

## CHAPTER XI.

## CULTURE AND CURING OF TOBACCO IN NEW YORK.

The culture of tobacco in New York began in Marcellus township, Onondaga county, in 1845, where it was introduced by Chester Moses and Nathan Grimes. In 1846 Mars Reading, of Salina township, raised 10 acres, and others were engaged in its culture in different parts of the county. In 1855 the county raised 554,987 pounds, or about 1,178 pounds to the acre. In 1856, or about that time, agencies for New York houses were established at Syracuse, and by 1863 the culture of tobacco had grown to large proportions in several counties.

During the early years of its culture the product was put up in boxes of various sizes, usually dry-goods or shoe cases, purchased second hand. There was no system, and neither grower nor buyer knew what kind or how much of any grade of tobacco each box contained. In the absence of inspection, buyers were compelled to rely each upon his own judgment as to grades and values, and few farmers had the knowledge of what was required for proper curing. The industry was a new one, the character of the product uncertain, and the profits of its culture were more frequently realized by the trader than by the farmer. Many new varieties have now been introduced, including Cuban and Spanish tobacco, together with some hybrids of considerable value, and the product of the New York tobacco districts now approximates that of the Connecticut valley.

Between 1845 and 1863 prices were subject to great fluctuations, often 5 or 6 cents per pound during the season. No statistics have been kept as to either price or production for those eighteen years, but prices ranged from 5 to 30 cents, the market sympathizing with the values in the Connecticut markets, and it is estimated that by the year 1863 the production had increased to about 6,000 cases of 400 pounds, net, each. The great bulk of the crops up to this time had been sold to local speculators and to manufacturers at from 5 to 18 cents, and sometimes, when the market was excited or cigar tobacco was scarce, as high as 20 to 30 cents.

In 1862-'63-'64 tobacco was very high, 30 cents being paid for some, while 25 cents was not uncommon. In 1863 prices fluctuated violently, falling at one time to 8 and 10 cents, and from 1864 to 1870 prices varied from 5 to 25 cents. In 1870 tobacco was sold as high as 30 cents, and much of the product was sold from second hands at from 27 to 35 cents. The crop of that year was excellent.

The crops of 1872 and 1873, being large, brought low prices. In 1872 prices ranged from 7 to 19 cents, but most of the crops were sold at from 10 to 12 cents. The crop of 1873 brought from 5 to 12 cents. Since that year prices have varied considerably, ranging from 4½ to 20 cents.

The quantity of tobacco produced is increasing, and is of a better quality. In 1879 prices ranged from 5 to 16 cents for Big Flats Seed-Leaf, while domestic Havana brought from 10 to 18 cents. The quantity produced in 1879 was about 6,000 cases on Big Flats and vicinity, and 10,000 cases elsewhere in the state. The product of the Big Flats district from 1858 to 1863 is estimated to have been from 1,000 to 2,000 cases; from 1863 to 1866, from 2,500 to 3,000 cases; and from 1866 to 1878, from 3,500 to 4,000 cases.

The prices paid for Big Flats tobacco have been higher than those paid in Onondaga county, except for domestic Havana, which is not raised on Big Flats. New York raises only seed-leaf and the foreign or domestic Cuba tobacco, used mainly for cigars.

The chief tobacco regions are fifteen townships in Onondaga county, eight in Cayuga, seven in Oswego, five in Madison, three in Tompkins, seven in Chemung, three in Steuben, two in Schuyler, one in Monroe, one in Genesee, three in Wayne, four in Tioga, and several in Orleans, with the eastern tobacco region of New York, which forms part of the Housatonic valley, and is described with Connecticut.

## CLIMATE.

The temperature at Ithaca during a period of over fourteen years of observation showed a mean of 48.2 degrees, and the average annual rainfall during eight years was 30 inches. The prevailing winds during June, July, August, September, October, and November for the same period were from the northwest. The mean average temperature of Cayuga for ten years was 48.93 degrees, and the average range 88. The prevailing winds in June, July, August, September, October, and November were from the south. The mean average rainfall was 32.50 inches. Cayuga is 447 feet above tide-water. The town of Hamilton, in Madison county, from the record of eighteen years, showed a mean temperature of 44.89 degrees, and for fourteen years had an average annual rainfall of 35.77 inches. The prevailing winds for June and July were from the west, and those of August, September, October, and November were from the northwest. The average mean temperature of Onondaga for sixteen years was 47.18 degrees, the average rainfall for the same time 31.40 inches, and the prevailing winds were from the west. At Rochester the mean temperature of fourteen years was 46.54 degrees, and the average fall of rain 39.95 inches. During May, June, July, August, September, October, and November the prevailing winds were northwest. Rochester is 506 feet above tide-water. The summer climate of interior New York is tempered by the numerous lakes which are inclosed in its bounds. The city of Albany, on near the same latitude as the places named, had a mean average temperature for twenty years, covering the same periods before cited, of 48.26 degrees. The average quantity of rain which fell was 40.80 inches, and the prevailing winds were from the south.

## COMPARISON OF RECENT TOBACCO CROPS.

The tobacco area of 1879 was greater than that of 1878 by 35 per cent., greater than that of 1877 by 50 per cent., and about equal to that of 1876, and the yield per acre is reported as about the same for the different years. The quality in 1879 did not differ from that of 1878, but was better than that of 1877, and was about the same as that of 1876, being sound, of good quality, and thick in leaf.

## VARIETIES OF TOBACCO.

A great many varieties are grown, as the Connecticut Broad Leaf, Ohio Broad Leaf, Connecticut Long and Narrow Leaf, Belknap Broad Leaf, Wellington Leaf, Deer's Ear, Duck Island, Wilson's Hybrid or domestic Havana, Spanish, Cuba, and Maryland Broad Leaf. The seed-leaf is raised more than any other. Of this variety all the kinds mentioned are represented, the Connecticut being perhaps the most extensively cultivated. The domestic Havanas come next, and both kinds are almost exclusively used for cigar fillers and wrappers, while the lower grades of seed-leaf are quite largely exported. The Glessner and Pennsylvania Broad Leaf are most highly commended in the reports, and are beginning to equal the Connecticut Seed-Leaf in general cultivation. The seed-leaf varieties are, in general, large, drooping, and tall, but with much difference in the length and breadth of leaf. The Havana grows tall and slender, with leaves erect, short and round, and far apart on the stalk. There are many varieties of the Cuban tobacco, and the nomenclature is in inextricable confusion—one being called Cuba, another "Havana", and another Domestic Havana. The Havana is raised mostly in Clay township, Onondaga county, and is there said to come nearest to the true Cuban flavor. The distinction between these tobaccos is not difficult to point out. The seed-leaf is native, and then there are the foreign or Cuban varieties, all more or less changed by soil and by climate. The hybrids are supposed to be crosses between the Cuban varieties and the seed-leaf, and tend to supersede the foreign varieties, because, with as fine flavor, they will produce more. The Wilson Hybrid grows erect, with broad, well-formed leaves, glossy, thin, and fine in texture. It is delicately organized, with veins and stems small and the ribs of moderate size. Mr. Wilson, who has experimented for thirty years in tobacco, tried the Cuban with moderate success, and from a western seed-leaf and Havana seed from the Vuelta Abajo district he obtained a cross which is the Wilson Hybrid. He claims a high rank for its flavor, color, and the excellence of the cigars made from it, its erect habit and tenacity of life under adverse circumstances, and affirms that it does not require as strong land as the seed-leaf. He frankly admits that it is yet an experiment, and the question is whether it will deteriorate and lose its flavor. Until 1880 it was raised only by three or four farmers beside Mr. Wilson, and by them only for two years; but in 1880 it was largely raised, with growing favor, in Onondaga and adjoining counties.

Haynes' Hybrid is similar, but darker in color, with the leaves thicker and broader. This variety has been raised for several years, although by a few growers only until recently. Within two years its cultivation has been widely extended. Both this and the Wilson will raise from 1,200 to 1,500 pounds per acre, although larger crops can be grown. Mr. Wilson raised 10 tons from 10 acres in 1878. More than three-fourths of the crop of 1881 will be of these two varieties. Both stand without injury the second sweat which the cigar manufacturers give their tobacco.

Much attention is now paid to cross-fertilization. Successful experiments with strawberries and other plants stimulated the same line of experiment with tobacco, and Mr. Wilson's is about the first systematic attempt to improve tobacco, although chance has developed some excellent varieties.

## GRADES OF TOBACCO.

In 1879 the grades of the product were reported as follows: Seed-leaf wrappers, 65 per cent.; binders, 25 per cent.; fillers, 10 per cent.; in 1869, wrappers, 50 per cent.; binders, 30 per cent.; fillers, 20 per cent. Havana tobacco being newly introduced, no data can be given.

The reasons for the increase of higher grades in the decade are better culture, handling, and assorting. The quality of the leaf is reported improved in burning qualities, the ash being whiter. Great care is exercised now in selecting soil adapted to produce a free-burning white-ash tobacco. Tobacco is grown much darker than ten years ago, the dark color being as much a desideratum as a light color in North Carolina.

## TOBACCO SOILS.

A sandy or gravelly loam, with soil deep, dark, and rich, is preferred, for seed-leaf especially. The timber growth of the lands most in use is beech, maple, pine, and chestnut. Where the growth is beech and maple the soils produce a very fine, dark, rich tobacco, but the growth is not so fine as when the soil is a very fertile, sandy loam, with a growth of chestnut and pine. No new land is used, and the product is not valuable. The soils cultivated in tobacco are generally of limestone or drift derivation. Clay and peat or muck soils are not adapted to the growth of tobacco of a good quality, and the light, friable, porous, sandy loams, well drained, dry, and warm, grow the best leaf. On these a rapid growth and early maturity can be secured. The pine and chestnut soils are from

6 to 20 inches in depth, and will bear plowing from 6 to 10 inches deep. While the best crops are raised on the fertile, sandy loams, very fine crops are also raised on the beech and maple lands, with basswood or linden and elm intermixed.

