatoes, which were seldom used." Idaho, a heavy production region for Irish potatoes, remote from sweet potato producing areas, would be expected not to use sweet potatoes in great quantity. The consumption figure given in this bulletin under the group defined above is 3.68 pounds per adult male unit, per week. This multiplied by 52 gives an annual consumption of 191.36 pounds.

It may be useful for purposes of comparison to tabulate these various consumption figures, though it is evident from the preceding discussion that they are arrived at through a great variety of methods.

The relatively small consumption of sweet potatoes and the large quantity of Irish potatoes used in the four northern states are striking, as is the predominance of sweet potatoes over Irish potatoes in the three southern states. The great contrast in total consumption of potatoes between North and South is also outstanding. Upon comparing Table XXXVIII with Table XXXVI it is found that the results in Table XXXVIII show heavier northern consumption and lighter southern consumption of sweet and Irish potatoes combined than do those in

Table XXXVI. One reason for the former might be found in that the studies were made among rural people, with the exception of the New Jersey urban survery. But this urban survey shows a higher potato consumption than any rural survey except that in New Jersey. The very low consumption in the Georgia groups is partially explained by the weighing only of edible portions; but these figures still seem abnormally low. The low consumption recorded by negro families in Mississippi may be significant. Too much weight should not be attached to any of the absolute quantities expressed in Table XXXVIII, due to the great variety of methods used in arriving at these figures. Their value for comparison is their chief utility.

Table XXXVIII

Comparison of Sweet Potato Consumption per Adult Male Unit in States Making Consumption Studies

Group Studied	Pounds Sweet Potatoes per Adult Male Unit	Pounds Irish Potatoes per Adult Male Unit	Total Pounds of Potatoes Consumer per Adult Male Unit
Urban families in New Jersey	4.03	349.25	353.28
Rural families in New Jersey	21.05	418.75	449.25
Ohio farm families	7.8	218.6	226.4
Idaho	Seldom used		191.36
Mississippi rural families	56.05[a]	20.15[a]	76.20[a]
Mississippi Delta:			
Rural colored families	20.76	2.88	23.64
Rural white families	68.88	15.96	84.84
South Georgia rural families	5.19[a,b]	2.29[a,b]	7.48[a,b]
North Georgia rural families	6.58[a,b]	2.53[a,b]	9.11[a,b]

[a] Per capita.
[b] Edible portion only.

3. Portions Served

Servings per Bushel - Accurate data as to the number of persons that can be served from 1 bushel of sweet potatoes were not readily available. However,

it is the opinion of the manager of a local cafeteria that about 120 portions of candied sweets are ordinarily obtained from a bushel; and this manager called attention to the contrast with Irish potatoes served mashed, in which form approximately 160 servings are obtained per bushel.

Meals Served per Bushel Consumed - However, this is somewhat misleading if one has in mind the actual number of customers whose sweet potato requirements may be satisfied with a bushel. The manager mentioned above was of the opinion that about 300 people were served a meal for every bushel of sweet potatoes that was used during that meal. The combined results of the previously discussed interviews at Knoxville eating places bear out this opinion in a general way. From the estimates of managers and chefs as to the length of time that a bushel lasted, or the average quantity used daily, and the number of meals served, it was computed that an average of 0.19 of a pound of sweet potatoes was consumed per person served at the meals at which sweet potatoes were offered. This is not the average serving, but the average consumption figuring in those who failed to take sweet potatoes. Considering a bushel of sweet potatoes as weighing 54 pounds, this gives 284 meals served for every bushel consumed.

From these data a further quantity of interest in the consideration of consumption was computed; this is the average weight of sweet potatoes used per meal served throughout the year, including all meals, whether or not sweet potatoes were served. This weight was found to be .097 of a pound. Now, considering that most persons partake of approximately 1050 meals annually, the per capita consumption figure of 101.85 pounds is reached. An error enters here because a very large number of those eating in public eating places have breakfasted at home, so that a total number of meals served is predominantly dinners and suppers, at which sweet potatoes are much more apt to be served than at breakfasts. Making what seems due allowance for the extra breakfasts,

a weight of .08 of a pound per meal for all meals is arrived at; and this gives a per capita consumption of 84 pounds. Even this figure is much higher than actual consumption, since most eating places either serve sweets less frequently or do not serve them at all in warm weather. If we estimate consumption as negligible in June, July, and August, the per capita figure would be reduced to 63 pounds, which is probably much nearer the truth, but still seems high by comparison with other estimates.

The data from which these computations are made are shown in Table XXXIX.

Table XXXIX
Summary of Quantity Data on Sweet Potatoes Used and Meals Served Daily at Knoxville, Tennessee, Eating Places Interviewed

Average Quantity of Sweet Potatoes Used Daily When Served	892.62 pounds
Average Number of Meals Served Daily	9190[a]
Average Number of Meals at Which Sweet Potatoes Are Served on Days When Served	4695

[a] In correcting computations 2000 meals were added to this figure to compensate for breakfasts eaten at home by those eating one or more meals at the public eating places interviewed.

4. City Consumption and Receipts

Schoenfeld's Study - In an unpublished study carried on at Cambridge, Massachusetts, in 1921 some interesting conclusions were reached as to the sweet potato industry, and as to a method of determining a consumption index for southern cities. (8, Schoenfeld, Sweet Potato Consuming Capacities of Southern Cities.) From the number of bushels of sweet potatoes estimated to have been produced in each of the southern producing states and in California in 1919, was subtracted the number of bushels estimated to have been shipped by each, using car-lot shipments as a basis for the latter estimate. This gave the number of bushels retained in each of these states. The retention figure thus obtained was divided by the 1919 estimated population of the re-

spective states to obtain the retention per capita. An average retention for these states was computed and found to be 3.01 bushels per capita. The percentage of the population which was negroes was then computed from census data for each of these states; and the average percentage of negro population for the group computed and found to be 30.9%. A correlation of per capita retention and percentage of negro population was worked out and found to be close.

On the basis of this correlation study, a method for estimating the potential consumption of a southern market is recommended. It is merely to find the percentage of negro population of the market, and then to work out the proportion:

3.0 bu. avge.: X Bu. :: 30.9%: Y

X Bu. is the potential consumption per capita and Y is the computed percentage of negro population in the prospective market. Having found the potential per capita consumption, the total consuming capacity of the market can readily be computed by multiplying this average figure by the total population. The formula has uses in computing consumption in political units or areas other than cities.

Schoenfeld lists the following criticisms of the suggested plan for computing consuming capacities and also the listed conclusions from his study:

Criticisms -

(1) Basic figures rather inaccurate.

(2) Assumptions based upon superficial knowledge of conditions.

(3) Even after the potentialities of a market are determined in the manner suggested, it does not mean that the particular market could readily absorb the calculated amount of sweet potatoes. Considerable advanced publicity, advertising, and preparatory work must be done to take care of the

additional amount of potatoes shipped in.

Conclusions -

(1) That the per capita rate of sweet potato production is increasing.

(2) That the northern markets are supplied from a relatively few states.

(3) That the southern states are the heaviest consumers of their own production of this crop.

(4) That the per capita consumption of sweet potatoes in southern cities must be increased to take care of the increased production.

(5) That there seems to be a close correlation of per capita consumption of sweet potatoes and proportion of negro population to total population.

(6) That this correlation can be used to ascertain the probable sweet potato consuming capacity of a southern city.

(7) That this preliminary study suggests methods of computing the consuming capacities of certain areas by means of other correlation studies.

(8) That error due to meager data can be reduced as more information of the kind used in this study becomes available.

(9) That southern sweet potato growers have good markets in an undeveloped state near at hand.

(10) That the results of this study would have to be tested out under actual conditions. Under heading, "Negroes and Sweet Potatoes", Schoenfeld says: "As was mentioned ....., negroes are very fond of sweet potatoes. To establish this fact, a correlation study was made between sweet potato shipments to certain cities in the United States during the season of 1919 and 1920, and negroes in these cities according to the 1920 census figures. It was found that no correlation existed. Then another study was made of sweet potato unloads in certain cities and the population of negroe women between the ages 20 to 45. This was done to see whether there was any rela-

tion between sweet potato consumption and negro women who might or might not show their strong tastes (racial, if such there is) for this vegetable by buying it for the households in which they were employed. This is on the assumption that most of the negroe women between the ages mentioned 'hire out'. It may be a very erroneous assumption. There was absolutely no correlation between the two relatives mentioned."

The lack of correlation in these two studies, taken with the low rate of sweet potato consumption shown for negro families by the figures in Table XXXVIII, and obtained from a recent study in Mississippi (4, Dickins, A Nutrition Investigation of Negro Tenants in the Yazoo Mississippi Delta, p. 29), and with the indifference expressed by several proprietors of negro eating places in Knoxville, Tennessee, in the personal interviews perviously discussed, point to the conclusion that a consumption index based on the percentage of negro population may not be dependable, even in the South. At least, a thoroughgoing comparative study of sweet potato consumption by negros and whites, in both North and South, both rural and urban, would be of considerable utility in any extended analysis of consumption of the commodity.

The average per capita retention figure, 301 bushels, and that for Tennessee 1.58 bushels, are of interest for comparison with the consumption figures already obtained. Considering that a bushel of sweet potatoes weigh 54 pounds, an average per capita retention of 162.54 pounds and a Tennessee retention of 85.32 pounds are obtained. Comparing these quantities with those appearing in Table XXXVI and in Table XXXVIII, it is found that they are considerably higher than those for consumption in any of the census divisions or than any obtained in the various state studies. This is readily explained when it is remembered that in these retention figures are included all of those sweet potatoes which are fed to livestock and all of those

spoiling in storage before shipment. The former is always a large item; and the latter at times takes half the crop in areas where primitive storage methods are practiced. It appears that the determination of a consumption index from basic factors subject to so much modification would be precarious. Retention per capita and consumption per capita are very different terms, and one is hardly an index of the other.

Furthermore, the variation from state to state in per capita retention might in particular instances be largely explained by the adequacy and efficiency of storage facilities and by the status of the industry - whether commercial or for home use and livestock feeding. Thus, the retention of 1.58 bushels per capita for Tennessee and that of 5.05 bushels for Mississippi may be almost wholly a matter of the development of efficient storage houses for the large shipping industry in the former state, and of the greater use of sweet potatoes for livestock feeding in Mississippi, rather than of different per capita consumption in the two states. To average such extremes and upon this average to base the consuming capacity of a city seems unsound.

It would appear, then, that criticisms 1 and 2, previously listed, which the author of the paper made of his work, are very apt, and that such mathematical procedure for determining consuming capacities may be rendered accurate only by the use of more accurate and detailed data, as suggested by the paper's author in conclusion 8. These data are more readily available each year and might well be put to use.

5. Market Preferences

Per Capita Receipts at Terminal Markets - In order to compare various markets as to the quantity of sweet potatoes absorbed and, therefore, as to their rank as potential markets and as prospective fields for effort directed at increasing consumption, the per capita receipts, based upon car-lot unloads, was computed for a series of five years, 1924 to 1928. For the most part, cities so far removed as to be little affected by truck movements were

selected, though a goodly number are included to which truck shipments are important; and in these cases the quantity received per capita is probably considerably higher than here indicated. The process followed was to secure government figures on car-lot unloads at terminal markets by states of origin for each year. The number of bushels shipped per car was obtained for each originating state, and the number of its car-lot shipments to each market was multiplied by this figure. By adding the resulting quantities, the number of bushels received by each market in each year was obtained. The population estimate for the respective years, based on U. S. Census Bureau figures, was secured from the World Almanac and the receipts in bushels per capita were computed. These quantities were then converted to pounds per capita. Table XL shows the results obtained, ranked by the per capita receipts for 1928.

Table XL

Pounds of Sweet Potatoes per Capita Received by Railway at Various Terminal Markets, Ranked According to 1928 Receipts

Markets	1928	1927	1926	1925	1924
Lexington, Ky.	55.3	89.7	(a)	(a)	(a)
Cincinnati	35.2	43.0	34.4	30.1	25.6
Pittsburg	33.7	35.6	28.7	26.7	27.0
Boston	28.1	30.5	25.9	22.3	21.2
Columbus	27.5	33.2	24.5	20.1	18.5
Portland, Me.	27.2	31.0	(a)	(a)	(a)
Indianapolis	22.1	25.3	21.8	17.8	15.7
Newark	20.1	22.2	19.0	12.4	11.5
Peoria, Ill.	18.7	17.8	(a)	(a)	(a)
Dayton	17.9	16.2	(a)	(a)	(a)
Youngstown	17.3	22.0	(a)	(a)	(a)
Denver	16.8	19.0	17.4	15.8	14.1
Albany	16.7	21.2	(a)	(a)	(a)
Sioux City	16.4	18.9	(a)	(a)	(a)
Evansville	15.7	18.0	(a)	(a)	(a)
Portland, Ore.	15.0	19.6	17.4	17.8	14.8
Toledo	15.0	16.3	15.0	8.1	2.8
New Haven	14.9	18.0	(a)	(a)	(a)
Seattle	14.8	23.0	13.2	?	10.3
Chicago	14.6	16.5	13.1	12.1	9.8
Springfield, Mass.	14.1	15.3	(a)	(a)	(a)
Spokane	13.9	14.7	17.3	11.6	8.3
Cleveland	13.8	17.5	16.6	13.7	13.3
Washington	13.6	12.8	14.7	11.0	9.4

(continued)

Table XL (continued)

Markets	1928	1927	1926	1925	1924
Hartford	12.7	15.6	(a)	(a)	(a)
Akron	12.4	13.6	(a)	(a)	(a)
Detroit	12.2	16.0	12.2	9.9	7.2
Grand Rapids	12.0	10.0	(a)	(a)	(a)
Salt Lake City	12.0	13.3	11.0	8.8	8.9
Rochester	11.2	7.9	(a)	(a)	(a)
New York	11.0	11.1	9.0	6.8	5.8
Louisville	10.8	12.1	6.9	3.9	6.2
Buffalo	10.7	13.7	11.7	10.2	8.7
Providence	10.7	11.8	11.8	9.1	10.2
Des Moines	10.5	11.5	(a)	(a)	(a)
Minneapolis	9.8	10.6	9.5	8.4	6.7
Syracuse	9.2	8.3	(a)	(a)	(a)
Omaha	8.8	9.3	10.2	10.2	7.8
St. Louis	7.5	11.2	5.7	4.8	3.8
Duluth	6.4	3.3	(a)	(a)	(a)
Los Angeles	6.2	6.7	5.6	4.0	5.9
Bridgeport	5.8	6.4	(a)	(a)	(a)
St. Paul	4.7	8.9	6.7	5.7	6.1
Milwaukee	3.8	3.9	3.6	3.9	3.6
San Francisco	3.6	6.0	(a)	(a)	(a)
Terre Haute	3.1	8.7	(a)	(a)	(a)
Worcester	2.3	3.9	(a)	(a)	(a)

[a] No data available prior to 1927.

It is well understood that the pounds of sweet potatoes unloaded from cars in a given city may be far from the quantity consumed per capita in that city. Most large cities serve as the distribution centers for vegetables not grown locally; and small lots are shipped or trucked to surrounding cities and towns, thus greatly reducing the quantities remaining for local consumption. However, except in the cases of large markets located close together, as Worcester and Boston, and in those cases within reach of quantity truck shipments from growing areas, the consumption per capita is not apt to exceed the quantity unloaded per capita. For their value in showing the relatively low receipts in many sections, and for their value in comparisons these figures are here included, an index of the absolute quantities consumed per capita in the cities named.

Perhaps the most striking reature to be observed in Table XL is that

those cities receiving a large or small quantity per capita have uniformly done so over the five-year period, so that, with few exceptions, the rank registered in 1928 approximates that for each of the other years. The rank of Seattle, Washington, was unusually high in 1927; that of Rochester, New York, rose considerably from 1927 to 1928; and there are other exceptions similar to these; but the interesting characteristic of the table is that it does not show more such exceptions. From this uniformity, we may conclude that, taking cities far removed from other sources of supply, and which have low per capita receipts, it is probable that they may be united in a group which might well be investigated as to reasons for low consumption and possibilities for consumption increase.

A group such as that just mentioned would include Milwaukee, Saint Paul, Duluth, Omaha, Syracuse, Minneapolis, Providence, and Buffalo. It is to be noted that all of these but Providence, Syracuse, and Buffalo are definitely within Tennessee's natural shipping area; and the freight rate is in most cases the same from important sweet potato shipping points in Tennessee to Buffalo as to Pittsburgh, which is a large receiver of Tennessee sweets. In fact, the contrast per capita receipts between these two cities is so great as to seem worthy of careful investigation. Pittsburgh received over three times as many sweet potatoes as did Buffalo in 1928 and 1924. In the other three years tabulated the former received over twice as many. Milwaukee and Saint Paul are other points at which there is no apparent reason for small receipts, unless the latter receives truck loads from cars unloaded at Minneapolis. But even so, the receipts in the latter city are so light that the per capita figure for the two combined would be sufficiently low to warrant investigation.

Low receipts in Worcester and Bridgeport may be possibly accounted for by by distribution by truck from Boston, New Haven, and other nearby cities; and

those in Terre Haute, San Francisco, Los Angeles, St. Louis, Des Moines, and Louisville are clearly the result of receipts by truck from nearby producing areas. The contrast between Louisville and Lexington, Kentucky, is remarkable. The latter is outside the heavy sweet potato producing sections, yet has a heavy percentage of southern people in its population. For this reason, it is, perhaps, the best example of typical receipts for a southern city among the markets included in the table. The contrast between its 55.3 pounds per capita receipts and the 3.8 pounds received in Milwaukee, a few hundred miles to the northwest, is a reminder of what possibilities might develop for the sweet potato producer, could the taste for sweets be developed in northern people. Since sweet potatoes are a concentrated food source of heat energy, and since there is a strong feeling that they are a cold weather food, the effort to increase their use in the North might well be considered likely to bear fruit.

That the ten markets ranking next after Lexington, Kentucky, in receipts per capita fall into two classes which might be expected to receive large quantities of sweets is noteworthy. Cincinnati, Pittsburgh, Columbus, Indianapolis, Peoria, Dayton, and Youngstown are all far enough South so that there has been a considerable number of southern people attracted to their industries. In addition, all are distribution centers of importance. This is particularly true of Pittsburgh and Cincinnati. Boston, Portland, and Newark form the other group, and apparently owe their large receipts to their importance as distributing centers, though the presence of many southern people in Newark is doubtless an auxiliary factor.

The general falling off in per capita receipts from 1927 to 1928 was probably due to the large crop and low prices in the former year. That 1927 is the peak year in receipts for the five charted, and that 1928 is more nearly normal, judged from the series, is easily seen.