Much the larger portion of Onondaga, which is the chief and a fairly typical tobacco county, is on a limestone formation. The leaf grown on the sandy loams of the pine and chestnut regions and that grown on the strictly limestone soils, with a loose, friable loam and a growth of beech and maple, burn freely with a white ash, and has an excellent flavor, is rich in color, is of fine texture, and has a good body. The muck or peat-swamp lands and stiff clay soils produce a slow-growing tobacco, which lacks free-burning qualities, and the leaves are a dark ash. The sandy lands, dark and light, and the limestone soils, are those mostly cultivated in tobacco. The clays are stiff, moist, cold, and hard to work, the product often full of white veins, stiff and harsh, and burns poorly. About one-half of the soil suited to tobacco in Onondaga county is now occupied. Of the woodlands of this county most of the upland is adapted to its growth.

The underlying rocks in Onondaga, Madison, and portions of Oswego are blue limestone. In Manlius township, Onondaga county, there are large deposits of gypsum and water-cement limestone. Excellent free-burning tobacco is produced on the gypsum formations. Gypsum is used freely on tobacco lands with good effect. Red sandstone crops out in portions of Onondaga, but the lands on this formation are but little used for tobacco. The great salt belt also runs through the tobacco region. This belt has an underlying formation of red, soft shale, or "marking stone", upon which tobacco is grown with success. Much the larger portion of the crop of New York is grown upon limestone soils.

The soil of the Chemung Flats and of the Big Flats is a rich, deep, dark loam, sometimes mixed with fine gravel, and admirably suited to tobacco. These soils are made up of alluvial deposits, and differ in that respect from those of Onondaga.

#### TOBACCO MANURES.

Manures of various kinds are used on between 50 and 80 per cent. of the tobacco raised, and phosphates and guano are sometimes applied in the hill, about 200 pounds to the acre, at a cost of \$4 per acre. Tobacco-growers, however, are only beginning to experiment with commercial fertilizers. Generally fifteen or twenty, and often as much as forty loads of stable, barn-yard, and hog-pen manures are applied per acre, and the cost is estimated at from \$5 to \$40 per acre, a good authority placing the average at \$15. The improvement in quantity is estimated at from 25 to 75 per cent. in actual practice, according to the kind and quantity used, with an improvement in quality of from 40 to 60 per cent. The coarser portions of barn-yard manures are scattered on the field and plowed in, but the more valuable portions are made into composts, with ashes, lime, gypsum, and potash, to be applied in the hill, a handful being covered 2 or 3 inches deep in the center and the plant set in this. When it can be bought at all, stable manure is sold at the barn for about \$1 a load.

Bone dust, plaster, and lime have been used to some extent, but the concentrated fertilizers very little. These are sold at from \$25 to \$45 a ton. Many growers consider them hurtful to the burning qualities of tobacco, to the flavor, and, in any excess, to the growth of the plant; but there is a substantially unanimous opinion that well-rotted barn-yard and stable manures are the best fertilizers. Some planters have reported excellent results from commercial fertilizers, and adverse reports are to be taken with the allowance that growers have had but little experience with them. Lands, when manured, may be cultivated indefinitely in tobacco; without it, the best lands will be exhausted in three or four years.

For rotation the best crops of tobacco are raised after clover. Wheat usually follows tobacco after the second or third year, though often after the first. Clover is sown on the wheat and plowed under in June of its second year's growth, and the land is immediately planted in tobacco. The tobacco crop is also made to follow wheat, corn, potatoes, and other crops.

#### TRANSPLANTING OF TOBACCO.

When the leaves of the plants are of the size of a silver half-dollar, if a rainy season comes they are set out; but if the weather is dry, a season is sometimes made by making with a stick a hole in the hill about 4 inches deep, which is filled with water. Plants thus set out will stand any ordinary spring drought and grow at once. In general, farmers wait for a natural season, and, if it can be avoided, weak or spindling plants from a crowded bed are never set out. Plants are set in rows, 3 feet 4 inches apart and 18 to 22 inches in the rows. The soil is thoroughly manured in March and April, and plowed twice, once in April or May, and a second time in June or July, just before planting. The cultivator and the harrow are used after the second plowing to level and pulverize the soil. Six thousand plants of Connecticut Seed-Leaf are planted to the acre, the same number of Pennsylvania Broad Leaf, and eight thousand plants of Cuban tobacco. Transplanting begins about the 10th of June, and continues to the 10th of July.

#### CULTIVATION OF TOBACCO.

The cultivation of tobacco is performed with a cultivator between the rows twice or three times during the season, and each time the rows are carefully hoed out. The cultivator is started as soon as the plants have fairly taken root and commenced to grow. The plants are not hilled up, growers preferring flat culture. The hoe, however, is used to loosen the soil around them and to destroy weeds.

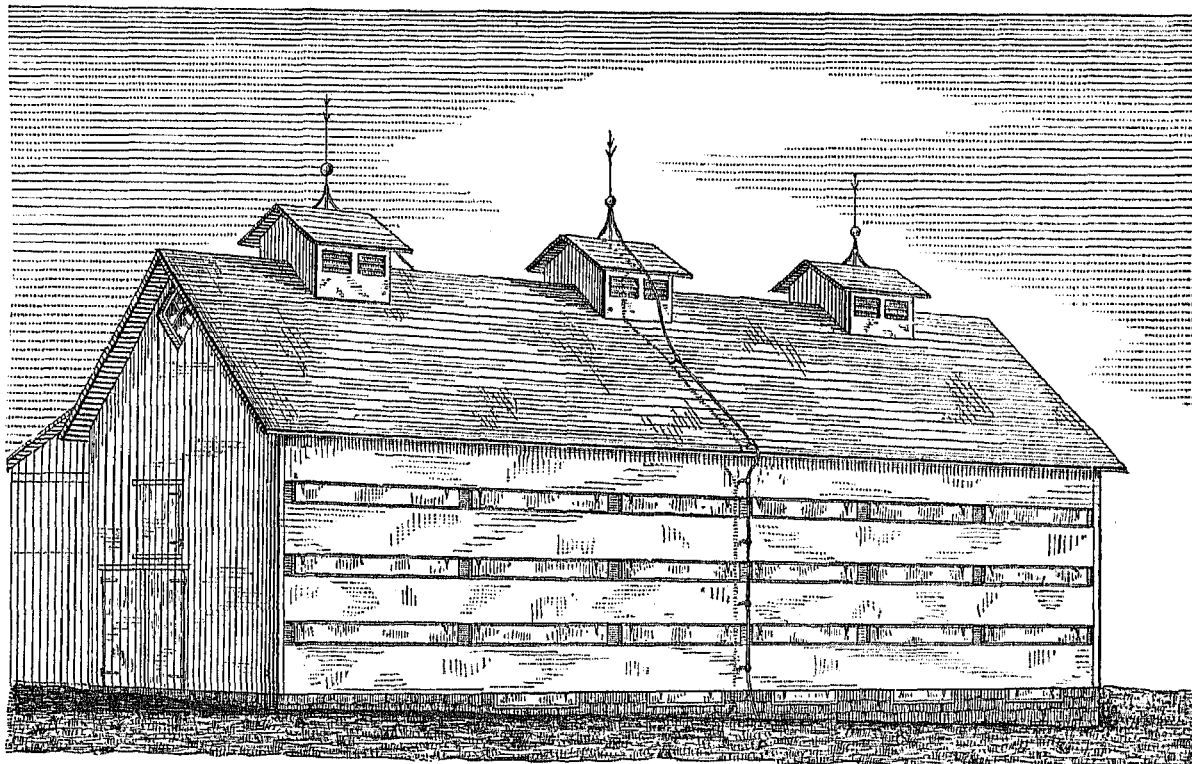
## TOPPING AND SUCKERING OF TOBACCO.

The best growers top low at from ten to fourteen leaves, estimating the gain from low topping at 25 per cent., and is commenced as soon as the blossom buds make their appearance. If the season is late, or the plant weak, a smaller number is left. Topping is now done much lower than formerly. Many, however, still top to as high as twenty leaves, and the result is late maturity, with small, imperfect top leaves. Seed-Leaf is topped fourteen days before cutting, but domestic Havana is allowed to stand thirty to forty days after topping. The time is varied as to both, however, by the season. Cutting is done from August 15 to October 10.

The suckers are kept carefully pulled out as soon as they are long enough to remove, and this is done as often as they appear. Worming is done at the same time.

## CUTTING OF TOBACCO.

Knives are generally used in cutting, though several appliances for cutting without injuring the plant have been tried. Many use a long-handled hatchet with a thin blade. Bending the plants, they are cut off with a stroke. The best time for cutting depends on the weather, and if very hot and dry this should be done after four o'clock in the afternoon. During the night they will have wilted sufficiently to haul to the shed by nine or ten o'clock the next morning. In mild or cloudy weather the plants may be cut at any hour. Most growers haul to the shed and then string on laths, and the latter method is growing in favor. A "horse" is made of scantling, 5 by 4 inches, and 6 or 7 feet long, one end on the ground, the other raised 2½ or 3 feet on two legs. In the raised end a slot receives one end of the tobacco lath, the other projecting forward. A knife, 5 to 7 inches long, sharply pointed and edged, with a socket at one end, is placed on the end of the lath, and by means of the sharp point from six to ten plants are placed on the stick. (a) The stick is then removed, and the knife serves for the whole crop. Laths cost \$1.75 per thousand, and with proper care will last several years. The sticks are generally removed from the "horse" at once to the wagon and placed on the rack. The rack is made the full width of the wagon, and as long as is convenient, and in width is 4 feet, or the length of a stick, and as high as the longest plants. The rear end is left open for convenience in loading. This is the most convenient and economical way of hauling, and exposes the plant to the least danger of injury.