In order to determine the preferences of various markets as to variety,

container, and season, and to attempt to secure light on the status of the Tennessee Nancy Hall, a questionnaire was circulated among dealers in widely scattered cities in the United States and Canada. The locations of those in which dealers sending usable replies are located are shown in Map 25.

The 56 dealers who replied with enough information to be of value handle 2774 carloads of sweet potatoes annually. Of these 1428, or 51.5% are Nancy Halls. The replies were sorted into four groups for purposes of comparison. These groups were as follows:

(1) Southern cities - those in Tennessee and Kentucky - reported handling 175 cars, of these 148 cars, or 84.6%, were Nancy Halls.

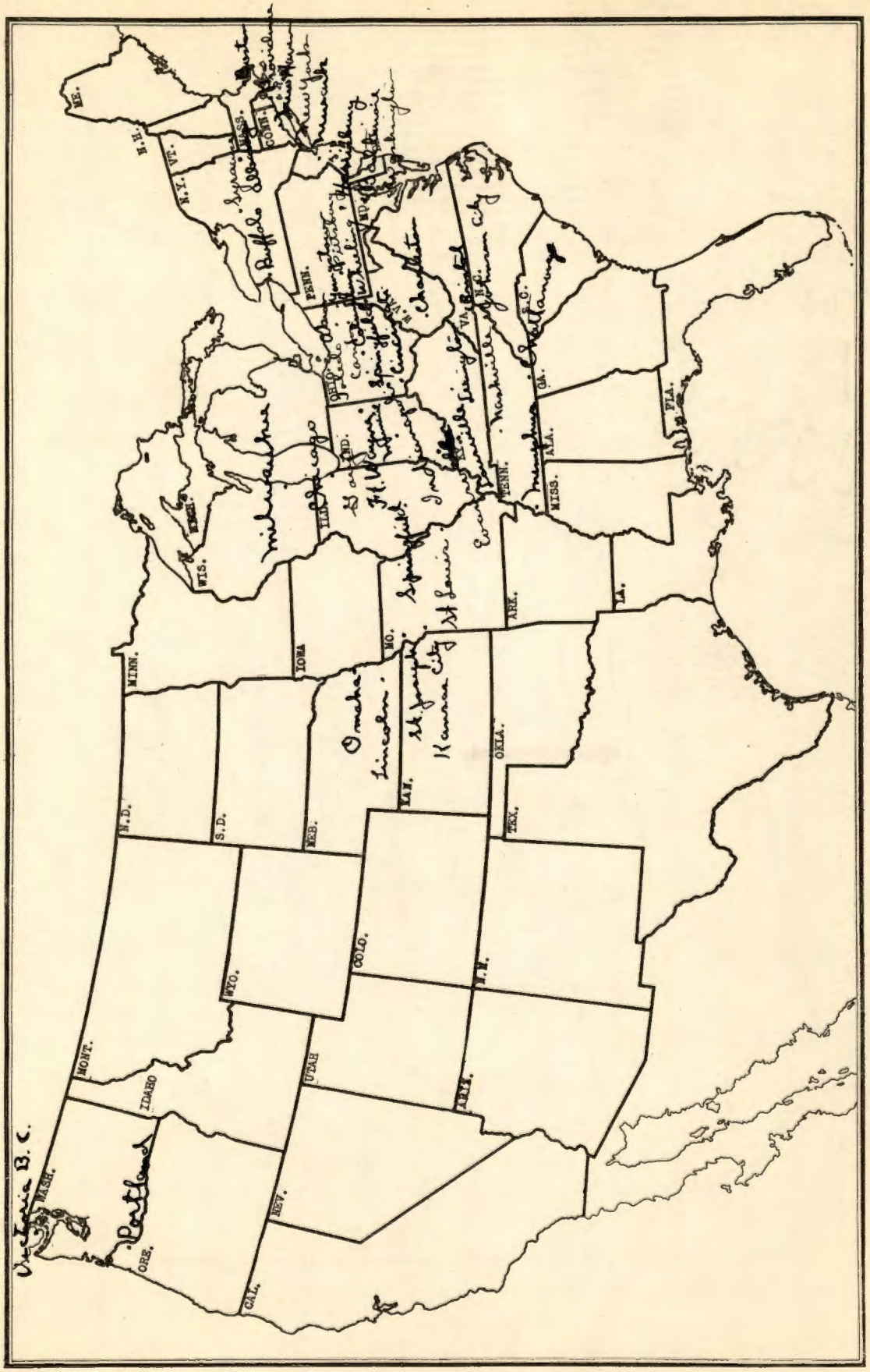
(2) Eastern cities - those east of the Ohio River and the western border of Pennsylvania - reported handling 1150 cars, of these 412, or 35.8%, were Nancy Halls.

(3) Northern Central cities - those north of the Ohio River, west of the western border of Pennsylvania, and east of the Rocky Mountains - reported handling 1421 cars, of these 1016, or 71.5%, were Nancy Halls.

(4) Pacific Northwest cities - Victoria, British Columbia, and Portland, Oregon - reported handling 28 cars. None of these were Nancy Halls.

It should be noted that the largest group, the Northern Central cities, handled the largest numbers of cars, and that the percentage of Nancy Halls handled by them, 71.5%, was greater than that for other groups, except the southern cities, where 84.6% Nancy Halls were handled. These groups constitute Tennessee's natural market. By contrast, the dealers reporting from the Pacific Northwest cities handled no Nancy Halls, and those in Eastern cities handled but 35.8% Nancy Halls.

Seasonal Consumption - Questioned upon the seasonal consumption of sweet potatoes, 42 replied that their trade would not use as many sweet potatoes in



Map 26. Cities from Which Dealers Returned Information Upon Market Preferences.

summer as in winter, even if good quality sweets could be obtained throughout the year; 7 believed consumption would be equal. In this connection, it is interesting to note that in the Knoxville interviews, previously discussed, it was found to be the policy of nearly all proprietors and chefs to buy in small quantities in warm weather. The complaint was almost universally expressed that waste was large from decay in summer, and that small quantities were bought that this loss might be reduced to a minimum through immediate consumption.

The dealers to whom questionnaires were sent were asked to give the approximate percentage of demand for sweet potatoes by their trade for each month. These were tabulated and the average figured by months. The resulting percentages are presented in Table XLI and are therein compared with the percentage of total carload shipments per month obtained from the government reports for 1928.

Table XLI

Percentage of Demand and Shipments by Months

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
% Demand of trade of dealers reporting	15	12	11	10	8	5	5	7	8	13	13	15
Carlot shipments	11	9	8	5	3	1	1	8	17	15	12	10

From Table XLI it is observed that the dealers' estimates and carlot shipments follow similar trends throughout the season, except during September and October, the digging season, when shipments reach their peak. Dealers estimate peak demand in December and January. Shipments drop considerably lower than the demand estimates in the four months from April to July, inclusive. Possibly dealers overestimated demand at this season. It would also seem, from the opinions of proprietors and chefs interviewed in Knoxville eating places, that

demand is not fully supplied during the summer months.

Variety Preference - Several varieties were indicated by some dealers as preferred, therefore more than 56 replies are tabulated. Table XLII shows variety preference distributed by city groups.

Table XLII

Variety Preference of Dealers by City Groups

Varieties	Southern	Eastern	Northern Central	Pacific Northwest	Total
Yellows (or Jerseys)	2	22	14	3	41
Nancy Halls	6	10	18	0	34
Porto Ricos	3	4	4	2	13
Southern Queen	0	0	2	0	2
Triumph	0	0	1	0	1

The preference is for Yellows (the Jersey type of sweet potato) in the Eastern and Pacific Northwest cities, and for the Nancy Hall in Southern and Northern Central cities. Reports from Omaha, Portland, Oregon, Victoria, British Columbia, and New York City indicated a preference for Yellows as long as they were available. Later, they preferred Porto Ricos to Nancy Halls. The trade had become used to Porto Ricos and will take them when Yellows are scarce in these markets. Some eastern dealers rebelled entirely against moist sweet potatoes of any variety, and one, in Providence, Rhode Island, advised feeding them to pigs and growing "some good eating dry sweets fit for human beings to eat". This is somewhat the attitude of many eastern consumers who are used to the dry type of sweet potatoes. On the other hand, a dealer in Albany, New York, while criticizing the grade of Nancy Halls received, expressed the belief that they would keep longer and would sell better than the dry type if properly graded and handled. A Milwaukee dealer stated that the Eastern Jersey, seed type is preferred by that market, and that Nancy Halls receive little demand there. In fact, throughout the Northern Central cities, there is a strong call for the dry type of sweet potato; but the moist type has

made gains in these markets in recent years.

Container Preference - The bushel hamper is the most popular type of container among the dealers furnishing information, as shown in Table XLIII. Here again, more than one preference was frequently listed by a dealer.

Table XLIII

Container Preference of Dealers by City Groups

Container	Southern	Eastern	Northern Central	Pacific Northwest	Total
Barrels	1	5	4	0	10
Bushel hampers	6	17	19	0	42
Bushel baskets	2	7	9	0	18
Bushel crates	1	6	4	3	14
70-lb. crates	0	0	0	1	1
30-lb. lugs	0	0	0	1	1

In markets accustomed to Eastern Short sweets from Virginia and Maryland, especially Virginia, the barrel was often listed, but along with it, in several instances, were listed bushel hampers and other containers. A large dealer in Cincinnati stated that if more were packed in bushel baskets, those packing in hampers would soon find it impossible to compete, since dealers can sell second-hand bushel baskets at from 60¢ to 75¢ per dozen for use in handling other commodities, while crates are unsaleable. He also believes there are less broken packages when baskets are used. This dealer stated that the grade could be seen better in baskets. On the Pacific Coast, crates - bushel and 70-lb. - and 30-lb. lugs are popular. The suggestion for using bushel baskets seems worth considering, as the returns show that they are already second in popularity.

Tennessee Nancy Halls - As to whether or not Tennessee Nancy Halls were as well graded as other varieties which they handled 30 dealers believed they were, 12 that they were not, and 4 replied "sometimes". A similar question

as to packing evicted 26 affirmative replies, 12 negative, and 4 again thought they sometimes were. When more specific information was sought by having dealers check the chief faults found in handling Tennessee Nancy Halls, the following results were obtained:

Faults in Grade -	
Irregular shape	21
Mixed sizes	19
Too many large	18
Soft rot	15
Black rot	11
Too many small	10
Sprouting	1
Faults in Pack -	
Slack pack	13
Carloads too large	10
Poor arrangement in packages	5
Lack of uniformity	1
Face of package better than bottom	1
Faults in Quality -	
Color of skin	7
Too moist	6
Too sweet	2

From these replies it is evident that the irregular shape of the Nancy Hall and the mixed sizes placed in packages for sale are serious handicaps. It is interesting that more complained of large size than of small. Dealers were insistent in calling for more careful and even grading and packing when asked for suggestions to improve the marketing of Tennessee Nancy Halls. Upon a field trip taken in furtherance of this study, it was found that most of those packing Nancy Halls for sale were putting in many potatoes which were either too large or too small to meet the United States standards for No. 1's. The reasons given were that the loss was too great when grades were strictly observed, and that dealers on the market were not very particular unless sweets were very plentiful. Backing for this attitude is seen in the reply of the Cincinnati dealer referred to above in the matter of containers. In a letter

upon the sweet potato industry he shows a fair attitude and a keen comprehension of the farmers' problem in growing, grading, and packing. In part, he says:

> "The way it is now there are lots of Nancy Halls. They grow them too large and rough; the majority of the trade likes a good medium size. Of course, a Nancy Hall sweet potato is a commodity . . . [with which] you can figure no two years alike, to grow them . . . [of] nearly one size, as weather conditions rule this . . . . [If] they get lots of rain and the weather is favorable, they are liable to grow too big, then if the weather is dry, they are liable to be undersized.
>
> . . . . . .
>
> "As stated above, Nancy Hall sweet potatoes are inclined to grow more or less rough regardless of where you grow them . . . .
>
> "As a rule, the packers around McKenzie, Tennessee, grade their stock pretty well, but of course some years they grow rougher than others, and it's hard to grade them just like they would like, as they would have too much waste, and if the crop is a little light, the trade sometimes is not so particular as it is when they are plentiful and cheap."

It is difficult for the farmer to believe that he ever will see benefit enough from strict grading to pay for half his crop which he would have to class as No. 2 or poorer in years of irregular shape and size, and for which he would have to take a very low price. He may be right.

That both soft and black rot are serious is shown by the returns.

In packing, it seems that many are carelessly or wilfully negligent in filling hampers full. Unless potatoes are well placed in the containers, one by one, full weight cannot be packed and they will shake down so that the containers are not filled to the rim when opened at the retailer's. This creates ill-will with the dealer and with the buying public. Dealers also like to have the packages faced systematically, so that they present a neat appearance.

The 10 replies complaining of too large carloads of Nancy Halls are significant. The usual practice in Tennessee is to pack 550 bushel hampers in

a car. The dealer already quoted believes that no more than 500 bushels per car should ever be loaded. He states that the extra layer interferes with ventillation, the sweet potatoes create heat, and decay results. Several other dealers mentioned that a car of 500 bushels or over is too large for reshipment unbroken to smaller towns. They recommended that railroads be induced to allow a carload minimum of 20,000 or 24,000 pounds instead of the 30,000 pounds minimum now applies to most shipments from this state. It is well to bear in mind that growers in the northeastern producing area have arrangements whereby 300 to 350 bushels can be shipped without the freight being prohibitive, and that most shipments from that area are of that size, except those from Virginia.

The complaint against color and moist characteristics of the Nancy Hall were chiefly from those used to Yellows. In color, the Nancy Hall resembles the Yellows more closely than does the Porto Rico, and therein has an advantage.

6. Conclusions

From the preceding discussion several conditions of importance to the sweet potato producer are outstanding. In the first place, the trend toward a preference for green vegetables on the part of the American consuming public is not favorable to the sweet potato industry. On the other hand, the distinct contrast in quantity consumption between northern and southern markets and the relative unimportance of the sweet potato, compared to that of other vegetables, in the northern diet point to great possibilities for the future of sweet potato growing if northern tastes can be attracted to that commodity.

Through various means of ascertaining per capita consumption, it is found that probably the present rate for the country as a whole is between 5 and 25 pounds, annually, though there appears to be no accurate data available for

computing the exact amount. The southern states range much higher and the northern states much lower in their consumption of sweets. The per capita consumption of this commodity, which may logically be substituted for the Irish potato in the diet, is insignificant compared with that of the latter vegetable, except in the South, where sweets are sometimes consumed in larger quantities than Irish potatoes.

Fewer portions of sweet potato, in the candied form usually served, than of mashed Irish potato can be obtained from a bushel. Approximately but one person in three selects sweet potatoes at meals where a choice is given between them and other vegetables in Knoxville, Tennessee, public eating places interviewed. This is computed on the basis of a requirement of almost 1/2 pound of raw, unpeeled, sweet potato to make one cooked serving.

A group of northern cities, notably, Milwaukee, Saint Paul, Minneapolis, Duluth, and Omaha, exists within Tennessee's shipping territory in which the consumption of sweet potatoes, in general, and especially of Nancy Halls, is very light, as indicated by the small car-lot receipts and the preference expressed for other varieties by dealers in some of these markets. Tennessee growers might well investigate the reasons for the consumption conditions existing and make an effort to create demand for their product in these population centers of low present sweet potato consumption.

The more southern markets of the central western states have become accustomed to the Nancy Hall variety and demand it. Eastern markets and those on the Pacific Coast express a preference for Yellows (or the Jersey type).

The hamper is, at present, the most popular container with dealers sending information to the investigators engaged in this study. However, there is strong sentiment in favor of the bushel basket.

The size, shape, and irregular grading and packing of Tennessee Nancy Halls, as well as their moist nature and soft and black rot, have handicapped

them in competition with sweets of the dry type from the northeastern producing area. There is much difference of opinion as to the profitability of conforming strictly to United States standards in grading this variety.

An effort to induce railways to reduce the carload minimum to 20,000 pounds, or even 24,000 pounds, would be an intelligent and progressive step, since such a reduction would not only lessen the chances of decay in transportation, but would place Tennessee growers in a position to compute with growers in the northeastern states for small markets which cannot absorb the carloads of 550 bushels that are customarily loaded in Tennessee.

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PART III. MARKETING

CHAPTER VI

THE RELATIVE POSITION OF TENNESSEE SHIPPERS IN THE MARKET

1. Origin of Sweet Potato Shipments.
2. Transportation and Freight Rates
3. Tennessee Shipments vs. Those of Competitors.
4. Possibilities for Expanding Tennessee Shipments.
5. Carloads vs. Bushels in Studying Shipments.
6. Conclusions.

1. Origin of Sweet Potato Shipments

In the United States - The chief sweet potato shipping centers of the United States, as has already been illustrated in Map 11, lie uniformly in low, sandy, warm areas. In the East, these sections lie along the Atlantic coastal plain from New Jersey to South Carolina, then follow the Gulf Coast to Louisiana. In the interior, such areas occur in the river valleys. Tennessee's chief shipping section is of the latter group.

However, the illustration cited gives no index of the relative importance of these shipping centers, since the most important shipping county in each state was selected and charted, regardless of the quantity shipped. In determining the chief shipping counties for designation in Map 11, the total shipments from 1920 to 1925 inclusive were considered, as explained in Chapter II. Table XLIV shows the total number of carload shipments and the average number per year from the 21 leading counties for this six-year period.