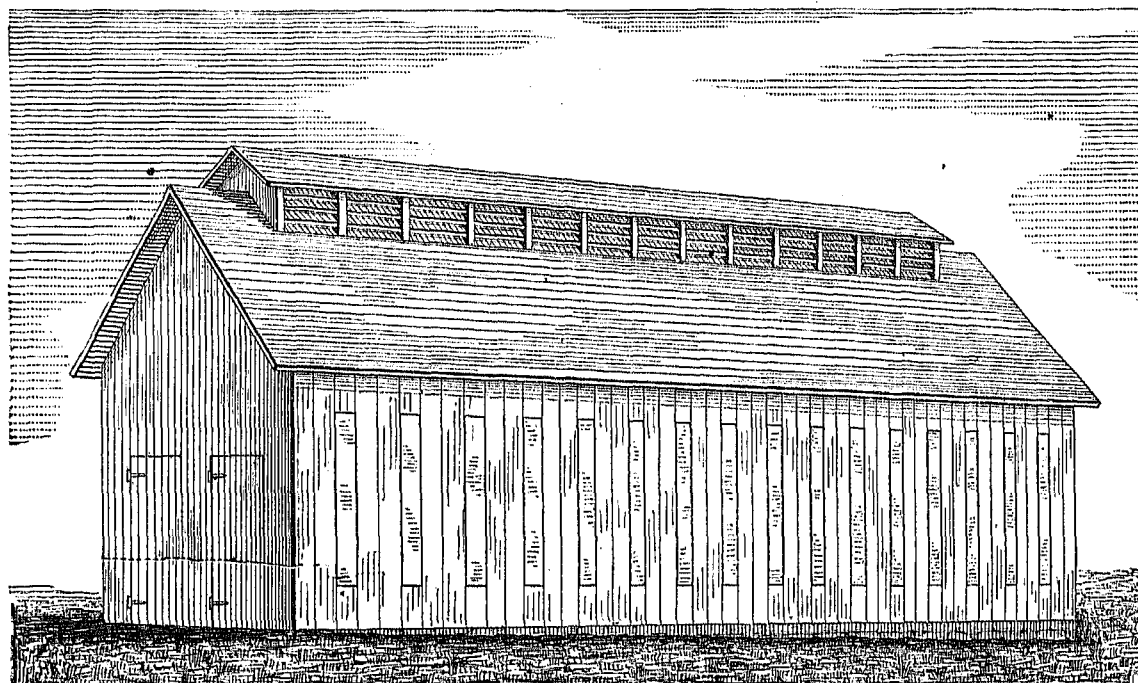


TOBACCO-SHEDS.

A description of one of the best barns or sheds in Onondaga will answer for a number of its class. It is built with well-laid stone foundation walls, with windows 4 feet long and 15 inches wide for ventilation and lap doors. On this foundation the building is erected, 24 by 80, or 28 by 100 feet, and 20 to 24 feet high, with tiers 5 feet apart.

<sup>a</sup> A cut in the chapter on Maryland, p. 91, shows a device for the same purpose.

This barn is built with gable roof, which sometimes contains ventilators, and doors are made in each end large enough for the entrance of a wagon and team. Side or ventilating doors are made horizontal, and not vertical,



and are hung with strap-hinges, so as to be raised and hooked up. The siding is made of a good quality of pine timber and painted. Blocks and tackle are arranged in the top, supporting a platform, on which the laths are placed and hoisted to the tiers, generally by horse-power, the horse being hitched to the end of a rope. A room is built in one corner, 12 by 14 feet, for stripping and assorting. This room is ceiled tightly and floored, and contains a stove, on which a vessel of water is placed, to preserve a proper moisture in the air. Plenty of light and ample ventilation are secured by doors and windows in the end and sides of the room. This barn cost about \$600, and the regulation of its admirable ventilation is entirely within the control of the owner. The medium shed in general use costs less, and is often merely a common farm barn altered to a tobacco-barn, and when not occupied with tobacco is used for sheep and cattle. It is without a stripping and assorting room, and is a rude structure of unplanned boards. The ventilating doors are vertical and hook back into staples. Sometimes these sheds are used for hay and grain, and are often half full of hay and grain when a crop of tobacco is stored in the top for curing. One-third or one-half of the sheds in Onondaga and Big Flats are of inferior or medium class, and their average cost is from \$200 to \$300. They are too diversified in structure to be described.

Sheds of a third class, of poor construction and badly adapted for the housing and curing of even a small quantity of tobacco, are found in large numbers throughout the district, but a description of these is unnecessary.

In such a barn as the first described, 28 by 80, with 24-foot posts and five tiers, four acres of 6,000 plants to the acre can be housed. The best sheds are ventilated in the top, so the ascending moist air from the green plants can be liberated and a free current circulated through the tobacco from bottom to top. Experience alone can teach when this is needed in the process of curing.

#### CURING OF TOBACCO.

Seed-Leaf raised upon some soils cannot be cured dark, while other soils will grow a plant which, with any ordinary care, will make a dark tobacco. The curer can do a great deal to regulate the process and secure the color desired if the shed is properly constructed, so that the ventilation can be perfectly controlled. It must be kept closed in hot, dry weather, or the rays of the sun will bleach the leaves, and neither light nor air should be admitted. Sometimes moisture is lacking, and it is necessary to place straw on the ground, and to keep it moist. One of the most experienced growers, however, declares that tobacco must never be cured over a plank floor or over straw, but, if necessary, the earthen floor must be moistened. When the crop is first housed, or when the weather is very moist and warm, the ventilators are kept open, and with continual watchfulness and proper regulation of them extremes of dryness and dampness may be avoided. During and after curing great care is necessary to obtain and preserve the colors of a good leaf, to avoid pole-sweat and stem-rot, and, while there is much badly-cured tobacco, it is almost all found to come from poorly-constructed, badly-ventilated sheds. Insufficient or badly-managed ventilation is the chief cause of bad curing. The part of the crop next the door is often bleached by too much air or sunshine, and other parts show house-burned spots or "fat stem". Stem-rot is indicated by a moldy,

wet stem, with incipient decay in the leaf adjoining, and is sometimes caused by early frost, when the curing has not gone far enough to prevent freezing of moisture in the stem. When crops are planted so as to be cut and cured before frost and sheds are well ventilated pole-sweat, house-burn, or stem-rot is the result of negligence.

#### AFTER CURING.

When cured, the crop is taken down from November to May; perhaps more in November than in any other month, and nearly all by the 1st of February. Tobacco is taken down when the wind is southerly and the weather moist and rainy, so as to handle the leaf without breaking, as can be done when it is soft and the stem hard. More than half the planters strip as soon as the crop is taken from the poles, placing the leaves in bundles of five or six. These bundles are then bulked or "ranked" in some secure place to cure out thoroughly before assorting. Others take down the crop, stalks and all, laying them in heaps until they are ready to strip. The plan of stripping and afterward assorting in the assorting-room is generally preferred, as assorting is then done less hastily and more carefully, and the cured leaf is not exposed to danger of partial injury in bulk from possibly damp stalks.

#### ASSORTING OF TOBACCO.

Formerly tobacco was assorted into two grades; now growers assort into three or four, and sometimes five grades—as many as the crop requires. When graded into three sorts, they are designated A, B, C, wrappers, binders, and fillers; if into five sorts, AA, long wrappers; A, short wrappers; BB, long binders; B, short binders; and C, fillers. The leaves in each grade are made, as nearly as possible, of the same length.

Uniformity adds greatly to the appearance and value of the product. From fifteen to seventeen leaves are placed in the "hands", and each is neatly straightened and bulked down. After lying several weeks, each kind is packed in a box by itself, in quantities varying from 350 to 400 pounds. The amount to go in each box is carefully weighed out, and the weight is marked on the box. Packing is now done lengthwise of the box by most growers, although a few adhere to the old method of packing crosswise. The screw or lever press is used to prize lightly, and the character of the leaf determines the amount to be packed in a box. Thick, heavy leaves of good body will stand a heavy sweat, and may be packed closely and prized heavily, while light, flimsy ones must be packed lightly. Mixed cases are allowable when there is not enough left of a kind to fill a box, but the weight of each kind should be carefully marked on the mixed box.

Tobacco packed lengthwise can be more neatly arranged, looks better when opened, is more easily examined, and prevents fraud in packing, and the best growers keep memoranda of weights and boxes, contents and qualities, which are often valuable to both grower and buyer. Packing is usually done from January 1 to April 1.

#### BOXES.

Cases for tobacco are made of pine, 50 feet to each, including cross-pieces, which are of seasoned hemlock, costing about \$12 or \$14 per thousand. The box complete costs about \$1, and, if planed inside, \$1.05 to \$1.10. It is 3 feet 6 inches long, and in each of the other two dimensions 2 feet 6 inches, measures being from outside to outside. In packing many use one-inch head-boards, which are slipped in loose, even with and on the inside of the ends. The tobacco is packed against these, after which they are withdrawn, leaving a space of one inch between the tobacco and the ends of the box for the circulation of air. This prevents rot, which sometimes occurs when the butts touch the ends of the cases. These cases are sometimes made with a crack one-fourth of an inch wide between the two boards of which the ends are formed.

#### RANGE IN PRICES OF TOBACCO.

The variation of prices is wide. One crop, well managed, sold in 1879 for 15 cents per pound; another, fairly managed, for 6 cents. There is sometimes a difference of 50 per cent. when it is hard to fix the cause, whether in the soil, the culture, the handling, or the curing.

#### VALUE OF THE LAST TOBACCO CROP.

The value of the crop of 1879, per pound, is thus reported by one: Seed, 6 to 9 cents; Domestic Havana or Hybrid, 9 to 18 cents. Value of different grades: Seed-Leaf—1, 13 cents; 2, 6 cents; 3, 3 cents. Wilson's Hybrid—1, 28 cents; 2, 12 cents; 3, 6 cents. Another gives 9 cents average for Seed-Leaf; shipping or export grades, 6 to 8 cents. These are all estimated, since tobacco is usually sold at a round price, which renders it difficult to distribute the price to the different grades.