Table XLIV

Total Carload Shipments and Annual Average Number of Carload Shipments from 21 Leading Shipping Counties in the United States, 1920-1925

Rank	County	Total Number Carloads, 1920-1925	Average Number Carloads Shipped Annually
1.	Accomac, Virginia	23,547	3,924
2.	Sussex, Delaware	9,203	1,534
3.	Glouster, New Jersey	6,631	1,105
4.	Wicomico, Maryland	5,150	858
5.	Northampton, Virginia	4,225	704
6.	Weakley, Tennessee	3,437	573
7.	Merced, California	2,659	443
8.	Pasquotank, North Carolina	2,557	426
9.	Atlantic, New Jersey	2,440	407
10.	Kent, Delaware	2,279	380
11.	Stanislaus, California.	2,264	377
12.	Baldwin, Alabama	2,246	374
13.	Cumberland, New Jersey	1,903	317
14.	St. Landry, Louisiana	1,570	262
15.	Henry, Tennessee	1,556	259
16.	Worcester, Maryland	1,378	230
17.	Salem, New Jersey	1,270	212
18.	Carroll, Tennessee	1,168	194
19.	St. Martin, Louisiana	1,137	190
20.	Gibson, Tennessee	1,058	176
21.	Norfolk, Virginia	989	165
	Total	78,659	
	United States Total	108,023	
	Percentage of U. S. Total Shipped by 21 Leading Counties	72.8	

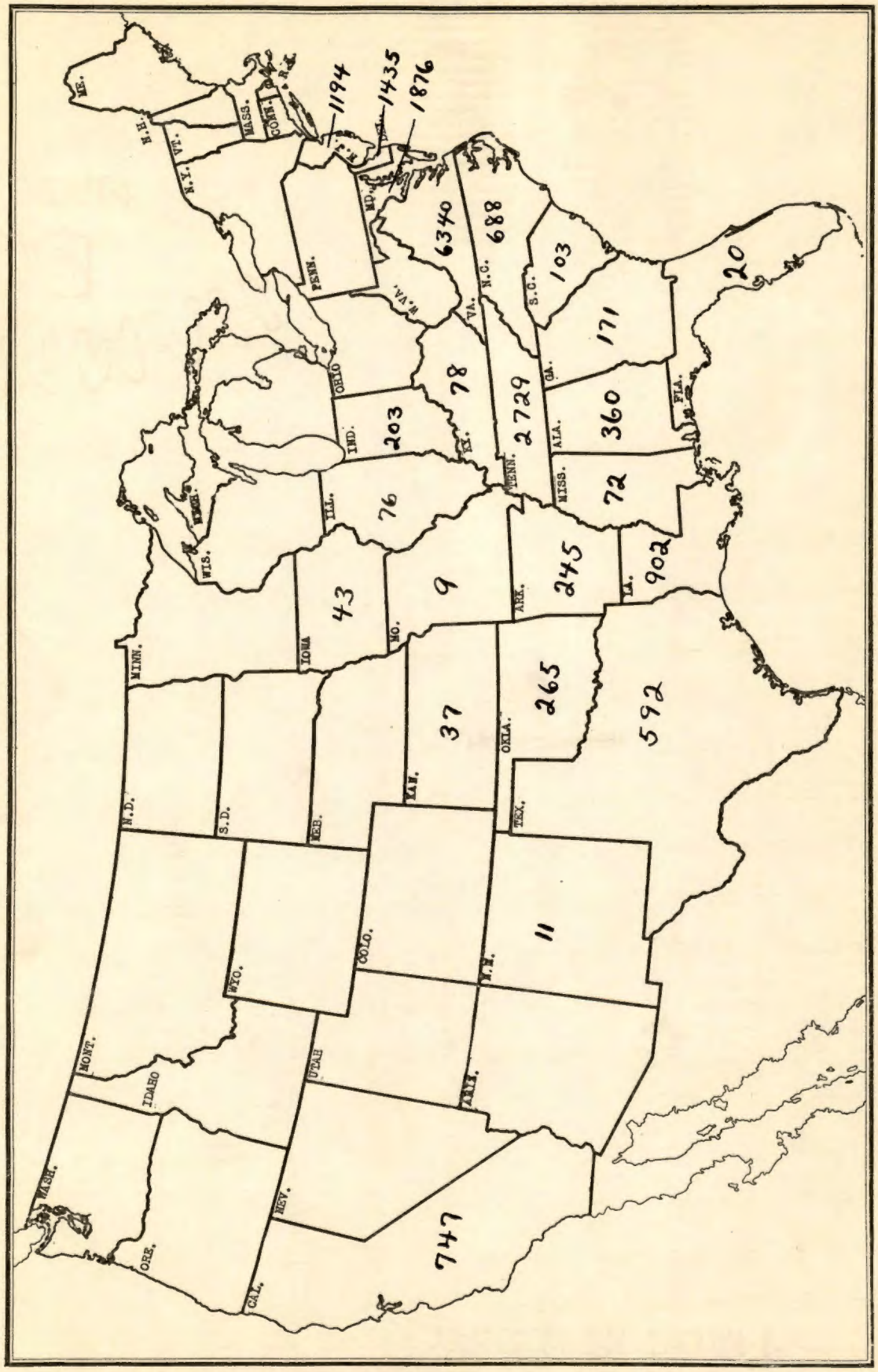
It is seen that, among the 21 foremost shipping counties of the country, Accomac County, Virginia, was far in the lead, shipping more than two and one-half times as many sweets as its nearest competitor, Sussex County, Delaware. Tennessee's foremost county, Weakley, was in sixth place; but Tennessee and New Jersey lead in the number of counties placing in the first 21, each contributing 4. Virginia placed 3; Delaware, Maryland, California, and Louisiana, each 2; and North Carolina and Alabama, 1 each. Six counties averaged shipments of over 500 cars per year for the period, Weakley County, Tennessee, being the lowest of these, while Accomac County, Virginia, on an

average, shipped nearly seven times as many annually. The 21 counties listed shipped 78,659 cars or 72.8% of the 108,023 cars shipped in the entire United States during this six-year period, while Accomac County's 23,547 cars represent 21.7% of the total United States shipments during that time.

Thus the great importance of these concentrated areas of production becomes apparent. It should be added that large shipments which are not accounted for were doubtless made from these counties by truck and boat, particularly from those in the northeastern area.

Reference to Map 27 shows the total volume of carload shipments from all states shipping by this method in 1928. From inspection of this map, it is found that the important shipping states, all of those shipping over 1000 carloads in that year, are located in the northern part of the section in which the sweet potato finds its climatic optimum. In the East the favorable climate of the Atlantic Coast and the large markets of the northeast combine to furnish incentive for heavy shipping centers in more northern latitudes than those of leading importance in the Central States. Thus in the former, Virginia, Maryland, Delaware, and New Jersey lead, Virginia's 6340 carloads more than exceeding the combined shipments of the other three states. In the latter, Tennessee enjoys the most favored position for commercial production, being closest to the great northern central markets of those states in which large areas with conditions favorable to good sweet potato yields occur.

The distance of a producing area from its markets largely limits its importance in the case of a bulky crop such as that under consideration. This, rather than especially favorable climatic conditions, is probably the leading influence in the firm establishment of commercial production in these more northern states. The large size of Texas and the unique

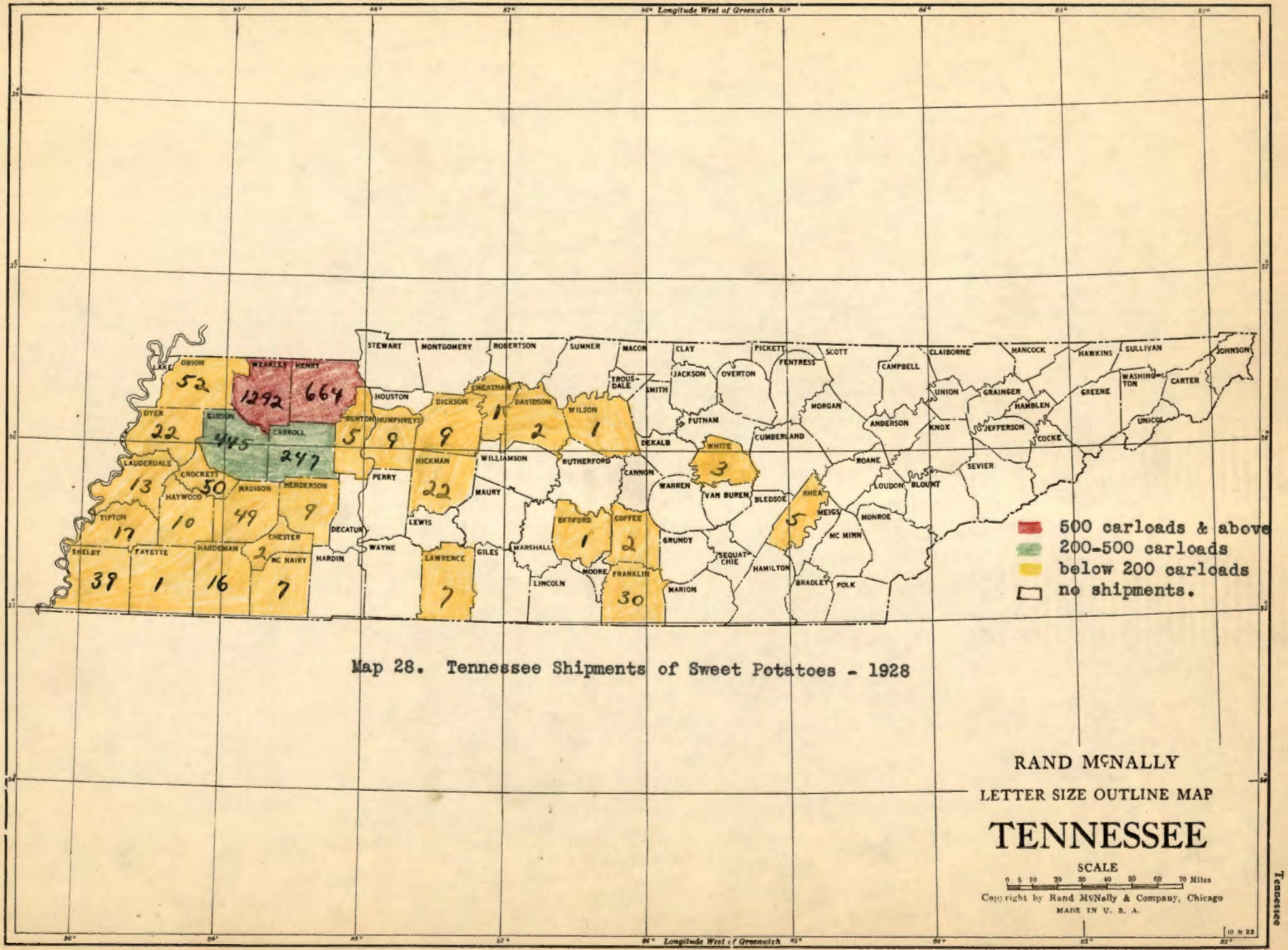


Map 27. Carlot Shipments of Sweet Potatoes from Each State - Crop Year 1928

advantage in transportation costs to Pacific Coast markets in the case of California are largely responsible for their relatively high volume of shipments; while the section just south of Virginia's Norfolk shipping area accounts for a major share of North Carolina's 688 cars.

In Tennessee - That production for shipment to the general market is greatly concentrated in Tennessee is evident from Map 28, which shows only one County, Weakley, with shipments of more than 1000 cars; but one more, Henry, with more than 500; and but two additional, Gibson and Carroll, with over 200. No other county in the state even approached shipping 100 cars, Obion County leading those remaining with 52 cars. In fact, only 26 counties, aside from the four in leading positions, shipped at all; and four of these shipped only one car each. In the 30 counties making shipments, it is interesting to note that 18 of West Tennessee's 20 counties are included; 11 in Middle Tennessee combined to ship a meagre 87 cars; while Roane County alone in East Tennessee is numbered among those shipping in carload quantities.

The climate and soils of the respective divisions of Tennessee are apparently of primary importance in apportioning the sweet potato shipping industry mainly to West Tennessee. The loose, warm soils and longer growing season in that section of the state are ideal for the crop and do not favor a pastoral industry. In adapting himself to these conditions, the farmer has established truck crop enterprises, among them the growing of sweet potatoes; and dealers have naturally entered the region of plentiful supply, offering storage facilities, credit, and establishing a cash market for the various crops. Thus the farmer may sell his sweet potatoes immediately or hold for as long or as short a period as he deems best, with the prospect of having no difficulty in disposing of his crop at any time



Map 28. Tennessee Shipments of Sweet Potatoes - 1928

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that he may decide to sell. This, in turn, has further stimulated production; and the industry has centered about Weakley County where conditions favor the growing of sweets.

In Middle Tennessee, the natural blue-grass pastures of the Central Basin favor a livestock industry; and farmers find this more profitable than truck crops. There are parts of the Highland Rim section of Middle Tennessee which are a little too high and do not have favorable soils for sweet potatoes. The Cumberland Plateau, forming the boundary between East and Middle Tennessee, like many of the other high sections of the former, particularly the Great Smoky Mountains, has too short a growing season and nights that are too cool to favor production of the crop. Those areas of East Tennessee which are well adapted to sweet potato production, especially the river valleys, are also suited to competitive crops, such as strawberries, tomatoes, and beans; and the parts of them that are devoted to producing sweets barely supply local markets in Knoxville, Chattanooga, and the smaller towns. In fact, not enough are produced and stored in East Tennessee to satisfy these markets in the late spring and early summer; and many cars are shipped in.

2. Transportation and Freight Rates

Tennessee Carload Rates - But though these factors are strongly influential in limiting heavy commercial production to West Tennessee, a comparison of transportation facilities and freight rates from the three divisions of the state may be useful in establishing further reasons for the existing localization.

From West Tennessee, a network of railroads lead out to the best markets of the Central West. The Nashville, Chattanooga, and St. Louis; the Mobile and Ohio; the Illinois Central; and the Louisville and Nash-

ville furnish excellent connections between nearly all parts of the section and St. Louis, Chicago, Cincinnati; and other great distributing centers and smaller cities and towns to the northward. Nor is the Central Basin of Middle Tennessee appreciably outclassed by West Tennessee in this respect, with the Louisville and Nashville, and the Nashville, Chattanooga and St. Louis acting as the most important transportation agencies, their many lines converging on Nashville and leading out to the same centers reached so readily from West Tennessee. Parts of the Highland Rim, however, are less adequately supplied with rail facilities; and service is slow on branch lines which tap parts of this region.

Inspecting East Tennessee, a somewhat different situation is found to exist. Here, the Southern and the Louisville and Nashville reign supreme, leading to Cincinnati as the chief Ohio River crossing gate to the North, and thence to Ohio centers and those in adjoining states; while to the east the Virginia cities form the gateway to Washington and the markets of the northeast. Chicago and St. Louis are a little too far west to be advantageous markets for East Tennessee. The growers of this section find themselves in more direct competition with eastern producing areas.

It might also be mentioned that East Tennessee and southeast Middle Tennessee are at an advantage in comparison to the remainder of Middle Tennessee and all of West Tennessee in competing for the limited market, which exists for sweets at Atlanta and other southeastern cities late in the season, after local supplies are exhausted.

Upon collecting data from freight tariffs through the agents of the several roads concerned, the economic advantage of each division in shipping to various markets is made clearer. Table XLV gives a comparison of freight rates from typical shipping points in each division to some of the more important markets.

Table XLV

Carload Freight Rates in Cents per 100 Pounds from West, Middle, and East Tennessee Shipping Points to Important Markets

From:	Martin (W. Tenn.)	Mitchelville N. (M. Tenn.)	Decherd S. E. (M. Tenn.)	Harriman (E. Tenn.)
To:				
New York, N. Y.	75	65	75	75½
Buffalo, N. Y.	62½	47	58½	55
Pittsburgh, Pa.	62½	45½	58½	50
Cincinnati, O.	42½	27	29½	28½
Detroit, Mich.	56½	45½	56½	56½
Chicago, Ill.	50	36	50	57
Milwaukee, Wis.	52½	39	52½	60
Minneapolis, Minn.	61	56	61	62
St. Louis, Mo.	36	29	36	58½
Atlanta, Ga.	53½	50	24½	31

From this table, it is seen that Mitchelville, in northern Middle Tennessee is most advantageously located for shipment to all points for which rates here appear, except Atlanta. Omitting this point from consideration, rates are so arranged on the long shipping haul to New York that there is little advantage among the other three shipping points. To the nearer cities to the north and east, Cincinnati, Pittsburg, and Buffalo, the rate grows progressively less as one goes eastward from Martin, through Decherd, to Harriman. In shipping to the markets farther north in the Central States - Chicago, Milwaukee, Minneapolis, and Detroit - the three points are nearly on an equal rate basis to the two latter, while West and Middle Tennessee enjoy an advantage in rates to the two former. Martin and Decherd are clearly in a more favorable position for shipping to St. Louis than is Harriman; and Harriman is also at a disadvantage over Decherd in Atlanta shipments.

While rates here shown are the same from both Decherd and Martin to St. Louis, Chicago, and other mid-western markets, in the course of a survey which covered the Decherd area, the investigators were informed by dealers of

that section that, though formerly they had enjoyed equal rates with West Tennessee to these markets, they were now paying a prohibitive rate on Chicago shipments; so that they could no longer compete with West Tennessee in that market. Further investigation might reveal error on the part of railway agents furnishing information or misunderstanding on the part of dealers.

At all events, the rates tabulated show that West and Middle Tennessee are able to ship to the great markets of the Middle West, such as Chicago and St. Louis, at an advantage, while East Tennessee enjoys lower rates in shipping to markets farther east, such as Cincinnati, Pittsburgh, and Buffalo.

Unload Rates in the United States - That Tennessee producers must compete with greatly specialized commercial areas in other states is evidenced by Table XLIV. One of the chief factors determining how successful will be this competition is the relative advantage of shipping areas in cost of transporting the crop to principal markets.

Table XLVI presents data on freight rates from important sweet potato shipping centers to the great markets of the country. These data were secured through correspondence and interviews with representatives of 27 railroads and steamship lines serving the shipping areas. In some cases, roads serving the same shipping points did not entirely agree as to the rates to various markets. In these cases, the lowest rate given is here shown. The data are not complete for all points and it is evident that data dependent upon computations by so many individuals are subject to considerable chance of error. However, they are probably correct in most instances and should give a definite basis for comparison of shipping advantages.

It might be considered that the construction of this table is based at northeastern markets and at northeastern sweet potato shipping points. Starting at the left with New England cities, the markets of the country are listed in their approximate order from east to west, except that the southern cities

Carload

Table XLVI./ Freight Rates in Cents per 100 Pounds, Between Important Sweet Potato Shipping Points and Terminal Markets.