#### SELLING OF TOBACCO.

Tobacco is sold on the pole, in the field, or in the assorting-room, and more frequently assorted and in lumps, or in the cases. Fully one-half is sold in cases. If it is not packed, the grower sells, to be delivered to the buyer in good merchantable condition, at so much per pound. In the main, however, growers do their own packing, and haul to market, usually in March, April, or May, before it has gone through the sweat, in order to avoid loss of weight, and

it is often sold to dealers at a certain price for each quality. The buyer frequently makes an estimate of the amount of each grade, and "averaging up", as it is called, offers the average round; for instance, 3 cents for C's, 4, 5, or 6 cents for B's, and 20 cents for A's, averaging 12 cents. The following example shows the method:

2,000 A's, at 20 cents.....	\$400
1,500 Short A's, at 14 cents.....	210
2,500 B's, at 5 cents.....	125
800 C's, at 3 cents.....	24
<hr/>	<hr/>
6,800 pounds.....	759

The average will be \$11 16 per hundred pounds. Tobacco is delivered at some convenient point, but usually at buyers' warehouses, and cash is paid on delivery. After tobacco is sold to the buyer, it is usually left in the warehouse until the following August, or even until January, when it is sampled by New York samplers, although sometimes shipped without being sampled. It is now generally sold from second hands by sample. This method greatly facilitates sales, and is growing in favor each year. Many home manufacturers of domestic cigars come from surrounding states, and often from Canada, to buy leaf, and frequently make their purchases directly from the grower.

#### WHERE SOLD.

New York leaf is sold largely in the United States and Canada for cigar-making. Very little is used for cutting into smoking- or chewing-tobacco, although some is so used, and is mixed with and sold as genuine southern leaf. Domestic cigar manufacturers furnish the great market, although considerable quantities are sold in Bremen and in some other foreign markets.

#### SWEATING AND SHRINKAGE OF TOBACCO.

When tobacco is stored for sweating the cases are placed on the sides, so that the moisture, when fermentation takes place, will condense on the sides of the case. It is also said that when thus stored it comes out more easily when the boxes are stripped off than when stored top up. The product is of no use to the cigar manufacturer until it has gone through the sweat or fermentation. This begins with warm weather, generally in May, although when it once begins cold weather will not cause it to cease, and unless disturbed it will continue until October or November. Sometimes crops are seriously injured by growers becoming alarmed and interrupting the sweat.

Manufacturers generally practice artificial sweating, especially when the natural process has been interrupted. This is done in sweating-rooms with steam-heating pipes. The temperature is raised from 125° to 140° F., and steam is let into the room in proper quantities, but not excessively. A second fermentation sets in, which lasts about forty days. This artificial process is found to be perfectly satisfactory. Tobacco shrinks about 10 per cent. in one year in the natural sweat.

#### SAMPLING OF TOBACCO.

A licensed sampler, regarded as fair and impartial, is procured, and the boxes are placed in position in the warehouse. The covers are removed, and a "stripping jacket" is used to remove the case from the tobacco. This is placed over the top of the box, and two men, one at each end, take hold of the handles, turn the box bottom upward, and lift it from the tobacco, leaving it exposed. The sampler takes six hands from different places, at either end or at both ends, usually one or two in a place, and in order to draw them easily two strippers "break" the mass in different parts, so that the sampler can get at its real condition. The case is replaced over the tobacco, and the box reversed and closed up as before. The boxes are weighed before and after stripping, to ascertain the net weight, the tares and gross weights being placed on the ends, and each box is numbered from 1 up, according to the number sampled. Sometimes the cases are also marked, according to the fancy of the owner,  $\diamond A$  or  $\diamond P$ , or some other mark. The six samples from each box are tied tightly together with strong cord, and a card is attached by a tape, over which a seal is affixed by the sampler. This card contains the number of the box, the gross weight, the tare, and the date of sampling, all corresponding with the case-marks. The sample is then ready for examination by buyers, and the cases may be sold from these samples in any part of the world, the tobacco remaining in the warehouse of the owner. The cases are generally forwarded after a sale by sample.

#### PRICE OF LANDS, ETC.

Lands in the Big Flats and in the valleys are worth from \$75 to \$150 per acre, according to location and improvements. On the hills in the vicinity of the bottoms the lands are cheap, running from \$15 to \$35 an acre; but in Onondaga, Cayuga, and Oswego counties the prices vary according to location and soil, the best farms selling at from \$75 to \$175 an acre, and the great majority may be set down as ranging from \$10 to \$75 per acre. The farmers in these counties generally have fair buildings and most of the modern conveniences. The average cost of production is estimated to be about 8 cents per pound for the state.

## LABOR.

Men receive on tobacco farms from \$14 to \$20 per month for six or eight months, with board and washing; day hands from \$1 to 10 shillings per day during the summer, and are generally boarded at these prices. In winter, in assorting season, wages are low when board is included, ranging from 50 to 75 cents per day. Labor is abundant in winter, and is not very scarce in summer.

## DISEASES OF TOBACCO.

Except some trouble with the horn-worm, the gray cut-worm, and the wire-worm, injury from diseases and insects is very slight. The flea-beetle is hardly accounted at all, and white-firing, brown-rust, and kindred wet and dry weather diseases are reported as of small moment. The horn-worm is more injurious to cigar tobacco than to that grown for other uses.

The following statement shows the production, acreage, yield per acre, value of the crop in farmers' hands or in primary markets, the value per pound, and the value per acre of the tobacco crops of the state of New York for the years 1876, 1877, 1878, and 1879. The figures for the first three years are estimates from the best data attainable, those for 1879 being made up from returns of enumerators and from schedules returned to this office:

Year.	Production.	Acreage.	Yield per acre.	Value in primary markets.	Value per pound.	Value per acre.
	<i>Pounds.</i>		<i>Pounds.</i>		<i>Cents.</i>	
1876.....	6,297,000	4,920	1,280	\$508,808	8.00	\$102 40
1877.....	4,308,901	3,292	1,327	393,201	9.00	110 44
1878.....	4,805,790	3,669	1,310	576,695	12.00	157 18
1879.....	6,481,431	4,987	1,313	721,059	11.12	146 05

## CHAPTER XII.

## CULTURE AND CURING OF TOBACCO IN NORTH CAROLINA.

The development of the fine-tobacco interest in North Carolina exhibits one of the most remarkable transitions in the annals of agriculture. Its growth was first begun in this state by two brothers, Eli and Elisha Slade, of Caswell county, upon a ridge between two small tributaries of the Dan river. The soil was thin and sandy, and, in comparison with the river bottoms, was of little value. About 1852 or 1853 the Slades grew, by chance, as they supposed, a small crop of yellow tobacco. As it grew year after year its peculiarities were attributed to special methods of culture and curing. They communicated their methods to all inquirers, and it was soon found that soil was the chief element, although care in the modes of cultivation and curing was also found to be necessary to the production of the best qualities.

From the plantation of the Slades its growth extended over Caswell county, and along the same ridge into Pittsylvania county, Virginia. This covered almost the entire area of yellow-tobacco culture before the civil war, when the production of tobacco was almost entirely suspended. The war increased the manufacture of tobacco in the North, where no tobacco suitable for plug or wrappers was grown, and at its close attention was called to the fitness of the North Carolina yellow leaf for this purpose. The price rose with the demand, and the production extended to other counties, especially to Person, Granville, and Rockingham. Granville outstrips all competitors, although many other counties have entered the lists, from Buncombe and Madison, in the west, where it is grown on the slope of the Alleghanies, 3,000 feet above sea-level, to the coast belt about Goldsboro', 200 feet above the sea—a vertical range of 2,800 feet, and a climatic range equivalent to about eight and a half degrees of latitude. While yellow leaf may have been raised in Virginia in small quantities, this may be taken as an accurate sketch of the origin and spread of the new product in North Carolina and in the contiguous counties of Virginia.

After the war the cheap and abundant production of shipping tobacco in the West and the reduction of the price below the cost of production in North Carolina coincided, with the demand for fine tobacco, to diminish the growth of the heavy tobacco and to extend widely the production of fancy leaf.

There are, broadly and generally stated, two varieties of soil in North Carolina: a gray, sandy, light soil, with a yellow, sandy-clay subsoil, suited to yellow leaf and the various types of fine tobacco, and a dark loam, a rich, unctuous, heavy soil, with a red-clay subsoil, suited especially to the cereals and to a heavy dark or red tobacco.

The change in the growth of tobacco has been from one of these to the other. Shipping leaf is still grown, however, both as an industry, upon soil selected for it, and as an incident to attempts to raise fine tobacco upon lands not suited to its production. Sometimes a part of the same field will offer both kinds of soil and grow both fine and heavy tobacco. The production of shipping leaf is not regarded as profitable, and planters generally endeavor to raise the fine leaf, so that this is the only branch of tobacco culture worthy of especial notice.



Alongside the decline in wealth in old areas of prosperity there are other instances in the South of the growth of thrift and wealth in communities which were poor before the war, but no other section presents such wonderful changes. Comfortable farm-houses have taken the places of rude log-cabins, excellent and convenient barns and outhouses exhibit the new thrift, and new life has been infused into all classes and into both races. The distinctive feature of this phenomenon is that it has brought into requisition, as most profitable, the poorest soils in the state, and wrought its improvements on the poorest farming classes. It has also enhanced the value of such lands until they actually sell for more than the most fertile bottom lands, and the spectacle has actually been witnessed of a contention between counties as to which could show the most poor land. The effect of this is practically to increase largely the wealth-producing power of the state, breaking down the ordinary economic distinctions between sterile and fertile lands. The amount of this enhancement cannot be given with even approximate accuracy, because nothing definite can yet be known as to the area of fine tobacco lands, the continued value of poor lands depending also on the stability of the demand for such tobacco.

The population of Winston, Forsyth county, in 1870 was 443. The leaf market opened in 1872, and one small factory was built, making 40,000 pounds. There are now fourteen plug factories in operation, and one smoking-tobacco factory not in operation. The plug factories make 3,880,000 pounds. Population in 1880, 2,854.

Reidville, Rockingham county, had, in 1870, no corporate existence. In 1880 it had 1,316 inhabitants and nine plug and two smoking-tobacco factories, with a capacity of 3,000,000 pounds of plug and twist.