To: / From:	Boston, Mass.	Providence, R. I.	Montreal, Que.	New York, N. Y.	Syracuse, N. Y.	Rochester, N. Y.	Buffalo, N. Y.	Pittsburgh, Penn.	Cincinnati, Ohio.	Columbus, Ohio	Cleveland, Ohio.	Detroit, Mich.	Toronto, Ont.	Louisville, Ky.	Indianapolis, Ind.	Chicago, Ill.	Milwaukee, Wis.	Minneapolis and St. Paul, Minn.	Duluth, Minn.	St. Louis, Mo.	Des Moines, Iowa	Omaha, Neb.	Sioux City, Iowa	Kansas City, Mo.	Wichita, Kans	Denver, Colo.	Salt Lake City, Utah.	Washington, D.C.	Atlanta, Ga.	Jacksonville, Fla.	Mobile, Ala. & New Orleans, La.	Los Angeles, Cal.	Seattle, Wash.	Vancouver, B.C.
Swedesboro, N. J.				24			34	34			40	44				56½		78													151	180	
Landisville, N. J.	34			25			34	34			40	44				56½		78													169½	169½	
Vineland, N. J.	34			25			34	34			40	44				56½		78													169½	168½	
Laurel, Del.				31			37	34			40½	44				56½		78													157½	180	
Salisbury, Md.	41½	41½		31			40½	40½	49		52½	44		56½		56½		78	78												180	180	
Parksley, Va.				34			40½	40½			40½	44				56½		78													161	180	
Norfolk, Va.																																		
Rail rate	39½			29			40½	40½	44	41	40½	41			47½	51½	51½	73								138½					151	151	
Water rate	35½																																	
Elizabeth City N. C.	46½			37			47	45	46		46½	44			48	50		89													167	167	
Vandemere, N. C.	54			38			51½	47			46	50				54		98½													167	167	
Vincennes, Ind.	61			56			36	36	25		32	32		22½	20½	21½	29½	40	40½	23	36	36	38½	36	67	89½	126				128	134½	
Decker, Ind.	65½			59½			37	37			32	32			21½	21½		42½	42½												136½	134½	
Cohden, Ill.	71	71		68			44	44	31	34	38	36½		29	27½	24	26	40½	42½	15½	33½			33½		82	113				113	113	
Fulton, Ky.	83			75			62½	62½	42½	52½	56½	56½		34	49	50	52½	63	66	36	59½			56									
Harriman, Tenn.	80½			75			56	50	28½			56½				57	60	62		58½		89		84½				67	31	33			
Dechord, Tenn.	79½			75½			58½	58½	29½		56½	56½		28½		50	52½	61	62½	36									24½				
Mitchellville, Tenn.	69		70	65	58	51	47	45½	27		43½	43½			36	36	39	56		29									50				
Paris, Tenn.																																		
Rail rate	86		88	83	74	70	62½	62½	42½	52½	56½	56½	62½		50	50	52½	61		36				56						61½	128	128	
Rail and water																															145½	145½	165½
Martin, Tenn.	83			75			62½	62½	52½	52½	56½	56½		34	50	50	52½	61	66	36			65						53½		128	128	
Greenfield, Tenn.	83			75			62½		49½	52½	56½			34	50	50	52½	63	66	36			65								128		
McKenzie, Tenn																																		
Rail rate	88		88	83	74	70	62½	62½	42½	52½	56½	56½	62½	34	50	50	52½	63	62½	36				56						53½	61½	143	143	
Rail and water																															145½	145½	165½
Gibson, Tennessee																																		
Rail rate	88		88	83	74	70	62½	62½	42½	52½	56½	56½	62½		50	50	52½	63		36				56						61½	143	143	
Rail and water																															145½	145½	165½
Milan, Tennessee																																		
Rail rate	88		88	83	74	70	62½	62½	42½	52½	56½	56½	62½		50	50	52½	63		36				56						61½	143	143	
Rail and water																															146½	145½	165½
Jackson, Tennessee	92			75			67	67	47½		61	61		39½	53½	56	59	69	70½	42	65½	68	74	61½	57	82	113				128	148½	
Memphis, Tennessee																															113	113	
Cullman, Alabama	83			75			67	66	47½		67	67				65	68	81		50				75									
Foley, Alabama	83.			75			73	72	51		73½	73½				68	70½	81		56				78							141½	141½	
Dardanelle, Arkansas	86			82			73	71	58		66	66		54	58	58	61	66	70	47	56	55	59	46	44	82	113				113	113	
Fayetteville, Arkansas	94			90			78	75	60		70	70		58	60	60	63	66	71	47	54	53	58	39	37	76	105				113	113	
Sunset, Louisiana	89			84			83	80			76	76				68		77													113	113	
Opelousas, Louisiana	89			84			83	80	68		76	76				68		77	81	58	68			58		88					113	113	
Jacksonville, Texas	93			90			80	78			73	73				65		73	77	56				54	46	88	113				113	113	
Pittsburg, Texas	90			87			78	75	62		70	70			62	62	65	70	74	52	60	60		51	46	88							

to which rates were obtained are inserted between those of the Rocky Mountain states and those of the Pacific Coast. This was done because the rail and water rate to Pacific ports from the Central South is determined by adding the water rate through Panama to the rail rate applying to Mobile and New Orleans. Other southern markets were placed next to these two for purposes of comparison.

Reading down the table, the New Jersey shipping points are listed first, then those farther south and west, to those more remote, in Louisiana and Texas. Thus the column for any given market may be selected and the rates from the northeastern, central, southern, and southwestern states studied in that order by following down the column. All rates are given in cents per 100 pounds.

It will be seen that, in general, the rates to eastern cities increase as one follows down their respective columns, while those to Pacific Coast points decrease because of the shorter distance from southwestern shipping points to these latter markets. It is, of course, impossible to avoid exceptions and variations, especially in connection with the more centrally located markets and shipping areas.

In passing from eastern to western markets, it is found that the northeastern producing areas enjoy a distinct advantage in rates as far west as Detroit and north of Cincinnati. With Cincinnati and Chicago, Tennessee gains a slight advantage over most northeastern points, though Elizabeth City, in eastern North Carolina, enjoys the same rates as most Tennessee points; and Norfolk, Virginia, ships at a rate but 1½ cents higher than that applying from West Tennessee which is approximately 300 miles closer. In markets still farther west, such as Minneapolis, Tennessee's advantage becomes more pronounced; but as western receiving points

farther south are examined, it is found that Louisiana and Texas shipping points are able to compete strongly, and that Arkansas shipping points hold an advantage over those in Tennessee. Alabama and, except in the case of these western markets, Louisiana and Texas are distinctly at a disadvantage compared with Tennessee and the northeastern section in shipping sweet potatoes.

In fact, a careful study of Table XLVI will reveal that the northeastern producing area is favored with much better rates to markets, even in the Middle West, than those which must be borne by producers of the cotton belt, where the moist-fleshed varieties are produced. Under these circumstances, it is not surprising that the dry-fleshed potatoes from New Jersey, Delaware, Maryland, and Virginia, which first invaded northern markets, have so long succeeded in keeping a tenacious grip upon them.

From the foregoing, it may be concluded that Tennessee's shipping advantage lies in those northern markets located from Cincinnati westward and east of Kansas City. In this area are situated many of the greatest markets of the Middle West, including Cincinnati, Louisville, Chicago, Minneapolis, St. Paul, St. Louis, and others. It is also evident that the difference in rates is not so great as to prohibit Tennessee competing in markets as far east as Buffalo, and Pittsburgh, and as far west as Denver and Salt Lake City, though only a small area around Memphis is accorded a rate low enough to be on a comparable basis with Texas, Louisiana, and Arkansas points in shipping to the Pacific Coast. Combination rail and water rates from West Tennessee points to points on the Pacific Coast are higher than are rail rates from these points, as shown in Table XLVI.

Less-than-carload Rates - While the advantage of the northeastern area is indicated by the commodity rates applying on carloads which have been discussed, a greater inconsistency is revealed when less-than-carload rates are compared. Table XLVII is a comparison of less-than-carload and carload rates applying from McKenzie, a West Tennessee point, with those applying from Salisbury, Maryland, a point centrally located in the great northeastern commercial production area. The less-than-carload rates are listed, then the carload rates, and the difference between them is placed in the third column.

Table XLVII

Comparison of Less-than carload and Carload Rates in Cents per 100 Pounds from Salisbury, Maryland, and from McKenzie, Tennessee, to 10 Terminal Markets

From:	Salisbury, Maryland			McKenzie, Tennessee		
	L.C.L.	C.L	Difference	L.C.L.	C.L.	Difference
To:						
Boston, Mass.	55	41½	13½	122	88	34
Buffalo, N. Y.	48	40½	7½	96	62½	33½
Chicago, Ill.	66	56½	9½	70	50	20
Cleveland, O.	61½	52½	9	85	56½	28½
Cincinnati, O.	57½	49	8½	69	42½	26½
Detroit, Mich.	51½	44	7½	84	56½	27½
Duluth, Minn.	90	78	12	144	62½	81½
Louisville, Ky.	66	56½	9½	63	34	29
Minneapolis, Minn.	90	78	12	152	83	69
New York, N. Y.	38	31	7	114	83	31
Total difference			96			380½
Average "			9.6			38.05

The highest excess cost per 100 pounds of making a less-than-carload shipment over that of making a carload shipment from Salisbury is 13½ cents, occurring in the case of Boston rates. The highest from McKenzie is 81½ cents, in the case of Duluth rates. The excess cost of less-than-carload shipments averages 9.6 cents per 100 pounds from Salisbury to the ten points listed; that from McKenzie averages 30.05 cents.

The significance of this contrast is more easily understood if a spe-

cific example is examined. Cincinnati, being a market near Tennessee and absorbing large quantities of Tennessee sweet potatoes, constitutes a good market to use in illustrating this situation.

A minimum carload of 30,000 pounds, or approximately 600 bushels, moves on a rate of 42½ cents when shipped from McKenzie to Cincinnati, while it takes a rate of 49 cents if shipped from Salisbury. This gives the Tennessee point an advantage of 6½ cents. The total freight charge would be $127.50 from McKenzie, and $147.00 from Salisbury, or $19.50 less from the former.

Now suppose that an order is received for a 300-bushel car, approximately 15,000 pounds. The Salisbury shipper's less-than-carload rate is 57½ cents; that of the McKenzie shipper is 69 cents, or 11½ cents greater. Thus the former could pay $86.25 freight on a 300 bushel car, or $60.75 less than the cost of making a 600 bushel carload shipment. The latter would pay $103.50 on the 300 bushel car, or only $24 less than he would pay for shipping a 600 bushel car. The Tennessee shipper is, then tied to the larger shipments by high less-than-carload rates, while his eastern competitor can enter markets nearer to Tennessee at less cost than the Tennessee shipper if both use small carload shipments. In the case referred to above, the Salisbury shipper could place a 300 bushel carload in Cincinnati for $17.25 less than could the McKenzie shipper.

It appears that there was formerly a commodity less-than-carload rate applying on sweet potatoes shipped from Tennessee, comparable with that now applying from the northeastern shipping area. However, on the grounds that southern railways are entitled to receive higher rates than those in the Eastern and Central Freight Association Territories, because of the much smaller volume of traffic hauled by the former, the Interstate

Commerce Commission allowed the southern roads to cancel this commodity rate and place all less-than-carload shipments upon the class rate, which is based upon the distance principle. The result is that the discrepancy between less-than-carload rates in Southern and in Eastern and Central Freight Association Territories is not so great on short hauls; but the Southern Territory rates increase in exact proportion to distance, while those in the other territories mentioned do not. This explains the great excess of the McKenzie to Duluth less-than-carload rate over the carload rate. The excess on a shipment from Salisbury to Duluth is less than one-sixth as much.

On the average, considering both long and short hauls, the rates in Eastern and Central Freight Association Territories are about 60% of those in Southern Territory, distance for distance. The rates of the Southern Territory apply upon all shipments out of, into, and within that territory; and there seems little probability that the Interstate Commerce Commission will change its decision. The whole economic life of the country is built about very delicate railway rate adjustments; and a small change often brings about far-reaching effects. Thus, if lower rates were restored in the South, the southern roads' earning capacity would be injured unless great increases in volume of traffic should result. To raise the rate in the two northern territories referred to would unduly increase their earnings. The latter are at a distinct advantage both in volume of traffic and kind of traffic. The greater amount of manufactured goods moving in those territories greatly enhances their earnings, since these commodities can bear much higher rates than the agricultural and forest products which comprise so large a proportion of southern traffic. (1, Miller, Railway Transportation, p. 220.) These circumstances make it possible for roads in Eastern and Central Freight Association Territories to do business at

much lower rates; the people should receive the advantage of these rates; and an adjustment of rates in those territories and the South upon the same basis is not likely to occur, except as increased business in Southern Territory warrants such an adjustment.

The detriment to sweet potato shippers arising from this situation is the result of the demand for smaller carloads, both because of better ventillation and less likelihood of crushing of containers in the bottom layers, which results in better condition upon arrival, and because of the inability of dealers in small markets and small dealers in large markets to use the quantity loaded in a car to meet the 30,000 pound minimum carload regulation. Since economic conditions do not warrant the reduction of less-than-carload rates, the solution may be sought in another direction.

It is common for roads west of the Mississippi to grant a 24,000 pound minimum for sweet potatoes through all, or at least a part of, the year. Occasionally, roads east of the Mississippi allow that minimum. In fact, the Illinois Central grants it in West Tennessee through March, April, May, and June. At this season, sweet potatoes spoil more rapidly and dealers are very cautious as to quantities bought. For the good of the industry in Tennessee and other nearby states, an attempt to secure reduction to this minimum throughout the year, or even to a 20,000 pound minimum, should be worth the necessary effort. In this connection, it is notable that several of the city dealers answering the questionnaire referred to in Chapter V were strongly in favor of this lower minimum. These men are in a position to know market conditions thoroughly.

3. Tennessee Shipments vs. Those of Competitors

Crossing of Shipments - Despite advantages enjoyed by various pro-

ducing areas in the matter of freight charges, shipments from these areas reach out to widely separated consuming centers, as shown in Map 29. The 1926 and 1927 crops were large, and, for that reason, competition was keener and shipments were made to more markets than usual in the calendar year of 1927. In that year, carload shipments from Virginia reached 45 of the 66 principal markets for which unload data are available, while Tennessee shipments reached 48, from Portland, Maine, to Los Angeles, California, and from the Great Lakes to the Gulf of Mexico.

Of the total number of carloads of sweet potatoes shipped in the United States, 66% are unloaded at the 66 markets mentioned above. (2, Gabriel, The Marketing of Delaware Sweet Potatoes, p. 20.) It is, therefore, evident that a diagram of shipments to these 66 markets shows only a part of the picture. While it seems that there is considerable economic waste involved in each production area serving so wide a territory, much of it often at the very doors of other producers, this seems to be the trend of competition under modern transportation conditions.

Comparison of Map 29 with Maps 30 and 11 will give an idea of the relative positions of the chief shipping and receiving points in the United States.

Seasonal Distribution of Shipments by States - One reason for the crossing of shipments from various shipping areas is illustrated by Chart 12, which shows the season during which sweet potatoes were shipped from the shipping states in 1929. There was no week in the year in which some shipments were not made. The last shipment of the previous year's crop was made by Tennessee in the week of July 22-28, 1928, a week after Florida, North Carolina, Georgia, and Alabama had commenced shipping the new crop. When the succeeding crop came upon the market from Florida in the week of July 23-29, 1929, Georgia, Alabama, Louisiana, Tennessee, and



Map 29. Cross Shipments of Sweet Potatoes in the United States, 1927, (Tennessee Shipments Shown in Red)



Map 30. Location of 66 Principal Markets for Which Unload Data are Available.

Kentucky were still shipping the old crop.

According to this chart, North Carolina was the steadiest shipper, missing but one week in the entire year. Louisiana came second, missing but two weeks, while Tennessee was third,[1] with three weeks without shipments. The shipments of Alabama and Georgia were well distributed throughout the year, though they were not as steady as the others mentioned. In contrast to these, are the short seasons during which New Mexico, Illinois, Missouri, Iowa, and Kansas shipped their crops. All of these are small producers, whose supplies are early exhausted. It is also true that sweet potatoes are produced only on limited areas in these states; and local markets take a large portion of the crop without the necessity for shipping by rail. On the other hand, those states mentioned which have shipping seasons extending throughout most of the year are in the southern belt, where production is heavy.

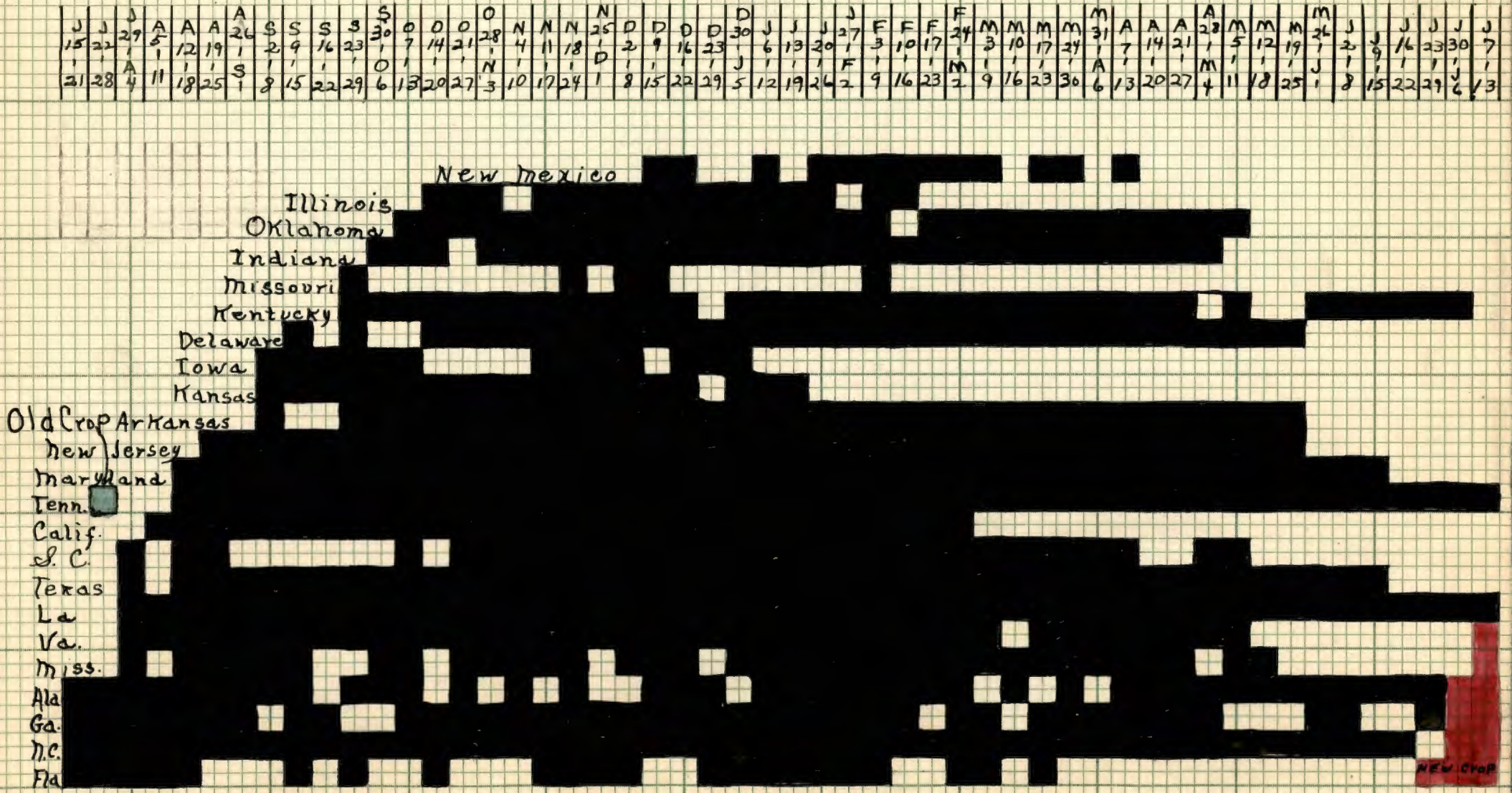
It is also significant that none of the states predominantly raising the dry-fleshed varieties occur in the group with long shipping seasons. Most of these states - Virginia, Maryland, New Jersey, Delaware, and California - despite their large shipments, have shipping seasons of only moderate length. The dry-fleshed varieties are poor keepers, while some moist-fleshed varieties improve in quality late in the season and nearly all are good keepers; therefore the southern states, which are producers of this type, supply the late market.

The order in which shipments from the various states reached the market is ascertained by reading up the left-hand margin of the chart, beginning with Florida and ending with New Mexico. It will be noted that the order is, in general, from south to north.

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[1] This chart was constructed to show weeks in which shipments were made, not quantity. Had quantity been considered, Tennessee would show up as the largest shipper throughout the year.

Chart 12. SWEET POTATO SHIPPING SEASONS BY WEEKS — 1928-29



Quantities Shipped - Since 1917, Tennessee's relative importance as a sweet potato shipping state has increased greatly. In that year, Tennessee shipped but 114 carloads and ranked below all of the five states - Virginia, Maryland, Delaware, New Jersey, and Alabama— which are now its chief competitors in the terminal markets, as illustrated in Table XLVIII and Chart 13.

Table XLVIII

Carload Shipments by Crop Years
Total United States, Tennessee, and 4 Chief Competitors

Year	Total	Tenn.	Va.	Md.	Del.	N. J.	Ala.
1917)	10,657	114	5615	607	670	1955	255
1918)a	10,540	545	3024	441	1377	1785	342
1919)	15,485	1212	5740	1179	1212	2237	401
1920)	17,206	924	4839	1363	1877	2392	579
1921)	19,383	1578	5300	1286	1722	2196	591
1922)	21,566	1495	6633	1750	2632	2858	537
1923)b	14,530	726	5374	1123	1549	1528	382
1924)	16,067	1137	5213	1155	1750	1894	649
1925)	20,859	2592	4750	1520	1742	1355	665
1926)	25,755	4972	6501	2283	1885	1770	515
1927)	23,402	3587	6616	2256	1517	1225	574
1928)	18,539	2862	6340	1836	1435	1194	360

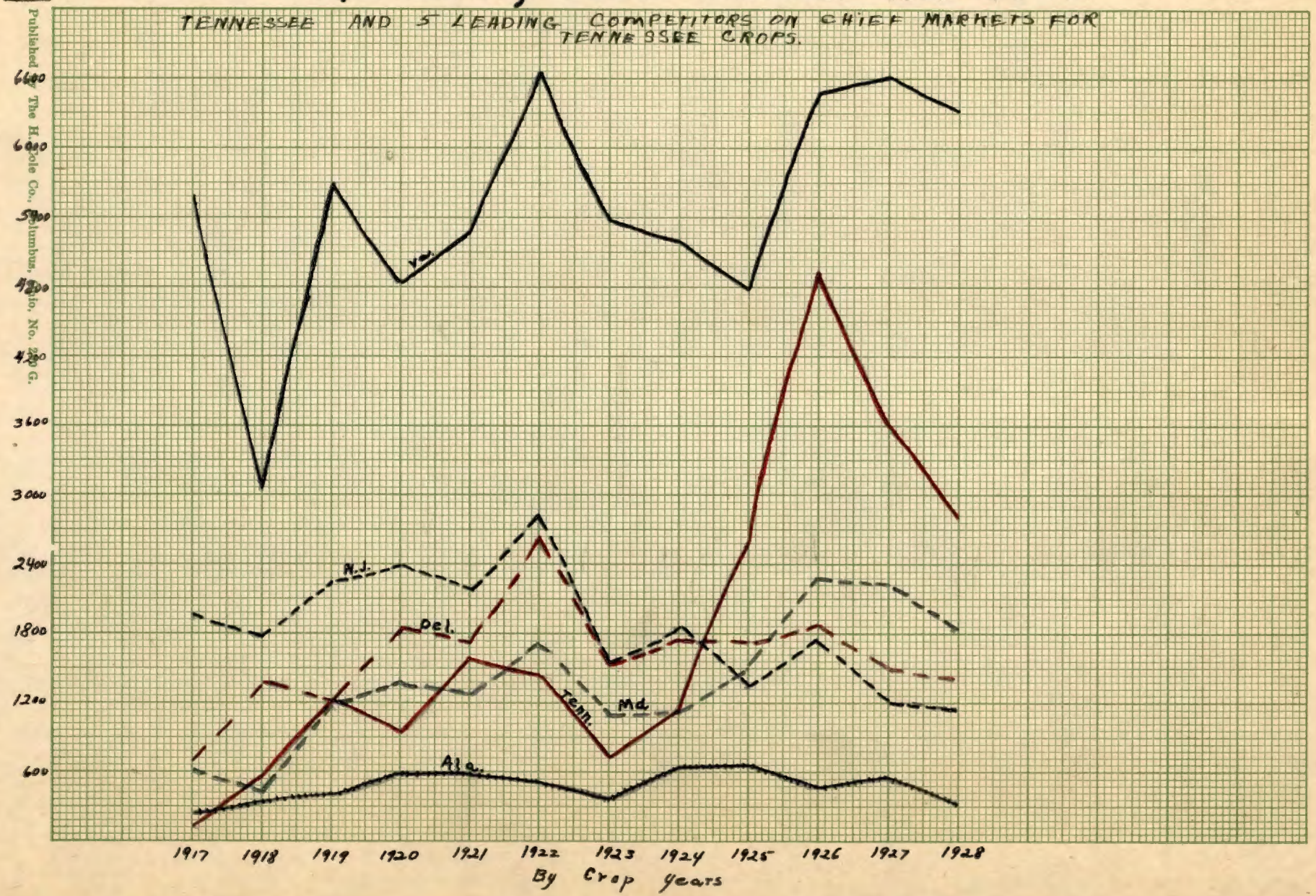
[a] Source: U. S. D. A. Statistical Bulletin 10.
[b] Source: U. S. D. A. Yearbook, 1928.

In Table XLVIII are found the total carload shipments by crop years, 1917-1928, for the United States and for Tennessee's five chief competitors, the latter arranged in the order of their importance in 1928. The United States shipments showed a steady increase from 1917 to 1922 inclusive. In 1923 they suffered a set-back; then increased through 1926, at which time they reached their peak, and after which they progressively declined through 1928. The relative importance of Tennessee and its five chief competitors, together with their individual trends is more clearly comprehended from Chart 13, which is constructed from Table XLVIII.

CHART 13.

Total Carlot Shipments of Sweet Potatoes: 1917-1928.

TENNESSEE AND 5 LEADING COMPETITORS ON CHIEF MARKETS FOR TENNESSEE CROPS.



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It is clearly seen from this chart that, of the six states, Virginia has continuously retained a strong lead, a lead of never less than 1200 cars, over all the others. Three times, in 1917, 1922, and 1923, Virginia's lead exceeded 3600 cars, and in 1928 it was nearly 3500 cars. On the other hand, Alabama has been as consistently below the others in number of carloads shipped, except that in the first year, 1917, Tennessee was lower.

But none of the other five states has shown the phenomenal change in position that has come to Tennessee. From 114 carloads shipped in 1917, Tennessee rose to 1212 by 1919, dropped to 924 in 1920, and then rose to 1578 in 1921. After suffering two declines which brought the low level of 726 in 1923, Tennessee shipments began a steady rise which culminated in the high peak of 4972 cars in 1926, nearly 200 cars more than Virginia's 4750 of the previous year, and nearly 35 times as many as Tennessee shipped in 1917. Since 1926 Tennessee shipments have fallen off to 2862 cars in 1928. Tennessee tied with Delaware for third place in 1919, fell to fifth place in 1920, rose above Maryland to fourth in 1921, fell back to fifth in 1922 and 1923, almost reached fourth in 1924, then leaped to second place in 1925 and has retained that position continuously since.

While there has been no such radical shift among the other states, it is seen that Maryland's trend has been upward from 607 cars and fourth place in 1917, to 1836 cars and third place in 1928. New Jersey, on the contrary, has declined from 1955 cars and second place in 1917 to 1194 cars and fifth place in 1928. This is probably largely resultant from the great increase in truck shipments from the producing area in that state to nearby markets.

Market Competition - Tables XLIX and L are included to present the competitive position of Tennessee in 1927 and 1928 respectively, in rela-

tion to other shipping states on the principal markets of the country for which unload data are available. In these tables are listed unloads of cars from Tennessee and from the five nearest competitors in order of their importance, together with the total unloads of the six high states shipping to each market.

Table XLIX

Carlot Unloads of Sweet Potatoes
Tennessee and Five Chief Competitors in Markets Reporting, 1927

	Tenn.						Total
Akron, Ohio	36	Va. 36	Md. 18	Del. 18	Ala. 5	Ky. 2	118
Atlanta, Ga.	58	Ga. 202	Ala. 1	Fla. 1			263
Baltimore, Md.	25	Md. 262	Va. 256	N.C. 70	Ga. 24	Ala. 5	647
Boston, Mass.	86	Va. 512	Del. 185	N.C. 74	Md. 37	Ga. 22	914
Buffalo, N. Y.	39	N.J. 107	Md. 61	Va. 57	Del. 56	Ark. 7	338
Chicago, Ill.	886	N.J. 279	Ind. 207	Va. 132	Ill. 103	Ky. 78	1859
Cincinnati, Ohio	424	Va. 68	Ala. 38	Ky. 29	N.C. 13	Fla. 9	603
Cleveland, Ohio	230	Va. 135	Md. 107	Del. 57	La. 34	Ala. 25	655
Columbus, Mo.	124	Va. 92	Md. 72	N.J. 22	Ind. 20	Ala. 15	364
Dayton, Ohio	40	Va. 23	Ind. 11	Md. 9	Del. 6	Ala. 6	107
Des Moines, Iowa	11	Ark. 20	Okla. 10	Va. 5	Ala. 5	Mo. 4	60
Detroit , Mich.	488	Md. 90	Del. 62	Va. 32	Ky. 28	Ark. 23	781
Duluth, Minn.	2	Va. 8	Del 3				14

(continued)

Table XLIX (continued)

	Tenn.						Total
Evansville, Ind.	50	Ala. 4	La. 2	Ky. 1	Miss. 1		58
Grand Rapids, Mich.	17	Va. 35	N.J. 1	Md. 1	S.C. 1	Ark. 1	56
Hartford, Conn.	5	Va. 62	Del. 26	Md. 7	Ala. 1		102
Indianapolis, Ind.	134	Va. 83	Ind. 33	Ala. 23	N.C. 14	Ky. 14	315
Jacksonville Fla.	12	Ga. 37	Fla. 6	N.C. 3	Ky. 1		
Kansas City, Mo.	24	Ark. 99	Okla. 25	Ala. 12	Nev. 11	La. 5	180
Lexington, Ky.	110	Ala. 14	Va. 13	N.C. 4	Ky. 3	La. 2	148
Los Angeles, Calif.	9	Cal. 200	Ark. 73	N.M. 40	Okla. 16		338
Louisville, Ky.	97	Ala. 12	Ky. 10	Va. 4	La. 4	Ind. 1	130
Memphis, Tenn.	19	Miss. 3	Ark. 1				23
Milwaukee, Wisc.	8	N.J. 45	Va. 16	Ind. 9	Del. 7	Iowa 2	90
Minneapolis, Minn.	22	Va. 76	N.J. 45	Del. 13	Md. 7	Ark. 6	184
Nashville, Tenn	83	Ala. 14	Ga. 2				99
Newark, N. J.	3	Va. 241	Del. 104	Md. 49	S.C. 7	N.C. 5	413
New Haven, Conn.	13	Va. 58	Del. 41	Md. 12	Ky. 3	Ala. 3	135
New Orleans, La.	6	La. 10	Al-. 6	Tex. 1			23
New York, N. Y.	63	Va. 1083	N.J. 601	Md. 476	Del. 222	N.C. 124	2707

(continued)

Table XLIX (continued)

	Tenn.						
Norfolk, Va.	2	N.C. 9	Va. 8	S.C. 6			25
Peoria, Ill.	21	Va. 12	Ala. 5	Ill. 4	Md. 3	N.C. 1	51
Philadelphia, Pa.	38	Va. 170	Ind. 73	Ga. 57	Del. 38	N.C. 30	422
Pittsburgh, Pa.	192	Del. 285	Va. 217	N.J. 151	Md. 85	N.C. 29	1014
Portland, Me.	3	Va. 62	Md. 17				86
Providence, R.I.	7	Va. 73	Del. 19	Md. 8	N.C. 5	N.J. 4	125
Richmond, Va.	6	N.C. 13	S.C. 8	Ga. 5	Va. 2		34
Rochester, N. Y.	15	Va. 45	Md. 25	Del. 8	Ga. 4	N.C. 2	99
St. Louis, Mo.	224	Ark. 28	Ky. 19	Mo. 17	Ala. 15	Miss. 7	318
St. Paul, Minn.	11	Va. 33	Del. 13	Ark. 13	N.J. 7	Md. 5	86
San Antonio, Texas	1	La. 117	Tex. 74	Okla. 5	Ala. 3	Cal. 2	203
Springfield, Mass.	2	Va. 63	Del. 9	Md. 8	Ala 1		83
Syracuse, N. Y.	8	Va. 38	Del. 12	Md. 10	N.J. 1		71
Tampa, Florida	42	Ga. 112	Fla. 21	Ala. 9	Va. 1	S.C. 1	188
Terre Haute, Ind.	11	Va. 8	Ky. 1	Ala. 1			21
Toledo, Ohio	47	Va. 95	Md. 11	Ala. 6	Ind. 5	Del. 4	174
Washington, D. C.	32	N.C. 86	S.C. 48	Va. 35	Md. 27	Ga. 14	251
Youngstown, O.	35	Va. 54	Del. 23	Md. 13	Ala. 5	S.C. 3	141
Total	3,814						

In 1927 Tennessee sweet potatoes reached 48 of the 66 markets reporting.

In 25 of these markets, Virginia was the chief competitor.

In 17 of these 25 Virginia unloaded more cars than did Tennessee.

Table L

Carlot Unloads of Sweet Potatoes
Tennessee and Five Chief Competitors in Markets Reporting, 1928

	Tenn.						Total
Akron, Ohio	24	Va. 49	Del. 11	Md. 10	Okla. 5	Ala. 3	110
Atlanta, Ga.	17	Ga. 148	S.C. 20	N.C. 5	Miss. 3	Ala. 2	195
Baltimore, Md.	2	Va. 329	Md. 276	N.C. 99	Del. 12	Ga. 4	725
Boston, Mass.	28	Va. 504	Del. 185	Md. 51	N.C. 37	N.J. 24	851
Buffalo, N. Y.	17	N.J. 98	Del. 68	Va. 50	Md. 27	Ark. 4	276
Chicago, Ill.	831	N.J. 315	Va. 129	Ind. 93	Ill. 91	Del. 59	1711
Cincinnati, O.	337	Va. 74	Ala. 29	N.C. 20	Ky. 15	Miss. 9	498
Cleveland, Ohio	57	Va. 136	La. 126	Md. 86	Del. 64	N.J. 42	564
Columbus, Ohio	89	Va. 94	Md. 69	N.J. 24	Ind. 9	Ala. 9	313
Dayton, Ohio	55	Va. 23	Ind. 8	Miss. 7	N.C. 5	Del. 4	117
Des Moines, Iowa	2	Va. 20	Ark. 15	Okla. 9	Ala. 4	Kans. 3	56
Detroit, Mich.	314	Md. 104	Va. 77	Del. 47	Miss. 17	Ky. 15	631
Duluth, Minn.	1	Va. 20	Iowa 2	Ind. 1	Kans. 1	Md. 1	26

(continued)

Table L (continued)

	Tenn.						Total
Evansville, Ind.	50	Miss. 2					52
Grand Rapids, Mich.	12	Va. 48	Md. 7	N.J. 1	Miss. 1		69
Hartford, Conn.	5	Va. 48	Del. 30	Md. 7			90
Indianapolis, Ind.	70	Va. 87	La. 42	N.C. 21	Ark. 21	Ala. 18	296
Jacksonville, Fla.	3	Ga. 8	Fla. 5	S.C. 3	Va. 1	Ala. 1	23
Kansas City, Mo.	10	Ark. 53	La. 15	Okla. 10	Ala. 7	Tex. 5	101
Lexington, Ky.	61	Va. 9	Ala. 9	Miss. 5	N.C. 2	Ga. 2	91
Los Angeles, Cal.	7	Cal. 115	Ark. 90	Okla. 79	N.M. 43	Miss. 1	335
Louisville, Ky.	87	Ala. 9	Miss. 7	N.C. 6	Ky. 4	S.C. 2	120
Memphis, Tenn.	1	Ark. 3	Ala. 1	Miss. 1			6
Milwaukee, Wisc.	7	N.J. 40	Va. 14	Iowa 11	Ind. 7	Del. 5	88
Minneapolis, Minn.	13	Va. 62	N.J. 39	Del. 24	Md. 18	La. 18	185
Nashville, Tenn.	74	Ala. 12	Fla. 2	S.C. 1			89
New Haven, Conn.	5	Va. 49	Del. 34	Md. 28	S.C. 1	Fla. 1	120
New York, N. Y.	8	Va. 988	Md. 419	N.J. 371	Del. 193	N.C. 188	2235
Norfolk, Virginia	2	Va. 4	N.C. 2	S.C. 1			9
Peoria, Illinois	15	Va. 12	Ark. 10	Md. 7	Ill. 4	Ala. 4	57
Philadelphia, Pa.	13	Va. 115	Md. 64	Del. 34	Ga. 34	N.C. 14	281

(continued)

Table L (continued)

	Tenn.						Total
Pittsburgh, Pa.	134	Del. 259	Va. 219	N.J. 162	Md. 84	N.C. 51	973
Portland, Me.	1	Va. 64	Md. 8	Del. 3			76
Richmond, Va.	2	N.C. 14	Va. 3	S.C. 1			20
Rochester, N. Y.	5	Va. 91	Md. 23	Del. 12	N.C. 2	N.J. 1	135
St. Louis, Mo.	161	Ark. 17	Ky. 8	Miss. 7	Okla. 6	Ala. 5	215
Syracuse, N. Y.	6	Va. 34	Md. 28	Del. 5			74
Tampa, Florida	17	Va. 28	Fla. 11	S.C. 1	Ky. 1		58
Terre Haute, Ind.	5	Ind. 1	Va. 1	La. 1			8
Toledo, Ohio	35	Va. 91	Md. 29	Del. 18	Ala. 2	Fla. 1	176
Washington, D.C.	15	N.C. 143	S.C. 54	Va. 39	Md. 7	N.J. 4	272
Youngstown, Ohio	19	Va. 61	Del. 18	Md. 10	S.C. 5	La. 4	114
Total	2612						

In 1928 Tennessee sweet potatoes reached 43 of the 66 markets reporting. In 25 of these markets Virginia was the chief competitor.