Lands worth from \$1 to \$3 per acre in 1860 now bring from \$20 to \$100, and old fields, worn out fifty years ago and grown up in pines—fields which would scarcely produce a bushel of corn to the acre—are now often sold for \$50 per acre.

#### PROGRESS OF THE TOBACCO INDUSTRY.

The area of tobacco has been enlarged in most of the counties reporting, showing a gradual growth from 1876 to 1879, Clay, Guilford, and Warren alone reporting a decreased area.

As to quality, the crop of 1879 is generally reported better than that of the three years preceding, only two counties reporting deterioration in quality by comparison with 1876-77-78, and the care directed to the production of quality rather than quantity renders the exhibit as to the yield per acre apparently more unfavorable, nearly half the schedules reporting a decreased yield per acre, two counties about the same, and one-half an increased yield for 1879, as compared with 1876-77-78. If the comparison were with the years when shipping leaf was raised, the diminution would be general; but this comparison is only in fine-tobacco culture. It is worthy of notice here that the counties where the industry is older show increased yield. The most experienced planters have learned to combine body and weight with quality, and the production of different grades in the crop, in comparison between 1879 and 1869, shows the rapid change in the character of the product. In 1869 the shipping leaf averaged 36 per cent.; in 1879, 15 per cent.; while the proportion of fine tobacco, wrappers, fillers, and smokers, was enormously increased in all the counties. In many localities fine tobacco has only been grown since 1869.

The chief reason given for the great change in the character of the tobacco grown is the decline in price for shipping leaf, coinciding with the demand for fancy leaf at high prices.

The deterioration of quality in certain localities is attributed to the following causes: High prices have led many to undertake the culture of fine tobacco without experience and on unsuitable lands; others have been induced to plant more than could be perfectly cultivated; and hasty and careless handling and curing have been the faults of still others; all these resulting in the production of much light, chaffy tobacco. This deterioration is reported at from 1 to 5 per cent. in Granville, which is the best fine-tobacco county. The general product of this county is, in the main, of improved character, better cultivated, and handled with increasing care and skill; but the average of quality has been somewhat lowered by the numbers of inexperienced and unskillful men who have rushed into the business of growing fine tobacco.

#### VARIETIES OF TOBACCO.

Slight differences in nomenclature, local names, and the uncertain use of descriptive adjectives make it difficult to reach absolute accuracy in treating of the varieties of tobacco cultivated.

The Orinoco, popularly called in some localities "Iron Oak", is a widely grown plant, of which at least three varieties are reported—the Yellow, the White-stem, and the Little or Sweet Orinoco. The Yellow Orinoco is early, matures well, becomes bright on the hill, and has a broad, heavy leaf of a fine, silky texture. The White-stem Orinoco grows brighter and whiter on the hill than most varieties, and is more easily cured the desired color. The fiber is also white. Silky Pryor has a long, sharp-pointed leaf, and grows thin on the stalk, with a leaf very tough and pliant when cured, which can be handled drier than any other variety. The Bullock has a broad, smooth leaf, with no ruffle on the stem. It stands heat well in curing. The leaves are far apart on the stalk, and it bears few suckers, often not more than four or five to the plant; nor do suckers start from below the surface of the hill. On account of the space between the leaves, a hand can sucker one-third more of this variety than of any other. The Cary makes a good sample, has a round leaf, and yellows well on the hill. Virginia Seed-Leaf and Tally are also grown to some extent. The Yellow Orinoco has largely the preference among planters, the Gooch and the Bull-face

coming next, and perhaps the Yellow Pryor next to them, and the Little or Sweet Orinoco, the Blue Pryor, the Adcock, the Mann, and the Cunningham, described under "Varieties", chapter II, are extensively cultivated. One general truth is established: that soil adapted to coarse shipping tobacco will not produce fine tobacco with any variety, and *vice versa*.

All varieties cure dark brown or red when grown on red-clay soils with heavy dark or brown top soil, but incline to brighter and lighter hues on sandy, gray soil, with yellowish subsoil, and cure from bright red to mahogany and fine yellow. On all fresh lands, except the very best fancy-tobacco soils, all varieties are somewhat lighter and brighter than on old lands. This is especially the case with those lands which will only produce shipping leaf after the first or second year.

Such is the effect of soils, that the purity of any variety can only be preserved by procuring seed from the soil which produces its original and most perfect type. This is a rule, however, of very little practical value until experiments shall have determined the entire subject of adaptability, and even then the purity of any given variety can only be maintained by great care. The seed-plants must be remote from any other variety to avoid the intermixture of pollen by insects, and the seed is to be selected from the crown, that alone reproducing the same plant. Seeds from the lower and side shoots grow plants resembling those coming from seeds of suckers; indeed, the side shoots are but suckers.

### TOBACCO SOILS.

In determining the question as to what constitutes fine tobacco lands, or what element is fatal to the growth of yellow leaf, the inquiry must embrace the important matter of drainage. Tobacco is a plant which delights in a dry, warm soil, requiring comparatively little moisture, and in no respect do these lands differ more widely from others than in thorough drainage. While such lands are very miry in wet weather, so that it is difficult to drive a wagon or even to ride over them, the top soil is always dry and warm.

There is a difference of opinion as to new lands. In the western counties, where the growth of tobacco is quite recent, new land is almost altogether planted, but in the older tobacco counties planters have learned to conserve their old lands and to raise upon them tobacco of the best quality by the judicious use of fertilizers, and no longer depend upon clearing. All agree, however, that a very fine quality of leaf is grown on new lands. Some lands will produce a fair fancy wrapper one or two seasons, and never after. It is also generally agreed that the first crop is very fine and most easily cured, but lacks the body and uniformity of texture and color of the second year's growth on the best tobacco lands.

Fertilizers are applied upon new as well as upon old lands. In the older tobacco counties cases are given where tobacco has been grown upon land for twenty years in succession without decrease in yield or deterioration in quality, but always with the aid of manure. Such lands appear to possess permanent qualities, which need only the addition of fertilizers and manures, and it is believed that with proper care and rotation most of them can be kept up indefinitely. (a)

Old fields of the proper soil, which have been worn out and abandoned, make, when cleared of their new growth, the best tobacco lands. They are generally overgrown with pines, with an undergrowth of whortleberry, chincapins, and other bushes, the pines growing to 2 feet in diameter in about twenty-five years. About fifteen or twenty years are required for the resuscitation of old, worn-out lands. One field was planted in corn in 1850, and the yield was so poor that the fence was removed. In 1876 it was cleared of its pine growth and planted in tobacco, which brought 50 cents a pound for the whole crop. This field has been cultivated in tobacco for five successive years, and the last crop was better than the first. The land was treated the first year with 200 pounds of a commercial fertilizer, and has since received yearly applications of stable manure and fertilizer in the drill. A great many farmers are of opinion, however, that the lands are exhaustible and require years of rest, and assert that, although the first crops on old fields reclaimed are better than when first cleared, a great falling off occurs after the second crop, the soil wearing out much more rapidly than in the first instance.

These old pine fields, when they have a gray, sandy soil and a yellow subsoil, are the best of tobacco lands. A man selected a few acres which had grown up in "bald-faced Spanish oaks", scrub hickory, chincapin, and sourwood, all indicative of very poor lands, and the crop raised sold for 50 cents a pound at the barn door. When the soil is of the right kind, old fields which have lain for years in "broom-sedge" or broom-grass (*Andropogon scoparius*) grow the very finest tobacco, while they are almost worthless for other crops. This "sedge" is turned under in the fall before frost, and tobacco is planted the next spring.

A southern exposure is generally sought for fine tobacco. This soil is drier and warmer, and the plant matures earlier. The rich, black soils of northern slopes will not produce fine tobacco, while a few yards off, on the other slope, the finest may be grown.

<sup>a</sup> It is unquestionably true that the mechanical condition of the soil and the absence of certain inorganic elements have more to do with the production of fine tobacco than a supply of plant food. This soil is, indeed, a sponge, which receives and retains just fertilizers enough to bring the plant to the proper size, when they become exhausted, and the plant goes into a gradual decline, growing more and more yellow and more and more delicate in tissue, until it is cut. Too much manure will destroy the fine qualities of the leaf, impairing its color and increasing its coarseness.

Reports show a general average of 33 per cent. of preferred tobacco soils cultivated, and the proportion of new lands is reported at 45 per cent. In Buncombe and Madison counties, in the west, where tobacco culture has been recently introduced, the proportion of new lands is 80 per cent., and the general average proportion of uncleared lands adapted to the plant is given as 58 per cent. Since fine tobacco lands are precisely those which farmers would avoid clearing for other crops, this is probably too low rather than too high an estimate.

#### THE TIMBER GROWTH.

The forest growths are found upon soils of such diverse character, and coincide over such wide areas, that it can only be said generally that hickories, white oaks, the tulip-tree, walnuts, maples, sugar maples, and beeches are indications of good land, and post oak, scrub oak, black-jack, chestnut, chincapin, pine, and whortleberry are indications of poor land; but either of these growths may be found upon lands better suited to the other to such a large extent that one must judge by the predominance of species and by the character rather than by the kind of growth, and especially by the undergrowth. The timber test for land is of little use to the inexperienced, while it is of great value to the experienced eye.

#### ROLLING AND LEVEL LANDS.

With regard to the "lay of the land", planters generally report no difference between rolling and level lands, provided the latter are well drained. If not well drained, the level land makes a heavier product, which does not ripen so well or so early, on account of excess of moisture.

#### PREPARATION OF THE SOIL.

In the preparation of tobacco lands methods vary with the character of the soils, old "sedge" lands, clover fallows, and stubble lands requiring more plowing than land last cultivated in corn or tobacco.

New ground is coltered twice or oftener, and is cleared of roots and trash; lot lands are plowed in autumn or in early winter, to obtain the help of the winter frosts in reducing the soil to fine tilth, are again plowed early in the spring, and a third time before planting. Turning-plows are used to a depth of from 2 to 5 inches, the object being to invert the upper soil as deeply as possible without exposing the subsoil.