In 21 of these 25 Virginia unloaded more cars than did Tennessee.

Tennessee's Chief Markets - A more thorough analysis of the competitive situation in 12 of the principal markets for Tennessee sweet potatoes is presented in Table LI. The total number of carloads received and the number and percentage received from Tennessee and important competitors are included.

The markets are listed in the order of their importance as receivers of Tennessee sweets in 1928. It will be noted that in practically all cases the total receipts of sweet potatoes declined in 1928.

Table LI

Competition in Chief Markets for Tennessee Sweet Potatoes

1. Chicago

Year	Total Unloads	From Tennessee		From New Jersey		From Indiana		From Virginia	
		No.	%	No.	%	No.	%	No.	%
1921	1231	359	29.2	327	26.6	(a)	(a)	143	11.6
1922	1315	411	31.3	427	32.5	(a)	(a)	154	11.7
1923	1497	482	32.2	480	32.1	(a)	(a)	171	11.4
1924	1096	385	35.1	379	34.6	59	5.4	97	8.9
1925	1383	613	44.3	350	25.3	77	5.6	89	6.4
1926	1467	677	46.1	328	22.4	118	8.0	79	5.3
1927	1859	886	47.7	279	15.0	207	11.1	132	7.1
1928	1711	831	48.6	315	18.4	93	5.4	129	7.5

(a) No data

2. Cincinnati

Year	Total Unloads	From Tennessee		From Virginia		From Alabama	
		No.	%	No.	%	No.	%
1921	368	152	41.3	68	18.5	7	1.9
1922	461	208	45.1	137	29.7	43	9.3
1923	413	186	45.0	114	27.6	27	6.5
1924	359	77	21.4	132	36.8	69	19.2
1925	428	224	52.3	46	10.7	75	17.5
1926	481	330	68.6	47	9.8	63	13.1
1927	603	424	70.3	68	11.3	38	6.3
1928	496	337	67.9	74	14.9	29	5.8

3. Detroit

Year	Total Unloads	From Tennessee		From Maryland		From Delaware		From Virginia	
		No.	%	No.	%	No.	%	No.	%
1924	317	99	31.2	17	5.4	143	45.1	28	8.8
1925	463	274	59.2	77	16.6	44	9.5	26	5.6
1926	583	379	65.0	68	11.7	66	11.3	26	4.5
1927	781	488	62.5	90	11.5	62	7.9	32	4.1
1928	651	314	49.8	104	16.5	47	7.4	77	12.2

(continued)

Table LI (continued)

4. St. Louis

Year	Total Unloads	From Tennessee		From Arkansas	
		No.	%	No.	%
1921	194	105	54.1	72	21.6
1922	127	69	54.3	29	22.8
1923	136	108	79.4	7	5.1
1924	106	15	14.2	60	56.6
1925	134	79	59.0	19	14.2
1926	183	133	72.7	25	13.7
1927	318	224	70.4	28	8.8
1928	215	161	74.9	17	7.9

5. Pittsburg

Year	Total Unloads	From Tennessee		From Delaware		From Virginia		From New Jersey	
		No.	%	No.	%	No.	%	No.	%
1921	913	0	0	348	38.1	232	25.4	107	11.7
1922	982	0	0	357	37.1	255	26.5	193	20.1
1923	944	0	0	555	58.8	158	16.7	149	15.8
1924	757	0	0	271	35.8	176	23.2	149	19.7
1925	809	0	0	367	45.4	184	22.7	135	16.7
1926	834	49	5.9	321	38.5	179	21.5	119	14.3
1927	1014	192	18.9	285	28.1	217	21.4	151	14.9
1928	973	134	13.8	259	26.6	219	22.5	162	16.6

6. Columbus

Year	Total Unloads	From Tennessee		From Virginia		From Maryland	
		No.	%	No.	%	No.	%
1924	201	13	6.5	36	17.9	53	26.4
1925	234	47	20.1	47	20.1	62	26.5
1926	274	56	20.4	61	22.3	58	21.2
1927	364	124	34.1	92	25.3	72	19.8
1928	313	89	28.4	94	30.0	69	22.0

7. Indianapolis

Year	Total Unloads	From Tennessee		From Virginia	
		No.	%	No.	%
1924	193	23	11.9	74	38.3
1925	234	63	26.9	55	23.5
1926	278	114	41.0	70	25.2
1927	315	134	42.5	83	26.3
1928	296	70	23.6	87	29.4

(continued)

Table XI (continued)

8. Cleveland

Year	Total Unloads	From Tennessee		From Virginia		From Delaware		From Maryland	
		No.	%	No.	%	No.	%	No.	%
1924	456	34	7.5	144	31.6	81	17.8	74	16.2
1925	533	64	12.0	127	23.8	132	24.8	97	18.2
1926	641	156	24.3	144	22.5	93	14.5	141	22.0
1927	655	230	35.1	135	20.6	57	8.7	107	16.3
1928	564	57	10.1	136	24.1	64	11.3	86	15.2

9. Toledo

Year	Total Unloads	From Tennessee		From Virginia		From Maryland		From Delaware	
		No.	%	No.	%	No.	%	No.	%
1924	30	0	0	12	40.0	2	6.7	11	36.7
1925	103	4	3.9	31	30.1	24	23.3	34	33.0
1926	161	31	19.3	90	55.9	7	4.3	20	12.4
1927	174	47	27.0	95	54.6	11	6.3	4	2.3
1928	176	35	19.9	91	51.7	29	16.5	18	10.2

10. Buffalo

Year	Total Unloads	From Tennessee		From New Jersey		From Delaware		From Virginia		From Maryland	
		No.	%	No.	%	No.	%	No.	%	No.	%
1924	215	0	0.	110	51.2	31	14.4	36	16.7	28	13.0
1925	258	2	0.8	91	35.3	49	19.0	59	22.9	54	20.9
1926	300	19	6.3	101	33.7	63	21.0	44	14.7	62	20.7
1927	358	32	9.5	107	31.7	56	16.6	57	16.9	61	18.0
1928	276	17	6.2	98	35.5	68	24.6	50	18.1	27	9.8

11. Minneapolis

Year	Total Unloads	From Tennessee		From Virginia		From New Jersey	
		No.	%	No.	%	No.	%
1921	91	33	36.3	26	28.6	19	20.9
1922	141	13	9.2	41	29.1	43	30.5
1923	133	13	9.8	43	32.3	29	21.8
1924	116	3	2.6	39	33.6	39	33.6
1925	148	9	6.1	45	30.4	22	14.9
1926	158	25	15.8	60	38.0	32	20.3
1927	184	22	12.0	76	41.3	45	24.5
1928	185	13	7.0	62	33.5	39	21.1

12. Milwaukee

Year	Total Unloads	From Tennessee		From New Jersey		From Virginia	
		No.	%	No.	%	No.	%
1924	66	1	1.5	18	27.3	30	45.5
1925	76	3	3.9	15	19.7	34	44.7
1926	83	8	9.6	41	49.4	7	8.4
1927	90	8	8.9	45	50.0	16	17.8
1928	88	7	8.0	40	45.5	14	15.9

(1) Chicago - Though the number of carloads of Tennessee sweet potatoes received on the Chicago market has increased greatly from 1921 to 1928, in two years, 1924 and 1928, there was a reduction of these receipts. The percentage of total receipts coming from Tennessee has, however, steadily increased. The number and percentage from Indiana also increased to 1927, then declined in 1928. The number of carloads coming from New Jersey and Virginia has declined somewhat in this period, while their percentage has declined sharply. This indicates that other states, especially Tennessee and Indiana, have not only cared for the total increase in receipts which has occurred, but have also gradually been edging New Jersey and Virginia from the market.

(2) Cincinnati - The total receipts on the Cincinnati market have increased slightly ; and both the number and percentage from Tennessee have shown sharp, though irregular, increases. The number of cars and the percentage received from Virginia have declined. Those from Alabama increased to 1924 and have since diminished both in number and percentage.

(3) Detroit - The increase in receipts from 1924 to 1927 was largely cared for by Tennessee. Both total and Tennessee receipts declined in 1928. Maryland, Tennessee's chief competitor, has held its position, while Delaware and Virginia have lost out, except that Virginia again increased its number and percentage in 1928.

(4) St. Louis - An increase has occurred in total receipts and in both the number and percentage from Tennessee. Though there was a decrease in 1928 in the absolute quantities, Tennessee's percentage increased. Arkansas, next in importance, has shown both an absolute and a relative decline.

(5) Pittsburgh - Tennessee's sudden rise to importance in the Pittsburgh market is phenomenal. No receipts from Tennessee are listed on the

Pittsburgh market from 1921 to 1925. In 1926 Tennessee furnished 5.9% of Pittsburgh's carload receipts; and in 1927, 18.9%. The percentage fell away to 13.8 in 1928. It appears that the gain was made largely at the expense of Delaware. Both Virginia and New Jersey maintained their positions. Delaware Bulletin 161 takes note of this situation (2, Gabriel, The Marketing of Delaware Sweet Potatoes, p. 21), as follows: "Some years Delaware furnishes over one-half of the sweet potatoes consumed in Pittsburgh . . . . Delaware has not gained any in importance during the past few years, but Tennessee and Arkansas stepped in during 1926 and shipped a considerable volume of sweet potatoes to this market during that year."

(6) Columbus - On the Columbus market, Tennessee has made both absolute and relative gains during the five years listed, except in 1928. Virginia has made steady increases, while Maryland's relative importance has declined.

(7) Indianapolis - Tennessee shipments here gained in importance to 1927, then suffered a set-back of nearly one-half. Virginia has shown consistent gains since 1925, but has never recovered the position held in 1924, a year in which Tennessee furnished less than one-third as many cars as did Virginia.

(8) Cleveland - Total receipts and Tennessee's number and percentage increased to 1927; then all declined, Tennessee showing a great loss in relative importance of shipments. Delaware's percentage has decreased, while Virginia and Maryland have about maintained their positions. Though it is not shown in this table, it is significant that Louisiana unloaded 126 cars, or 22.3% of Cleveland's total receipts in 1928. There seems to have been a rapid development of the market for the Porto Rico varieties in Cleveland, largely at the expense of Tennessee Nancy Halls.

(9) Toledo - Though making no shipments to this city in 1924, Tennessee entered the market in 1925 and gained to 1927, when it furnished 27% of Toledo's receipts. It then fell away to 19%. Virginia has made slight relative gains, Maryland's position is unsteady, and Delaware's importance has lessened.

(10) Buffalo - There has been an increase in Tennessee shipments to Buffalo since 1926, when the first were recorded. The decrease in 1928 is again apparent on this market. New Jersey is clearly the leader in the Buffalo market and has about retained its position since 1925, as have Delaware and Virginia, though New Jersey's prestige was much greater in 1924, when none of the other competitors were as strong as they were thereafter. Maryland has lost in relative importance. Tennessee shipments have never exceeded 9.5% of Buffalo's receipts. Further effort at marketing Tennessee Nancy Halls here might be worth consideration, especially in view of the recent gain to the point of furnishing 18.9% of the receipts at Pittsburgh, a market to which freight rates from Tennessee producing areas are approximately on a par with those to Buffalo.

(11) Minneapolis - The situation in the Minneapolis market is unique among those studied. Data are available from 1921 through 1928; and it appears that in this period, despite an advantage in freight rates, Tennessee has been driven out by Virginia and New Jersey. At least, Tennessee's position has been unstable and has shown no consistent gains, while Virginia has gained and New Jersey has remained at about the same level over the period, with some fluctuations. Tennessee furnished 36.3% of Minneapolis' receipts in 1921, only 2.6% in 1924, gained to 15.8% in 1926, and lost to 7% in 1928. The advantage in transportation costs to this consuming center enjoyed by Tennessee might seem ample reason for

attempted conquest of the market.

(12) Milwaukee - The most striking feature of the Milwaukee market is the small number of cars received in proportion to the city's size. Tennessee has never furnished as much as 10% of these receipts. Formerly, Virginia was the chief shipper to Milwaukee, but, in the past three years, New Jersey has exchanged positions with Virginia. Tennessee has gained slightly but here appears to be an excellent opportunity for educational work as to the virtues of moist-fleshed sweets and for expansion of the market. It is a city which consumed few sweets; therefore it would be advantageous to educate the people directly to the use of Nancy Halls, thus eliminating the necessity of overcoming a prejudice for the dry-fleshed varieties.

Ranked in order of Tennessee's importance in these markets in 1928, the order changes. With the percentages of total receipts of the respective markets furnished by Tennessee, this rank is as follows:

(1) St. Louis	74.9	(7) Toledo	19.9
(2) Cincinnati	67.9	(8) Pittsburgh	13.8
(3) Detroit	49.8	(9) Cleveland	10.1
(4) Chicago	48.6	(10) Milwaukee	8.0
(5) Columbus	28.4	(11) Minneapolis	7.0
(6) Indianapolis	23.6	(12) Buffalo	6.2

Tennessee furnishes considerably over one-half of the carloads of sweet potatoes received in 1928 by St. Louis and Cincinnati, and nearly one-half those received by Detroit and Chicago. Further expansion of Tennessee shipments to the other markets, particularly the last three, should greatly aid the industry if the necessary demand can be created in these markets.

The importance of Virginia as a competitor is emphasized by the preceeding discussion and data. Even in cities of the Middle West where Tennessee is on equal footing in rates or enjoys an advantage, Virginia Yellows

are often sold in greater quantity than are Tennessee Nancy Halls. This situation may be partly due to Virginia's cooperative marketing organization on the Eastern Shore, which has efficiently watched the markets for a long period of time. Could data on shipments to small markets be assembled, it would probably be found that this watchfulness for orders is even more significant. The low rates of less-than-carlot shipments has also been an advantage to eastern shipping points in supplying small markets.

4. Possibilities for Expanding Tennessee Shipments

Large Cities - In 1928, three cities in the United States received over 900 cars of sweet potatoes each. Of these, two, Chicago and Pittsburgh, were within the territory where Tennessee enjoys favorable freight rates. Had all cities outside the production areas taken as many sweet potatoes in proportion to population as did Pittsburgh, six would have received over 900 cars, and four of these — Chicago, Pittsburgh, Cleveland, and Detroit — would have been within Tennessee's natural shipping area. This indicates the possibilities for increase in demand at large central markets.

Small Markets - However, the minor attention accorded small markets in the past by Tennessee shippers leaves open a field of equal importance. In the development of this field, an effort should be made to secure a carload minimum of 20,000 pounds if possible, and if not, then one of 24,000 pounds. This would aid in marketing Tennessee sweets, not only in the small markets, but in general; because the quality of the product would be improved through better preservation in shipment.

Canada - At the north lies a potential market for considerable quantities of sweets if they can be properly introduced to the Canadian diet. That present receipts in Canadian cities are small is shown by Table LII which gives the carlot receipts of imported sweet potatoes at principal

Canadian cities for 1926-1929.

Table LII

Population and Carlot Receipts of Imported Sweet Potatoes at Principal Canadian Cities for Calendar Years 1926, 1927, 1928, 1929 [a]

	Population	Carlot receipts			
		1926	1927	1928	1929
Montreal	989,835	26	45	52	42
Toronto	585,628	64	62	74	69
Winnipeg	202,377	2	10	7	8
Vancouver	149,262	15	22	15	16
Quebec	131,071	0	0	0	0
Ottawa	122,731	1	1	3	2
Calgary	72,500	2	3	6	8
Edmonton	69,293	0	3	4	4
St. John	60,000[b]	0	0	0	0
Halifax	58,372	0	0	0	2
Regina	37,329	4	5	8	3

[a] Receipts furnished by Canadian Department of Agriculture. Population from Statesman's Yearbook.

[b] Approximate

Toronto and Montreal are the chief receivers, but neither show consistent increases in receipts for the four-year period. Nor is the quantity received in proportion to population on at all the same basis as in the United States, as may be seen by comparing Table LII with Table LI. Toronto, with a population of 585,628 in 1928, is a smaller city than Montreal, but uses more sweets. However it received but 74 cars in 1928. Buffalo, with a population of 555,800, received 276 cars. Montreal, with a 1927 population of 989,835, received but 52 cars; Cleveland, with 1,010,300 people, received 584 cars — over ten times as many. Neither Buffalo nor Cleveland are large receivers in proportion to population compared to other United States cities, e.g. Pittsburgh, with a population of 673,800, and receipts of 973 cars in 1928 (see Table XL).

The other Canadian cities are much smaller, the next in size being

Winnipeg, with 202,377, but many of these could absorb large quantities of sweet potatoes if the taste for them could be developed. Montreal is clearly in the shipping territory of the northeastern production area. Tennessee might compete in Toronto, since the rate is the same as to Buffalo and Pittsburgh. In the Canadian cities farther west Tennessee's freight advantage would be an important factor.

A more encouraging phase of the Canadian consumption situation is revealed by examination of Table LIII, giving the quantities of sweet potatoes imported from the United States annually since 1926.

Table LIII

Sweet Potatoes Imported into Canada from United States for Fiscal Years Ending March 31st, 1926, 1927, 1928, 1929, and for Nine Months Ending Dec. 31st, 1929

Year	Pounds
1926	2,990,267
1927	3,725,865
1928	4,992,300
1929	5,093,200
9 months to Dec. 31, 1929	3,705,500

Importations have nearly doubled in the four years, showing consistent increases. However, a less favorable outlook for the future is described by a receiver in Victoria, British Columbia, who answered a questionnaire concerning the sweet potato trade. He states: ". . . To add to this short demand, we are now faced with a 25% duty, in retaliation to your new tariff, whereas we before paid but 35¢ a hundred pounds. As this duty was not imposed last year, it will probably cut into the demand for the coming winter even more heavily." Thus the tariff wall between the countries will tend to retard the development of a Canadian outlet for sweets.

In connection with Canadian and other northern shipments, it is of

importance to keep in mind that considerable loss and damage occur in winter through freezing. Shipments made in winter are sometimes heated with ordinary stoves. Specially constructed cars for heating perishables in cold weather are better; but not many are in operation. Further development of heater service by railways should help greatly.

However, the great difficulty in handling winter shipments is unloading and distribution in small quantities during zero weather. This is more readily accomplished with the higher-priced vegetables, since they will bear heavier carrying charges. The possibility of establishing heated unloading sheds in which cars could be spotted for the removal of contents is another step which might be investigated. Dry refrigerator cars (i.e., without ice) are suitable for keeping sweet potatoes safe from frost in shipment in all but the coldest weather, since they are well insulated and do not require heating. It is when the cars are opened for unloading that the danger of freezing becomes imminent.