If the land is trashy, or not in thorough tilth, it is dragged with a heavy harrow after the last plowing. It is then bedded up by throwing from two to four furrows together with a turning-plow, and the hills are laid off from 2½ to 3 feet 3 inches apart and patted on the top, so as to compact the soil where the plant is to be set. Hilling is strongly recommended by the best planters, especially in wet seasons, affording better drainage and protection against all the wet-weather diseases of tobacco. Hills present a flat surface of from 10 to 15 inches in diameter, and are made when the ground is in good order for working. If too dry, it will require too much rain to moisten them sufficiently; if too wet, they will bake. In new ground the hills may be made in March or April; in old ground they are to be made late enough to avoid danger of growing up in weeds and grass before planting, not earlier than the first of May. Listing or bedding up by 3 or 4 furrows of a turning-plow saves labor in making hills.

There is a wide difference of opinion and of practice as to the proper distance between plants, varying from 2½ by 2 feet 3 inches to 3 feet 3 inches by 3 feet 3 inches. Many hold that nothing is gained in aggregate weight, while something is lost in length, breadth, and body by crowding closer than 3 feet 3 inches apart each way. Hills are generally made by measuring or stepping off one row and placing the hills of the next opposite the center of the space between those in the first, and so on, in quincunx order.

#### TOBACCO FERTILIZERS.

Both commercial fertilizers and home-made manures are used: of the former, special tobacco fertilizers and Peruvian guano; of the latter, chiefly stable manure. Stable manure is used in connection with numerous commercial fertilizers—guano, superphosphates, and special compounds prepared for tobacco.

In the eastern tobacco counties no attempt is made to raise tobacco without fertilizers and manures; in the western counties planters are farming a virgin soil and using very little manure; and the policy of clearing new to replace old lands promises to go on until it has wrought the ruin it has elsewhere. It is generally agreed that upon most lands in the west two crops can be raised without manure, and this is generally the limit.

The use of fertilizers is said to yellow the crop in the hill as well as to increase the yield, and they are applied broadcast in the hill and in drills. The practice of placing them in the drills possesses advantages every way. The most approved method is to apply stable manure in the winter. A furrow is opened, in which it is placed, according to the character of the soil, and a furrow is thrown over it. In the spring the center of this is divided with a bull-tongue or shovel-plow, and the commercial fertilizer is placed in the new furrow with the stable manure, a bed being thrown over this by three or four furrows with a turning-plow. In this way the soil of the bed becomes thoroughly permeated by the fertilizer and manure, and upon this bed the hills are made at the proper time, the

object being to place both the manure and the fertilizer so that the plant will receive the stimulus from the very start. Both commercial fertilizers and barn-yard manures are applied according to the soil, and this must be done, after long experience, with great care and judgment. Too much will injure the quality and the texture or may cause firing; too little may leave the plant small, lean, and poor; the object being to use enough to make eight or ten plants yield a pound of fine tobacco when cured. Quantities applied are variously reported, as from 50 to 500 pounds per acre, and when no home-made manure is used the amount of commercial fertilizer is very nearly doubled. Peruvian guano has been generally abandoned in raising fine tobacco. Most of the fertilizers used are manufactured especially for fine tobacco under various names and brands, and most of them are said to be rich in ammonia, soluble phosphates, and potash.

Much attention has been paid to home-made manures, stable manure being generally used and preferred to all others, and giving best results when used in combination with commercial fertilizers—the latter starting the plant and giving quick growth; the former finishing the growth, giving body and maturity. Size may be attained without manure by the use of fertilizers alone, but not body. Some planters make their own fertilizers by treating bone dust with sulphuric acid, and composts are also made of muck and stable manure. Ashes are also used, and by some guano is considered especially applicable to new land.

Reports from various counties show an average increase of yield per acre of 70 per cent. by the use of fertilizers, with a considerable improvement in quality; but the cost varies so much with the amount used and the distance from market that it is hardly necessary to give it when intelligent planters report it as ranging from \$1 50 to \$15 per acre, the area of their use being of more importance, as exhibiting progress in careful culture. The area of tobacco land on which fertilizers and manures are used is reported as follows: Granville, 90 per cent.; Rockingham, 95; Guilford, 98; Warren, 75; Alamance, 75; Forsyth, 95; Yadkin, 25; Wilkes, 10; Buncombe, 5; Madison, 2; Cary, Randolph, and Haywood, none. The counties using the least quantity are those in which fresh soils are mainly employed for the production of tobacco.

#### ROTATION.

The rotations practiced in connection with manuring for the preservation of the soil vary somewhat, but wheat is almost unanimously regarded as the best crop to follow tobacco, both to allow the land time to recuperate its exhausted tobacco-producing qualities, and because the clean cultivation necessary for tobacco and the unconsumed manures and fertilizers make an excellent preparation for wheat. Wheat is followed by pease, one bushel to the acre, the growth of which is turned under in the fall when just beginning to ripen and followed by wheat or corn. What is called green-manuring is not practiced, except in the use of pease. A succession of tobacco two seasons, then wheat, followed by corn, is a common course; after which the land is often allowed to lie idle one season. On account of wire-worms it is almost impossible to obtain a stand of tobacco after clover or grass; hence they are not used to any great extent as rotating crops. Some of the best planters report planting for several successive years in tobacco, with yearly improvement in quality and in quantity. Soil may have something to do with this, but it is in the main due to superior care and diligence and to the judicious use of proper fertilizers. Some planters follow tobacco with wheat and clover for two years, followed by rye or wheat, and then tobacco. As a rule, when wheat stubble land is intended for tobacco, it is plowed early in the fall or winter, to receive thorough freezing and to destroy the cut-worms, and cross-plowed in the spring, thoroughly harrowed and pulverized, and cleared of trash and unrotted stubble. Corn is not regarded as a good crop to rotate directly with tobacco.

#### SEED-BEDS.

The soil selected for the seed-bed is as fine as flour, with the least possible admixture of coarse sand and gravel, inclined to be moist, but not wet, and thoroughly drained. The sowing is done sometimes as early as December 1, and again as late as the 15th of April, but January and February are preferred.

Usually the plants appear about the 1st of March if the sowing has been timely, and are sufficiently well grown for transplanting by the first week in May.

Plants are ready for setting out when the leaves are about 3 inches long and the width of three fingers, but for old ground the plants should be larger, and the leaves 5 or 6 inches long.

#### TRANSPLANTING TOBACCO.

Planters generally agree that the 10th of May is soon enough to begin transplanting, and that successive plantings are desirable, in order that the crop may not all mature at once. Later than the 10th of June is not looked upon with favor by the best planters. Planting is sometimes done as late as the 1st of August, but never with expectation of more than very moderate returns. If set out too early, the plants are likely to be damaged by cold, and to be deprived of the dews of August and September; if too late, they may not mature properly before frost.

In general, planters wait for rain in order to transplant, though crops of seventy acres have been successfully planted by making artificial seasons.

## CULTIVATION OF TOBACCO.

As soon as the plant has rooted and begun to grow, which is shown by the color, and is usually within five or six days, the turn-plow is run, with the bar next the plant, thus "barring" off the soil. The hill is then cleared of weeds with a hoe, and a little fresh earth is drawn to the plant. An excellent authority opposes the use of the plow unless the rows have become very foul, and recommends breaking the crust of the hill with the hoe and drawing loose earth around the plant until it has covered the hill to a breadth of 12 inches. This is probably the better way, but it is too tedious and costly for general practice.

About a week after the first plowing the earth is thrown to the plant by the plow, and a broad, flat hill is made with the hoe. A third plowing is given before topping, and the hoe hands follow, hilling up well with a high hill. Unless grass and weeds are very prolific this will be cultivation enough. Both the turning plow and the bull-tongue are used, the former being preferred when the rows are foul. The cultivation is shallow, and the subsoil is but little stirred, and cultivation is avoided after topping unless the weeds and grass require the hoe.

The plowing is often done with a cotton sweep, which is growing in favor, and cultivation is pushed rapidly by the best planters. In shipping leaf cultivation is continued until August, but in fine tobacco, beginning with plow or hoe when the plant has commenced growing, it is continued about once in ten days until the 10th or 15th of July.

## PRIMING, TOPPING, AND SUCKERING OF TOBACCO.

At the last hoeing, as a general rule, the bottom leaves are primed off. When it is possible, all plants for fine tobacco are topped by the last of July, or at latest by the 10th of August. There is, however, the greatest diversity of opinion as to both priming and topping. The general rule as to priming, however, is from 4 to 6 inches, while the range in topping up to the last of July is usually from ten to fourteen leaves. Ten may be taken, however, as the number approved most widely, as measuring that which can be easily matured with the greatest weight and desired texture and color. Planters who adopt a standard of ten top as high as twelve leaves when the plant is gross, or go below that if it appear that ten cannot be properly matured. Topping is usually done at intervals of a week, and at each successive topping fewer leaves are left, so as to make all plants set out at the same time ripen together. The season and the character of the plant have much to do with the topping, but the best authorities assert that those who are tempted to go beyond ten leaves, except with very gross plants, lose in body, oil, and toughness, and gain nothing in weight, texture, or color. Some planters top even as high as twenty leaves on strong land, holding that low topping makes the plant coarse and the fibers large.

One planter advises topping high in dry weather and low in wet weather, on the ground that if the plant be topped low in dry weather and rains follow it will be surfeited with moisture and the top leaves will grow large and the bottom leaves fall off. If dry weather succeeds wet, the plant having been topped high and the supply of moisture ceasing, the growth is checked, the plant is not filled out, and the leaf grows thin and papery. Perhaps the best rule given as to priming is to allow the tips of the bottom leaves at maturity to hang well clear of the ground.

Suckers are pulled off when 2 or 3 inches long, and every week, as they appear, until the plant is cut, usually from three to four times. There are two weeks between successive crops of suckers.

The usual time between planting and topping is about six weeks, but this is so dependent on the season that the time may be from forty to sixty days. The time between topping and cutting is from six to ten weeks, varying according to season and according to soil, gray lands maturing the plant earlier than red lands. The variation on account of soil is given at as much as four weeks, and the plant will stand longer on strong than on thin land. The method of cultivation also has an influence on the time, shallow culture ripening the plant earlier than deep culture. The time of maturing is also affected by the quality and the quantity of fertilizer used, and the variation in time of planting finds a corresponding variation in the time of cutting, from the last of August to the 15th of October.