The greater shipments and wider territory reached by Tennessee Nancy Halls in 1927, shipments for which year include parts of the large crops of 1926 and 1927, indicate the increase in demand of moist-fleshed sweets which can be expected with low prices. Consistent advertising and careful attention to the markets might effect the same results.

5. Carloads vs. Bushels in Studying Shipments

In this discussion, and in most published studies dealing with the marketing of sweet potatoes, comparisons have usually been made on the basis of carload shipments and receipts. The true situation is not revealed by such comparisons because of the variations in size of carloads shipped from different producing areas. Account was taken of this source

of error in the table of per capita receipts appearing in Chapter V (see p. 161 and Table XL).

The importance of this factor is emphasized by a concrete illustration. The total receipts of sweet potatoes on the Pittsburgh market for 1928 amounted to 973 cars. Delaware led, with 259 cars. Tennessee was in fourth place, with 134 cars. The usual quantity shipped in a car from Delaware is 300 bushels; that from Tennessee is 550 bushels. Multiplying, it is found that there was no great difference in the actual number of bushels shipped to Pittsburgh by each of the two states:

Delaware 259 x 300 = 77,700 bushels

Tennessee 134 x 550 = 73,700 bushels

Virginia and Tennessee together with several other states, ship in carloads of similar size; so that no variation in the relationship of these states to each other would be effected by converting tabulations to the bushel basis. However, where other states are involved, the tabulated ranks would be greatly changed. This is especially true in the cases where comparisons with Delaware, Maryland, and New Jersey occur. The size of the usual carload shipped by these states varies from 300 to 400 bushels. It is, therefore, evident that Tennessee, Virginia, and the other states shipping in large carloads furnish a much larger proportion of the sweet potatoes reaching the various markets than carload comparisons would indicate. The quantity commonly loaded per car in states where the 24,000 pound carload minimum is effective is 480 to 516 bushels, and in some southern states 600 bushels are often shipped.

In further research dealing with shipments it would be well to convert all data to the bushel basis for the sake of forming true comparisons.

6. Conclusions

(1) Carload shipments of sweet potatoes originate largely in areas of concentrated production.

(a) 72.8% of the carloads shipped in the United States for the years 1920-25 inclusive originated in the 21 leading shipping counties.

(b) Tennessee shipments, for the most part, originate in West Tennessee, the industry centering about Weakley County.

(2) Transportation facilities and freight rates are important factors in determining shipping areas and the markets to which they ship.

(a) West Tennessee and the Central Basin of Middle Tennessee have the most adequate and economical transporation facilities for reaching the more important markets for Tennessee sweet potatoes.

(b) The northeastern producing area enjoys a rate advantage over the southern producing area to large terminal markets, even to many in the Middle West. This advantage is great in the case of less-than-carload rates, which aids in securing orders from the smaller cities and towns.

(c) The area into which Tennessee can ship most advantageously from the standpoint of transportation costs lies from Toronto, Buffalo, and Pittsburgh, westward to St. Louis and Minneapolis.

(3) There is great competition in the terminal markets between producing areas, as shown by the great number of sources from which these markets draw their supply.

(a) The shipping season of the producing states is not uniform. States with small production and those producing the dry-fleshed type of sweet potato have a shorter shipping season. Many of those producing large quantities of the moist-fleshed type ship throughout most of the year.

(b) From 1917 to 1925, Tennessee rose from fifth to second place among the states in number of carloads of sweet potatoes shipped, and has since maintained that position. Virginia leads all states in quantity shipped.

(c) In over half of the markets reached by Tennessee sweet potatoes in 1927 and 1928, Virginia was Tennessee's chief competitor; and in most of these Virginia unloaded more cars than did Tennessee.

(d) Tennessee has shown a strong gain recently in relative importance as a shipper to many of the important markets of the Middle West.

(4) Three classes of markets deserve attention by those interested in expanding Tennessee shipments:

(a) Large terminal markets in the United States — Buffalo, Milwaukee, and Minneapolis offer especial opportunities because of present low receipts of Tennessee Nancy Halls.

(b) Smaller cities and towns, which have been neglected by Tennessee shippers — A reduction of the carload minimum to 20,000 pounds would be of great benefit in securing orders from smaller markets.

(c) Canadian cities and towns — The quantity consumed is relatively small; and the recent tariff increase is an obstacle to securing greater demand for American sweets on Canadian markets.

(5) Comparisons of shipments and unloads on the carload basis are misleading.

(a) The relative importance of Tennessee, Virginia, and other states shipping in large carloads is belittled by such comparisons, while that of Delaware, Maryland, and New Jersey is unduly enhanced.

(b) Further research should be conducted on the basis of bushels rather than carloads.

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CHAPTER VII

THE DECHERD GROUP OF COOPERATIVE ASSOCIATIONS

1. Reasons for Organization.
2. Difficulties Encountered.
3. The Individual Associations.
4. Observations and Conclusions.

In 1922 a sweet potato cooperative association was organized at Decherd, Tennessee, through the efforts and under the direction of a dealer and landowner of wide experience, keen insight, and great ability. Such success was achieved within the next few years by this organization that it precipitated a wholesale entry of groups of farmers in surrounding, and even in distant, towns into the business of growing sweet potatoes and of marketing them cooperatively.

The general lack of information upon fundamental principles of cooperation, the scarcity of good leadership, and the widespread expectation of quick profits, with no foresight as to the possibility of overproduction and hard years, gave this mushroom development an unstable setting. The result was a chaos of poor financing, unsuitable membership, and faulty methods, which, combined with a bumper crop and low prices the first year, served to remove most of the glamour.

When this year of disaster was followed by one with the greatest sweet potato production in the history of the United States and continued depression of prices, all but the men of real metal lost interest in the new cooperative marketing projects. Many ceased to grow the crop, leaving the entire overhead costs of newly constructed storages, largely as yet unpaid

for, to be borne by the acreage of stand-bys. Even these men had deemed it necessary to greatly reduce the area planted; and the burden was greater than could reasonably be carried. Therefore, the financing scheme for paying off indebtedness fell behind in its schedule; and dragging payments were the order in most of the newly formed associations.

1. Reasons for Organization

The reason that a dealer should institute cooperation becomes apparent when the characteristics of the sweet potato industry are considered. In order to furnish the grade and quality of sweets demanded by the market, it is necessary to have a storage suitable for curing the crop. Such a storage is further necessary to provide for holding the product until markets are favorable for selling. The individual farmer hesitates to invest the necessary money in a private storage if he is not located in proximity to a market, local or dealer, so that he may sell his crop without risking entry to the shipping field.

The position of the dealer is likewise difficult. He must depend upon the product from a great variety of individual storages and upon the willingness of enough growers to sell at times when the market is favorable to enable him to ship in carload quantities. Under these circumstances, the supply is neither uniform nor dependable. The result is that dealers in large commercial production areas usually own their own storages, buying in the autumn and holding until they see fit to sell. They sometimes store for individual growers at an established rate per bushel; but even this method gives them a degree of control over the marketing of the crop belonging to those for whom they store.

In areas where the industry is new and its future uncertain, a dealer

feels that he would be taking considerable risk in investing the necessary funds in a storage for which there might be no crop in a year or two. The Decherd dealer referred to observed that climatic and soil conditions locally were favorable to production of sweet potatoes and desired storage facilities for sweets grown on his own land, as well as for rendering it safe for farmers in the surrounding country to develop the industry. Under these conditions, he considered it a safer policy to develop storage on a cooperative basis. With a large number of farmers holding a direct financial interest in the house, the incentive to continue the industry was much stronger.

It should be said to the credit of this dealer that he has strengthened the cooperative with his ability and influence from the outset. In contrast to this are to be found, throughout the state and country, many examples of similar cooperative developments instituted by dealers, who after the industry was established, either left the cooperative and bought competitively, or took over its property, through purchase, thus using the disheartened state of members at a particularly depressed period to eliminate all competition and place the marketing of the commodity involved entirely within his control.

2. Difficulties Encountered

The local county agent, observing the success of the Decherd cooperative, spread news of it to other farmers in Franklin County, and even to those in other counties. In fact, he was instrumental in rapidly organizing many similar associations, several of which were located at points where local conditions did not warrant the development of the sweet potato enterprise.

The houses were all built according to specifications recommended by the United States Department of Agriculture, and show great similarity, as may be seen from the series of pictures, Figures 10 to 22. They vary in capacity from 8000 bushels to 15000 bushels, but most are supposed to hold 10,000 bushels to 12,000 bushels, it being possible to crowd in more in case of necessity. The average cost was about $5000. It was notable that in several instances economies in the matter of obtaining a lot were effected. In several instances, lots were rented from the railroads over which shipments are made. The cost in this case was small, about $5 per year. In one instance the local merchants gave a lot. However, in several instances, high prices, as much as $500 or $600, were paid for small lots, thus increasing the overhead.

In discussing essentials to the success of cooperative grain elevators, Filley emphasizes three of the principles of the Rochdale Pioneers, an early group of successful English cooperators. (1, Filley, Cooperation in Agriculture, p. 74.) These three principles seem equally applicable to cooperatives storing and marketing sweet potatoes. They are:

1. One man, one vote.
2. Dividends on stock limited to current interest rate.
3. Division of profits in proportion to patronage.

The Decherd group of cooperatives were organized in accord with the first of these principles. The second has never yet become an important factor, since dividends are still almost uniformly taken up in reducing the initial indebtedness. But the third principle was only partially followed; and much trouble has arisen in consequence.

It is true that the seasonal pool, which was the original operating plan of all the cooperatives in this group, does divide returns among

Storage Houses of Decherd Group of Associations.



Fig. 10. Decherd.



Fig. 11. Cowan.



Fig. 12. Winchester.



Fig. 13. Belvidere.



Fig. 14. Flintville.



Fig. 15. Estill Springs.



Fig. 16. Tullahoma.



Fig. 17. Manchester.



Fig. 18. Wartrace.



Fig. 19. Sparta.



Fig. 20. Algood.



Fig. 21. Jasper.



Fig. 22. Soddy.

members according to the respective quantities furnished for sale. However, a flat rate per hamper, usually 15 or 20 cents, was charged for storage; and this constituted the association income. The usual agreement was that the whole surplus remaining after payment of operating costs was to be applied directly to the reduction of the loan made for building the storage.

Now, when the storages were constructed, the total cost was, in most cases, financed by local banks which took the notes of members, usually in the amount of $100 or $50, as collateral. Thus, when the income from storage charges paid by a part of the membership were applied to the reduction of the whole loan, the members who had stored potatoes felt that they were paying the debts of those who stored none. In this they overlooked two essential points: first, that they had received full value for the charges paid for storing; second, that they had received the benefit of having storage available, which would have been impossible without the financial backing of the members who did not store, and for which the latter received no service benefit, since they stored no potatoes. These two considerations are at least a partial reason why the actual grower members should not have become incensed. However, there is an element of injustice involved; and it is not surprising that a group disheartened by small returns should nurture this excuse for dissatisfaction.

The roots from which sprang this unfortunate situation developed in the process of membership selection and took two forms: first, the merchant or business man who took a share in the association merely to help the project along and who was not a grower in any sense; second, the farmer who took a share and entered the industry, then received small returns and ceased growing the crop. Funds were in such demand to start the projects that doors were thrown wide open; and whoever would take a share and fur-

nish a note that the bank would accept was taken in. More caution and selectivity at this stage would have been handsomely rewarded in the trying years that followed.

The first year there was widespread ignorance of how to grade and pack for storage. Farmers were of the opinion that to dump everything into the hampers, field-run, and store it was the quickest and best policy. They failed to take into account that they would thus be forced to pay storage upon a large part of the crop which was fit only for stock feeding, that potatoes not carefully placed in the containers would settle and leave slack space upon which storage was payable, and that injured or diseased potatoes would spoil and affect those next to them, thus causing a heavy shrinkage upon which they must pay the usual storage charges. When, in addition to low prices the first year, they found that in many cases not more than one-half the potatoes upon which they had paid storage were salable, the blame was placed everywhere but upon their own mistaken policy. This condition has improved from year to year with hard experience.

Those producers who were wise enough to leave unsalable potatoes in the field and to carefully grade those stored, and who placed the potatoes in containers in such a way that there was little shrinkage, had so much less work to do in regrading and paid so much less storage per bushel sold that they were better satisfied with the new enterprise and have tended to continue in it.

Several of the associations entered the field in 1926 and in that year marketed through the Federated Fruit and Vegetable Growers' Association. The inexperience in field grading already discussed was emphasized by the insistence of this marketing agency upon conforming to United States grades, which, it is thought by many, are too strict to be suited to the Nancy Hall variety, the variety grown by all organizations in this group. The result

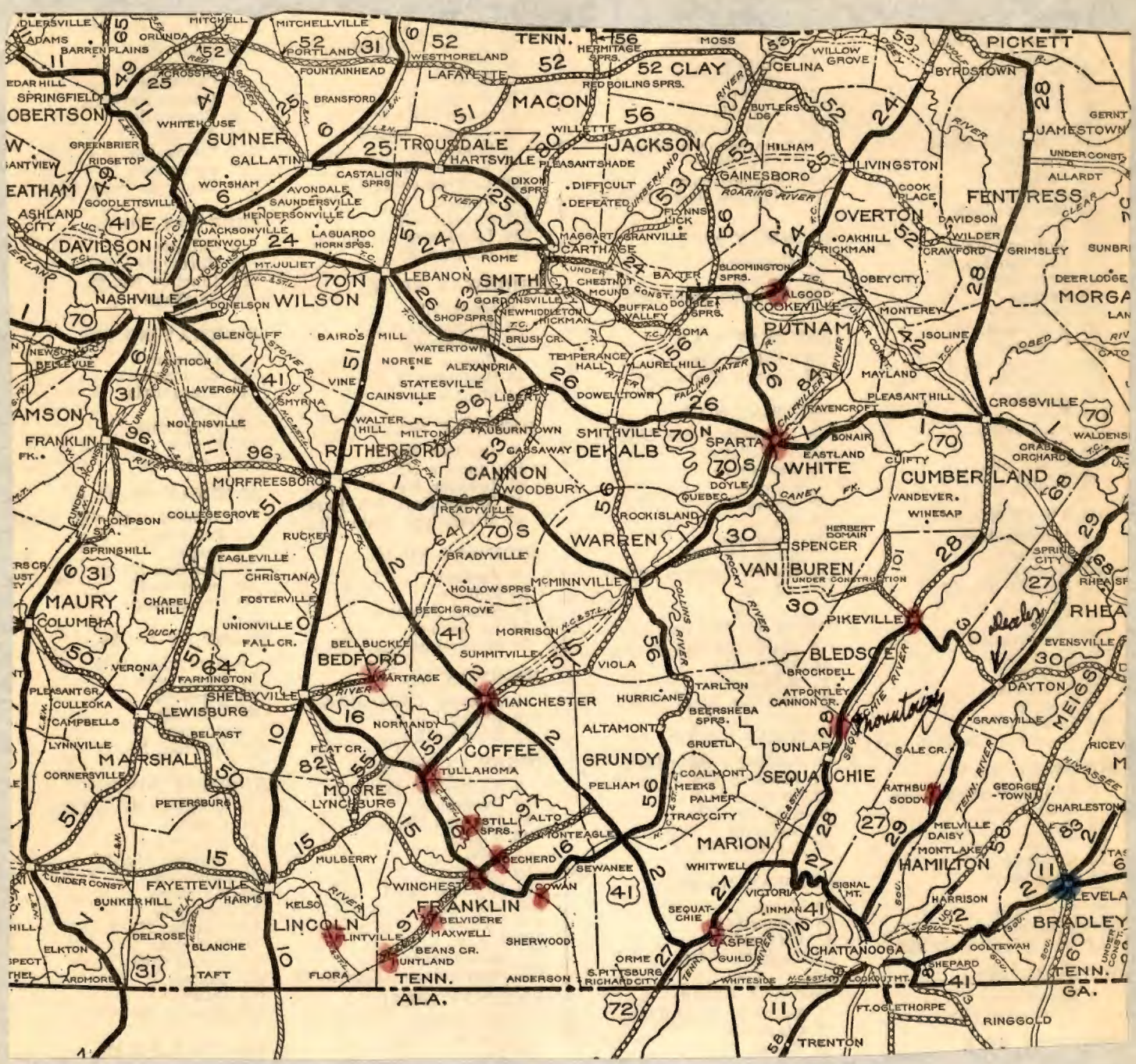
was dissatisfaction with the Association on the part of several of the cooperatives, though others found it satisfactory and regretted that the Association found it unprofitable to operate in a section with such small production.

The seasonal pool was a new idea to most growers. Few could finance their own operations and advances were made, in many cases, as soon as part of the crop had been sold. There was much impatience at the long delay in obtaining final settlement.

All in all, interest in growing sweet potatoes declined and acreages were greatly reduced. Despite the average capacity of 10,000 bushels to 12,000 bushels, it was found that in 1928 and 1929 only 2,000 bushels to 5,000 bushels were stored in most houses, while some fell still lower. The Sparta house did not open at all for the 1928 crop, many selling "green" and leaving so few to store from the greatly reduced area under the crop that it was not thought worthwhile. However, it reopened in 1929.

3. The Individual Associations

On Map 31 are shown the locations of those associations visited in the course of a field trip designed to gather information upon the cooperative marketing of sweet potatoes in East and Middle Tennessee, and here considered as the "Decherd Group" because of the influence that the Decherd association had in their organization. It should be mentioned that associations were organized at several other places through the same influence, but are not shown on Map 31 since they were not visited. Herewith are presented salient characteristics of the associations visited, together with the county in which each is located and the year in which each was organized.



Map 31. The Decherd Groups of Sweet Potato Associations.

(1) Decherd, Franklin County - 1922 -

(a) Organized at the right time to take advantage of high prices occurring a few years later.

(b) Skillful guidance and leadership by a man acquainted with the production of sweet potatoes and with the markets, without charge until the house was paid for.

(c) A carefully selected board of directors which has always held monthly meetings and carefully considered association policies.

(d) Continued production, usually nearly at house capacity.

(e) Competition from early Irish potatoes.

(2) Cowan, Franklin County - 1924 -

(a) Poor grading previous to storage in early years.

(b) Greatly reduced production and loss of interest.

(c) Suspicion that one most active in organizing desired to market the potatoes at an advantage to himself.

(d) Instrumental in uniting several local houses for a profitable sale to a Chicago dealer early in the history of the group.

(3) Winchester, Franklin County - 1925 -

(a) Promotion with the idea of quick profits.

(b) Poor financial condition.

(c) Pooling discontinued.

(d) Falling off in production and interest.

(e) Competition from livestock and early Irish potatoes.

(4) Huntland, Franklin County - 1925 -

(a) Lack of interest.

(continued)

(b) Good financial condition through early efforts of those most interested, free of charge.

(c) Early success followed by desertion of the industry.

(d) Competition of cotton, early Irish potatoes, and other crops.

(e) Pooling discontinued.

(f) Partial use of house for storage of Irish potatoes.

(5) Pikeville, Bledsoe County - 1925 -

(a) Early mismanagement and dissatisfaction.

(b) Finances have been allowed to drag, and much money is still due from members.

(c) Greatly reduced acreage.

(d) Association rented house to dealer for 1928, and disagreed with him over contract.

(e) Dealer built storage in 1929 and bought competitively, forcing the association to buy.

(f) Has strong support of a few men able to give good financial backing.

(6) Belvidere, Franklin County - 1926 -

(a) Organized because Huntland was succeeding financially.

(b) Helpful direction and influence of local merchant.

(c) Greatly decreased production.

(d) Tendency to use part of storage for Irish potatoes and considering installation of refrigeration plant in part of house for convenience of local farmers.

(e) Pooling discontinued.

(f) Strong competition from early Irish potatoes and livestock - no need for developing sweet potato industry. Irish potatoes

(continued)

preferred because returns are quicker and because can take two crops from the land.

(g) Best constructed house visited. Kept up well.

(7) Flintville, Lincoln County - 1926 -

(a) Influenced by success at Huntland.

(b) Strong financial policy — each member gave note of $100 and paid it or paid $30 on it and put remainder in hands of bank, releasing the association from all indebtedness the first year.

(c) Pooling discontinued.

(d) Association continued largely as a convenience for members and others, all storing in small quantities.

(e) Competition of cotton.

(8) Estill Springs, Franklin County - 1926 -

(a) Development by county agent with impression given that farmers could make money quickly.

(b) Inefficient management and high operating costs.

(c) Lack of interest and decreased acreage.

(d) Pooling continued.

(e) Poor financial condition.

(9) Tullahoma, Coffee County - 1926 -

(a) Organised with the expectation of profits because houses in Franklin County were doing well.

(b) Outside the region of most favorable soils for sweet potatoes.

(c) Guided largely by local business man. He was striving to bring back the industry in 1929.

(d) Indications that might be operated on dealer basis.

(continued)

(e) Competition of tobacco.

(10) Manchester, Coffee County - 1926 -

(a) Outside area of most favorable sweet potato soils.

(b) Best conducted storage visited.

(c) Manager very careful about field grading before storage. Lives in part of storage house through winter and gives it excellent care. Also does all possible to encourage cooperation and good practices.

(d) Manager's rooms serve as sort of office and meeting place where matters are discussed — apparently a good idea.

(e) Some lack of interest.

(f) Operating costs a little high.

(g) Finances in poor condition.

(h) Competition of tobacco.

(11) Wartrace, Bedford County - 1926 -

(a) Organized because of successful associations in Franklin County.

(b) Loss of interest and diminished production.

(c) Pooling discontinued in favor of trucking to local markets.

(d) Movement on foot to revive interest in 1929.

(12) Sparta, White County - 1926 -

(a) Organized with expectation of profits.

(b) Difficulty in collecting from farmers disappointed in results the first year. Legal action taken by association, without success because of difficulty in finding jury not prejudiced against this association policy.

(continued)

(c) Great dissatisfaction and very small acreages.

(d) House closed in 1928.

(e) House reopened in 1929.

(f) A movement to clear up debts and go on with association began in 1930.

(13) Algood, Putnam County - 1927 -

(a) Early manager believed in developing the favorable local markets in coal mining towns, and in trucking to Nashville and Knoxville, the prices in the latter cith being good because of high freight rates from other sections.

(b) Differences arose over sales policy.

(c) New manager was put in charge and policies changed.

(d) Considerable dissatisfaction and future uncertain, though the industry is likely to live because of favorable markets.

(14) Mountairy, Sequatchie County - 1926 -

(a) Pooling continued.

(b) Shipment by rail supplanted by trucking to Chattanooga.

(c) Efficient manager.

(d) Good cooperators.

(e) Successful association.

(15) Jasper, Marion County - 1926 -

(a) Prefer not to pool.

(b) Shipment by rail supplanted by trucking to Chattanooga.

(c) Efficient manager.

(d) Minor difficulties among members, arising from price cutting.

(continued)

(e) House entirely paid for.

(f) Successful association.

(16) Soddy, Hamilton County - 1926 -

(a) Poor cooperation.

(b) Bad financial condition.

(c) Good nearby market in Chattanooga discourages pooling.

(d) Indications are that will be taken over on a dealer basis.

(17) Cleveland, Bradley County - 1926 -

(a) Inactive organization.

(b) After organizing, rented an old building unsuitable for storage.

(c) Had some difficulty because farmers did not know how to grade and handle.

(d) Decided too expensive and too much trouble and never built storage.

(e) Good local market in Cleveland and some farmers built their own storages.

4. Observations, Conclusions, and Suggestions

From a study of the information obtained in interviews with managers, growers — both members and non-members — county agents, and business men upon the Decherd group of cooperatives, several facts are outstanding, and a number of conclusions may be drawn and suggestions made.

Overlapping - It appears that there is some overlapping of territories, especially in Franklin County where the local associations are in close

proximity to one another (see Map 32). Possibly overhead could have been reduced by more careful planning and resultant placing of houses only at the most strategic points.

Competing Crops - There is a widespread preference for growing other crops, such as early Irish potatoes, cotton, or tobacco, rather than sweet potatoes, in various sections of the area covered. The chief reason for such preference was usually that returns were quicker. The trouble of grading, storing, and regrading, with the irksome wait for settlement, meet with disfavor from farmers, especially from those accustomed to a cash crop the returns from which are immediate after harvesting. The double crop from land devoted to early Irish potatoes is also an important influence in sections where that crop is grown.

Financial Policies and Pooling - In order to strengthen cooperation in the sweet potato industry in this area, it seems that financing and book-keeping should be so organized as to return to the grower as much of the money from early sales as possible within the shortest time compatible with good business practice. In organizations dealing with other commodities returns are often immediate upon delivery. Such an arrangement involves credit and might be unsafe with so perishable a commodity as the sweet potato.

The question of immediate returns raises that of the adaptability of seasonal pooling to organizations of men always pressed for money. It is the consensus of opinion of those interviewed that quantities handled are too small to warrant the extra book-keeping and supervision necessary in pooling returns on each car. However, this system would offer quicker settlements and would eliminate inequalities arising from variation in the quality of stock furnished by individual producers. Even the advisability of any pooling practice may be questioned in growing sec-

tions which are in close proximity to good local markets. The decision may rest upon whether or not members can eliminate the pool and still avoid price cutting injurious to one another.

Meticulous care should at all times be exerted to avoid wasteful expense in operation and to keep down overhead. This does not mean that it is advisable to follow a policy of false economy in order to save a small sum.

A further problem in financing concerns the payment of the original cost of the storage. The idea upon which rested the financing system followed by most of associations was that the easiest way to pay for the house was to utilize income from storage charges, thus removing individual burdens. It has been shown why this system failed in the case of most houses — the farmers ceased growing sweet potatoes or lowered their acreages. Those houses which are in the best condition financially are of two classes: (1) those which continued growing sweet potatoes, as Decherd; (2) those which followed an ironclad financial plan whereby the house was paid for early, as Flintville.

From the results in the associations considered, there appear to be good grounds for recommending that one of the following policies be followed: (1) Members should agree to grow at least a certain minimum acreage of sweets until the house is paid for;[1] or (2) each member furnishing a note as collateral should agree to take up his note within one year, whether or not the returns from his crop are sufficient to effect this. These policies may seem difficult to carry out. If there is not sufficient need for an organization felt by growers to create a willingness to enter the project with the idea of seeing it through, it is not yet time to organize.

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[1] Section 11 of the Marketing Agreement recommended to cooperative associations in Tennessee, mimeographed copies of which are furnished them by the Extension Service, is particularly weak on this point.

Membership - Membership and financing are closely related, since the members must finance the project. The advisability of admitting business men who grow no sweet potatoes as members, merely to gain financial backing and influence, is debatable. In many cases it has proven helpful, these men taking an active part in directing financial policies. However, there is always danger of the feeling that the organization is not the farmers' own project. There is also danger of keen business men usurping control and turning the association to their own profit.

In many towns business men, and particularly bankers, have tremendous power over the rural population. If the antagonism of such men can be avoided and their aid enlisted through membership, it may be best.

Nevertheless, the association strong enough to stand on its own feet, without the necessity of catering to the whims of individuals, should always be more vigorous.

One of the best methods of building a permanent association seems to be for a few good cooperators to start together, achieve something of real benefit to members which will be sought after, and thereafter to take in only those new members whom they are certain can be depended upon and who will fit into the organization well. Difficulties multiply when the membership is large and heterogeneous. Small membership has some financial disadvantages; but slow strong growth is always preferable to sudden springing up with no background of underlying need and determination to make the organization a success.

Directors - The board of directors is of great importance. It should be composed of men thoroughly imbued with the ideals to be striven for and of active interest that will prompt their presence at all meetings and their best efforts to direct. The Decherd directors exemplify this in their monthly meetings in contrast to those of the majority of the associa-

tions in the group, who were so little interested that they could scarcely be gathered for the regular annual meeting. Frequent conferences and activity in directing association policies are greatly to be desired. Often, there have been so many directors as to be hard to assemble, e.g., the Jasper Association has eleven directions. Smaller numbers and greater interest are more conducive to success.

Contracts - The advisability of having members sign contracts is another question concerning which justifiable doubt exists. Several associations operate successfully without contracts; others have contracts which have been broken. If they are used, it seems advisable that they be as simple and as easily understood as possible. Such contracts satisfy the grower much better than those too complicated to be comprehended. In dealing with members who are discontented, it has seldom proven successful to try to enforce contracts. Such a state of affairs tends to establish the view that, as with the pooling policy, the system followed should be readily adaptable to local conditions, allowing sales outside the association if this tends to a satisfied membership, and dealing with other problems in like manner. Benefits and returns, rather than rules and restrictions, should occupy the attention of those serving the association.

Grading and Packing - The costs of grading out sweet potatoes from storage and hampering them for sale was, in the case of several associations which had taken note of the matter, believed to average about 3¢. Two systems of handling this operation were found. Several associations pooled all grading and packing expense; others charged the expense for grading each man's crop directly to him. The latter system has the advantage that it places a premium upon careful field grading. The man who

does poor grading in the field pays the penalty in heavy grading expense at marketing time, in addition to an added storage charge for the space occupied by the poor stock stored. Where grading and packing costs are pooled, there is a tendency to laxity in field grading. Each grower knows that he must pay his share of costs incurred by those who are lax and feels that he is "getting even" by being lax also. This is absolutely unsound reasoning if he considers his extra storage costs; but it seems to be the natural reaction.

Under these circumstances, the practice of charging each man with his individual grading costs seems advisable. One method by which this is done is to allow each man to grade out his own potatoes. The disadvantage in this system is that each man is apt to try to place as large a part of his crop as possible in the No. 1 grade. The grade suffers and is likely to be uneven, some being more conscientious than others. Control of grading by the association with direct charges to each farmer for the costs on his crop appears to be best.

In general, it was found that the associations were grading well, though few were conforming to United States standards. The opinion was repeatedly expressed that there is too much waste in grading Nancy Halls when United States grades are adhered to. The majority of both dealers and managers of cooperatives who were interviewed believed that the receivers on city markets were not particular that such grading limits be followed. They further stated that the United States grades do not fit the variety, especially in years of exceptional weather conditions. These views were substantiated by a Cincinnati dealer, as shown in Chapter VI. It might be profitable to investigate the possibility of developing a revision of standards to fit the Nancy Hall variety. Such a revision might possibly take the form of elastic standards to be applied in accordance with the characteristics of the crop for a given year.

Types of Operation - Two methods of operating were found suitable for the storages visited: For the ones under conditions similar to those at Decherd and Mountairy — good soil and good cooperators — continued commercial operation under the pooling plan seemed imminent. For houses located where other crops are more profitable and are therefore preferred by growers, as at Belvidere and Flintville, the operation of the house for the convenience of local farmers in storing sweet and Irish potatoes, and even for the cold storage of the more highly perishable products, for home use and individual marketing, without pooling, gives promise of being a worthwhile use.

Those growers in close proximity to such markets as Chattanooga and Cleveland are tending to individual storages from which they can market in small quantities at their own convenience. The tendency seems economically sound.

Uniting the Individual Associations - From early reports of the organizations and from the provisions of by-laws, it is evident that the organizers of many of these associations looked forward to uniting in one large organization. Unsuccessful efforts at unified selling were made on the part of some in the combined sales to a Chicago dealer, mentioned under the Cowan association, and in those through the Federated Fruit and Vegetable Growers. The results of these attempts have not given promise of consummation of the plan.

There is a strong suspicion of large organizations noticeable on the part of growers nearly everywhere. However, the consensus of opinion among managers and the more progressive growers in those cooperatives operating on a commercial scale was that the individual associations would benefit greatly through united effort. There was some contrast in ideas as to how large this organization should be. Some believed that a state

association, or one of even wider control, could do most good; others favored an organization within the Decherd group. All agreed however that this last arrangement would form a starting point.

Questioned as to a suitable man to head such a united sales organization, it was noteworthy that all turned to the Decherd dealer who originated the movement and has made it a success in his own community, as well as having handled most of the potatoes for several of the other associations. This dealer was not at all inclined to push such a movement, lest others should suspect him of doing so for his own benefit, though he admitted that he believed the individual cooperatives would profit by the arrangement. He further favored a state or national association, purely for the exchange among its members of information on the trade, not a sales agency, in order that the markets might be worked more successfully and with less unnecessary competition.

It is not likely that such a movement will find favor with the associations in the Sequatchie Valley (Pikeville, Mountairy, and Jasper) or with the Soddy organization, these being in a position to take advantage of the growing Chattanooga market. Should sentiment for uniting sales develop from within several of the associations in the Decherd group, the movement should prove beneficial.

Association Success and Leadership - For a truly successful and lasting cooperative organization there must be results, results in the tangible form of benefits to members which non-members cannot acquire. Even with such an organization, hard years come; and it is very difficult to build any cooperative association that will withstand a continued period of low prices. In the building of such an enterprise, the man at the head is the center of support upon which all other factors depend. He must command the confidence of the people; he must work hard and con-

stantly in the interests of the association; and he must usually be willing to do more than he receives compensation for, according to standards set in other types of business. Most successful cooperatives of the present are built about such men. Leaders of such caliber that they can resist the temptation to desert the association for competitive private business, or to turn the associations with which they are affiliated to their private gain, are rare; and fortunate is the association which finds a man so loyal.

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CHAPTER VIII

FUTURE PROSPECTS FOR COOPERATION IN THE SWEET POTATO INDUSTRY IN TENNESSEE

Thus far, the importance of the sweet potato among vegetable crops, the factors tending to limit and to localize its production, both in the United States and in Tennessee, the progress of the industry in these political divisions, and the rapid rise in importance of Tennessee as a commercial producer have been discussed. The valuable character of the sweet potato as a cheap source of human food, its present and potential place in the American diet, preferences of the consumer, and possible methods of increasing demand have been elaborated. The preceeding chapter is devoted to the existing conditions in a group of small sweet potato cooperative associations, largely started without sufficient basis of need, and in many individual cases located in areas unsuited to commercial sweet potato production.

There remains the consideration of cooperative marketing of sweet potatoes in the great commercial production area of West Tennessee, and of the probable future of cooperation in this enterprise throughout the state. These matters are chiefly ground for future investigation.

Questionnaires were sent to dealers, growers, and cooperative associations in the commercial area referred to, and some data obtained. They were hardly sufficient to serve as bases for definite conclusions. However, indications are that cooperation has been tried out in this important region and has given place to competitive buying by large dealers. The cash market offered by such shippers, and the smaller risk

and effort involved for the producer seem attractive to him. In fact, questionnaire returns from the commercial producing areas throughout the state indicate no very marked success for cooperation. More detailed investigation is necessary to a comprehensive understanding of the situation.

From the standpoint of management, five types of houses appear to have a place in the respective kinds of producing areas to which they are suited:

First, the small individual house, especially adapted to the producer situated near a good local market in which he wishes to distribute his crop in small quantities at his convenience.

Second, the small cooperative house for the convenience of a community in storing supplies of sweet potatoes chiefly for local use, and possibly for similarly storing other kinds of produce.

Third, the large individual house in shipping areas for the grower with sufficient acreage to warrant individual supervision of curing, storing, and perhaps shipping to terminal markets.

Fourth, the large dealer's house in commercial production centers, for the storing of crops bought at digging time until market conditions are favorable for sale.

Fifth, the large commercial cooperative house in centers of heavy production for shipment to market where growers feel a need of concerted action to accomplish desired ends in marketing.

Any one of these types may enter the field of commercial storage for growers not interested in the house.

The question of whether or not to establish a commercial storage should be decided entirely upon the individual merits of the case, and should rest largely upon the true desires of the growers and upon their

willingness to see the enterprise through to success. Certainty in the all-important factor of sufficient volume can be vouchsafed in no other way. Under no circumstances should such an undertaking be entered upon under the temporary stimulus of a campaign conducted on the lines of high-pressure salesmanship. Whether the cooperative movement considered is of wide jurisdiction or merely of local character, the motivating force should proceed from within, rather than from without. And in any such endeavor, departure from the over-worked system of "educating" the farmer to practices which are recognized as good, but for which he seldom receives sufficient remuneration to justify the effort, and concentration upon securing returns should be the governing policy. If the reward is forthcoming, the necessary effort is certain to appear.

For further study, the field is wide and offers great opportunity for those interested in continuation of this investigation. The whole subject of prices and their interrelationship with phases of the industry already covered has been left almost untouched. Likewise, the question of utilization of a surplus when it occurs, by such means as manufacture into by-products, dessicating, canning, or use for livestock feeding, affords sufficient promise to warrant detailed investigation. Dealers and their methods, Tennessee shipments, comparison of variety preferences in individual markets, contrast in consumption between colored and white population in various walks of life, and comparison between the social classes within these color groups offer ample opportunity for satisfaction of the individual preference in subjects for research.

One characteristic of the whole sweet potato industry is outstanding and should be borne in mind by those interested in its future development: The sweet potato is a crop that is easily grown over a wide area; and

any marked rise in price is certain to stimulate production in new areas and increased yields in old. Such a crop, over a long period, is destined to average low in price; therefore, the problem of the investigator who would render real benefit to the industry lies in the field of organized marketing.

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