## RIPENING TOBACCO.

Ripening is indicated by the leaf becoming sleek, the fuzz disappearing, and the appearance of dappled yellow spots, called "graining". Dappled leaves make a mahogany leaf when cured; uniform grayish-green color (melon-apple green), when cut, indicates the finest leaf. Poor tobacco, without body, has a smooth, lifeless yellow, improper ripening, due to wet seasons, rendering it almost impossible to attain the desired color. The plant will not ripen well in wet seasons, especially when rain follows drought, but it is not injured by rain after it is ripe. It may begin a new growth, but will ripen again in a few days. Cool nights and heavy dews thicken the plant, and cause it to mature rapidly, with good body.

## CUTTING OF TOBACCO.

Tobacco is always cut thoroughly ripe, unless it is necessary to sacrifice quality to escape total loss from frost. There is a difference of opinion as to the effect of rain or dew, almost all asserting that it does no harm to cut even when wet with rain or dew; yet one of the best authorities on the subject declares that the least water on the leaf spoils the color in drying.

When the plants are fully ripe each cutter takes two rows, a stick-carrier walking between two cutters, holding a stick. The plants are split down the center of the stalk and cut, and six to eight plants are placed astride the stick; another hand takes two sticks at a time to the wagon; and a third hand keeps the stick-carrier supplied. The plants are assorted in the field, so that those only of a uniform color and ripeness shall be cut and cured together, and the tobacco is placed at once in the wagon, if possible, without exposure to the sun, and without allowing it to wilt or to lie upon the ground. It is desirable that the plants shall be stiff and open, so that the hot air can circulate freely among the leaves, and is never scaffolded before housing.

Cutting is done on Monday and Tuesday, so as to cure by Saturday, or it is cut on Friday and Saturday, postponing the curing till Monday, from the rigid regard for the Sabbath and its universal observance by all classes, although the planters suffer serious inconvenience and expense in the cutting season when the weather on Monday is unfavorable for outdoor work.

Twelve hands will fill a barn of 600 pounds' capacity in two days; but this is excellent work, and the last loads will not be gotten in until after nightfall.

The sticks are  $4\frac{1}{2}$  feet long, and are placed at a distance of from 8 to 10 inches apart on the tier poles, but never less than 8 inches, for fear of sweating or "house-burn".

#### TOBACCO-BARNES.

For fine tobacco curing barns are built of logs, small and tight, from 16 to 22 feet square. The larger size has the merit of economy, while 16-foot barns have the approval of the larger number of planters. The comparative housing capacity is about as 4 to 7, the smaller holding 352 sticks, the larger 650, one foot apart. If 16 feet, the barn is divided by five sets of tier poles into four equal compartments; if 20 feet square, six sets of tier poles divide the barn, including, in both cases, the joists, and exclusive of the collar beams. A slope to the east is used, if possible, that the furnace may open on that side, prevailing winds being from the west in the curing season.

When, as is generally the case, more than one barn is needed the barns are grouped together for convenience, but not nearer than 100 feet, on account of danger from fire. An inclination of 2 feet in 20 will be found advantageous in arranging the furnaces. The reason assigned for the use of log instead of frame barns is that the latter, even though they be ceiled, cannot be heated sufficiently. The ground sills are of oak, well underpinned, and on these the pen, 20 feet square, is built of logs about 6 inches in diameter, notched down closely. At the height of 5 feet a set of six tier poles, generally of pine, and 4 inches in diameter, is laid horizontally, resting upon the northern and southern walls, the two outside poles lying against the east and west walls. The first tier is only used in hanging and hoisting; the next is laid on in the same way, three logs above; and so on to the top, when the sixth is laid, serving also as joists, and resting upon the plates. If the roof is framed, the rafters are raised directly above and in line with the joists or last tier, and the collar beams are nailed to the rafters, giving one and a half more tiers in the roof. Cabin roofs are usually built; that is, each gable is built up with logs of decreasing length, with their ends beveled, the long side down, to the last and shortest, which is notched in the center for the ridge pole of the roof. Each end of the gable log is laid upon a roof pole, which extends the full length of the barn, and by the shortening of these logs the roof poles form on both sides the slant of the roof, which is crowned by the ridge pole. Into these roof poles the collar beams are let in the cabin roof. The walls for a barn 20 feet square, when completed, contain about twenty logs each, plates included, and are about 16 feet high. The cracks are then closely chinked and daubed with mud, to which lime enough has been added to make it adhere well, and doors 4 feet square are cut in the north or south side and are provided with very closely-fitting shutters.

#### THE FLUES.

The Smith patent is the one most commonly used. Furnaces are built, if the barn is properly located, on the east side; and if the ground is rightly inclined only one log need be sawed out, which is done 4 inches from the corner next to both the north and the south walls. The arch is of brick or fire-proof stone, 5 feet long, projecting externally 18 inches. The walls are built of brick, two bricks thick, and 2 feet apart, 18 inches high, 4 inches from the walls of the barn, the space being filled with dry earth, and the space between the two carefully filled up to the first log. A covering is then made over the external arch, running the length of the barn, and an ash-bed is dug out in front of the opening of each arch. The iron flue pipes are let in about 6 inches from the floors of the arches, and the cracks are stopped with clay. In order to give the greatest heating capacity the flues are built one foot from the north, the west, and the south walls, and, as a protection against fire, when this is done a thin wall is built between the pipes and the ground sills, running from where the pipe joins the furnace 6 feet along the flue, the distance to which the pipes are heated red. The pipes are made of No. 24 iron, except the two joints that enter the furnaces, which are of 18-inch iron, and are from 12 to 15 inches in diameter. The pipe is elevated gradually about 1 inch in 2 feet, and runs continuously from both flues along the north and south walls and the west wall. In the center of the pipe, along the west wall, which lies horizontal, and 1 foot from the wall, the return pipe makes a T, and conducts the draught through the center of the barn back to the east wall, rising gradually, so as to make the perpendicular distance between the points where the pipes leave the furnaces and that where the return pipe comes out through the wall about 18 inches. A short elbow joint in a small chimney receives the return pipe on the outside.

From two to three cords of dry wood suffices for one curing. Barns thus constructed, with flues complete, cost from \$50 to \$75 each; packing-houses, about \$200 each. With barn and flues properly constructed fires are always the result of carelessness, and yet about one barn in twenty is reported as lost by fire.

#### CURING OF TOBACCO.

The process of curing tobacco by fire is the most difficult and delicate in the whole course. Experience alone will make a curer of fine tobacco, and that only of one who possesses nice judgment, excellent powers of observation, and care. A trifling inattention may, at a critical moment, reduce a barn of the finest yellow tobacco to the lower grades. If the fires are allowed to die out or decline after the leaf is cured, sap remaining in the stalks or stems will diffuse itself through the leaf and mar the color irremediably in twenty-four hours; and, on the other hand, too much heat will cause sweating, which will, unless checked by speedy ventilation, both injure the color and impair the body and texture. In order to prevent this it is necessary to use a thermometer, hung level with the tails of the plants on the lowest tier, and, to guard the degree of heat by constant care, to watch day and night, with frequent inspection of the plants, generally selecting some one plant as a guide, but not by any means omitting general inspection.

#### CURING TOBACCO BY CHARCOAL.

In curing by charcoal, as soon as the crop is housed in a barn 20 by 20 feet square four rows of fires are built, four fires in a row,  $1\frac{1}{2}$  bushels to the sixteen fires. The entire process requires from three to four entire days. About 100 bushels of charcoal, at 4 cents per bushel, are allowed to 800 pounds of tobacco.

#### FLUE-CURING.

Since curing by flues promises very soon to supersede all other methods this process is more particularly described. The only difference between that and charcoal-curing is in the manner of applying heat. Two distinct stages are recognized in curing: yellowing with a damp heat at a low temperature, which is generally  $90^{\circ}$ , or, when the tobacco is very light and yellow,  $100^{\circ}$ ; but if the weather is very cool,  $80^{\circ}$ . The second is the drying, which may be divided into curing the leaf and curing the stalk.

A few examples of curing will illustrate the variations in the process. The first is from a *Manual of Tobacco Culture*, by R. B. Davis, a successful planter of Catawba county:

**YELLOWING.**—This is done at  $90^{\circ}$ , or at  $80^{\circ}$  if the weather be cool, in from eighteen to thirty-six hours, until the desired color is attained.

**DRYING OR CURING** is then effected by the following management of temperature:  $95^{\circ}$  for two hours,  $100^{\circ}$  for two hours,  $105^{\circ}$  for two hours,  $110^{\circ}$  for two hours,  $115^{\circ}$  for two hours,  $120^{\circ}$  for six hours,  $130^{\circ}$  for two hours,  $140^{\circ}$  for two hours,  $150^{\circ}$  for two hours, and  $160^{\circ}$  for twenty-four hours, the last temperature being kept up until the stalks and stems are dried. This table is for tobacco not gross and very yellow when cut, and to be modified with judgment. If the tobacco is gross and of a gray color, four hours instead of two should be taken to each stage from  $100^{\circ}$  to  $120^{\circ}$ .

**THE RAGLAND METHOD.**—This method is for medium tobacco. Ripe tobacco only is to be cut, and is then placed five to seven plants on a stick 4 feet long and from 10 to 12 inches apart on the tier poles. Steaming or yellowing is done at  $90^{\circ}$  from eighteen to forty-eight hours, according to character of tobacco. When yellowed, the heat is raised from  $90^{\circ}$  to  $95^{\circ}$  in from one to two hours, from  $95^{\circ}$  to  $100^{\circ}$  in two hours, from  $100^{\circ}$  to  $105^{\circ}$  in two hours, from  $105^{\circ}$  to  $110^{\circ}$  in from one to three hours, from  $110^{\circ}$  to  $115^{\circ}$  in two hours, and from  $115^{\circ}$  to  $120^{\circ}$  in two hours, at which the leaf is cured in from four to eight hours. The stalk is cured by a temperature advancing from  $120^{\circ}$  to  $175^{\circ}$ , at about  $5^{\circ}$  an hour, keeping the temperature at  $175^{\circ}$  until the stalk is thoroughly cured.

These two curings, from the *Border Review*, are based on records made at the barn door:

No. 1. The barn was 18 feet square, four firing tiers high; 450 sticks, grown on old-field land, bright yellow on the hill, leaf long, but thin and light, due to light cultivation. The fires were started and run up to  $90^{\circ}$  in six hours; then to  $100^{\circ}$  in six hours; then to  $110^{\circ}$  in six hours; leaf thoroughly yellowed at the end of eighteen hours. The temperature was then advanced to  $120^{\circ}$  in six hours; to  $125^{\circ}$  in six hours more; to  $130^{\circ}$  in six hours; to  $140^{\circ}$  in three hours, at which it was allowed to remain six hours; at the end of which time the leaf was about cured. The temperature was then run up to  $150^{\circ}$  in three hours, and held at that for three hours; then to  $175^{\circ}$  in twelve hours, where it stood twelve hours, until the stalk was dry—a perfect cure, a bright lemon color, within seventy-five hours.

No. 2. The barn was of the same size, with the same kind of flues, same number of sticks of tobacco, grown upon the same character of land, but of larger and thicker leaf. The fires were started and run up to  $95^{\circ}$  in eight hours; to  $100^{\circ}$  in six hours; to  $110^{\circ}$  in ten hours, when the leaf was yellowed. The temperature was then advanced to  $120^{\circ}$  in eight hours; to  $130^{\circ}$  in six hours; to  $140^{\circ}$  in six hours; from  $140^{\circ}$  to  $150^{\circ}$  in eighteen hours; from  $150^{\circ}$  to  $175^{\circ}$  in six hours, where it was held twelve hours; at the expiration of which time leaf, stem, and stalk were fully cured a bright lemon—all in eighty hours. The difference in time was due to the difference in size and grossness.

## THE GROWTH OF FLUE-CURING.

Air-curing was practiced in many counties until the demand for fine leaf required better results, with more certainty. Charcoal-curing was the first step forward. This was found expensive, difficult to regulate, soiling the plant with dust and soot, and often giving it a bad flavor. The first flues were of stone or brick, or were trenches covered with sheet-iron, running through the barn. The flue has been gradually growing into use from about 1867 or 1868, a general adoption dating from about 1872. Twenty reports give but nine counties where air-curing was practiced at all in 1879, and only three in which more than 10 per cent. of the crop was thus cured. Fourteen counties report an average of 56 per cent. flue-cured and 34 per cent. charcoal-cured. As the flue is comparatively recent, this shows that it is rapidly superseding other means of curing. These flues are constructed of brick, stone, and iron, preference being expressed for brick, as being more durable and safer and giving better results, although costing more. The iron flues are cheapest, and the heat can be regulated with the utmost nicety, rapidly raised with dry wood and as rapidly lowered by drawing fires, but requiring greater care and vigilance. Iron flues cost from \$15 to \$20.

## TREATMENT OF TOBACCO AFTER CURING.

When the stalk is cured thoroughly dry the fires are allowed to die out. There is a wide difference of opinion as to the after treatment. It is agreed that the plants cannot be safely stripped in the moist, warm weather which follows the curing season, because of the danger of loss of color. The plant comes from the drying barn always with a little greenish tinge. In the after treatment this fades away, and it takes on a solid bright yellow, uniform throughout. The crop is allowed to remain with fires out and doors open for thirty-six hours, until it can be handled. Some, however, recommend throwing wet straw on the flues, which is kept moist, and the tobacco thus is steamed at a safe temperature, to bring it at once into "order" for removal. It is then "bulked down" in the packing-house on the sticks, butts out, in square piles. This improves the color and straightens out the leaves, rendering them smooth and neat in appearance. Many farmers allow it to lie in bulk for only three or four days and then rehang it, crowding very closely, to prevent injury to the color from atmospheric changes. On the other hand, the best opinion favors more permanent bulking down, in such order that it can be handled without breaking, the leaf soft and stem hard. Those who thus bulk down rehang, to come in order for stripping. After it is stripped, it is tied in hands of six to twelve leaves: bright wrappers, six; fillers, eight; smokers, ten to twelve, when it is by some rehung and crowded closely, but, according to the best practice, it is bulked down on sticks, heads out, each grade by itself, and carefully covered with carpets, to exclude light, the colors being very sensitive to light as well as to air. In this condition the color is fixed, and after two months in bulk it is no longer subject to change.

Fine tobacco is packed in tierces of from 350 to 800 pounds, each grade by itself, or it is sold loose at the barn or carried loose to market, where it is placed in piles and sold at auction. Dealers buy enough of each grade to fill a cask, when they prize lightly and ship to the various markets.

It is sometimes necessary in very small crops to sell loose, because the quantity of each grade is not sufficient to fill a cask; but to pack in casks or boxes before taking to market avoids risks in handling. Sometimes, though rarely, it is put up by farmers in casks or boxes, being usually packed by mere hand pressure.

The period for stripping, assorting, packing, and marketing is generally from October to August, and the unstripped crop of one year may be on hand until the next. May is probably the season most favored. The spring sweat comes in May if bulked or packed; if not, it will come later, after which it is bulked down and packed. This sweat sweetens the tobacco, if its condition is dry; if too moist, it is injured in flavor and in color, and has the effect to redden a bright tobacco and brighten a dark leaf. If the tobacco is very moist and the sweat excessive, "funking" to some extent occurs, the injury being estimated at about 5 per cent., which can only be avoided by bulking in good order. Natural seasons are used for stripping and packing. Some experiments have been made with steam or warm air, but not enough as yet to determine their value.

## ASSORTING TOBACCO.

When the tobacco is kept bulked down on the stalk until the stripping season it is necessary to hang up as much as can be stripped in a day to "order" for stripping, that is, to absorb humidity enough to handle without breakage; but, to avoid the danger of a possible change of color, it is not allowed to become too soft. An assorter then strips off from each plant one or two leaves, to be tied by a boy as lugs or common smokers, and from one to three of the next leaves for smooth lugs or fancy smokers. These are tied into hands of eight or ten leaves by the assorter. The remainder of the leaves is then cast together in a pile, to be assorted into the various higher grades of leaf and tips. All the leaves of each grade must be uniform, and every bruised, worm-eaten, or injured leaf excluded from the best grades. So particular are the best planters, that the assorting-houses are constructed with a window to the north, that a uniform light may fall upon the leaf all day, increase or decrease in the intensity of the light making it very difficult to keep up the narrow line between the finer grades.



## GRADES OF TOBACCO.

Fine tobacco is variously graded by different planters and in different counties in from four to ten grades. The best average prices round are obtained by those who exercise most fully a delicate discrimination, which results, when the crop presents a great variety, in a large number of grades. The attempt to make fine carry coarse and inferior leaves results in loss to the planter and benefits only the rehandler. It is to be understood, however, that the grading is to be determined by the character of the crop. When assorted into six grades the proportion of the various grades in each crop is about as follows: 1st, one-thirteenth; 2d, one-tenth; 3d, two-sevenths bright mahogany; 4th, two-tenths dark mahogany; 5th, one-fifteenth bright lugs; 6th, rest of the crop.

Bright wrappers are sometimes classed in grades 1, 2, 3, and 4, beside tips, which are sometimes suitable for wrappers. Lugs are generally divided into two grades: sand lugs and smooth, clean lugs. Sometimes a third grade is made, called wrapping lugs, composed of larger and better leaves than the other two, and made of inferior wrapping leaf and the best lugs. First grade wrappers are used on the best brands of chewing-tobacco, and the rest on lower brands, and are bought by all the best manufacturers in the United States and Canada. Tips are thicker, have more body, and make first-class fillers. Tobacco commanding the highest price has a very large leaf, bright yellow and mahogany or a clear, whitish yellow, of good body, with fine texture, toughness, and elasticity, an oily appearance, small stems and fibers, and no holes or spots. Body, size, and color are indispensable for the very best. Thin, papery tobacco, easily torn, brittle, inelastic, and lifeless, will not bring the best prices, no matter how fine the color.

## DISEASES OF TOBACCO.

"Firing", known in New England as "brown rust", "frenching", "walloon", or "waterloon", and "hollow stalk", all make their appearance when soil conditions, bad weather, or inferior cultivation invite their attacks. No great amount of loss or damage by diseases of any sort is reported.

## INSECT ENEMIES.

The flea-beetle is the dreaded enemy of the plant-bed, and the gray cut-worm is sometimes very destructive to newly-set plants. The horn-worm is more injurious than all other insects and all diseases combined.

## HAILSTORMS.

Hailstorms are local, of narrow breadth, and the damage from such storms is of little consequence, being placed at from 2 to 5 per cent.

## AVERAGE VALUE OF TOBACCO.

The average value of the product is thus reported by various counties from all parts of the tobacco region: Buncombe, 15 cents; Madison, 15 cents; Haywood, 20 cents; Warren, 10 cents; Rockingham, 15 cents; Alamance, 15 cents; Caswell, 16 cents; Granville, 14 cents; Forsyth, 11 cents; Yadkin, 7 cents; Wilkes, 6 cents; Randolph, 12½ cents; Guilford, 8 cents; Person, 15 cents.

## VALUE OF DIFFERENT GRADES IN 1879.

Reports from a number of counties are given—in some cases two from one county—as the best way to illustrate the wide range in the prices. These are for 100 pounds, except where otherwise stated:

MADISON.—Average around, \$8 to \$20.

BUNCOMBE.—Common lugs, \$6 to \$8; medium lugs, \$8 to \$10; good fillers, \$8 to \$10; common wrappers, \$10 to \$15; medium wrappers, \$15 to \$25; fine wrappers, \$25 to \$50; extra wrappers, \$50 to \$80; small lots, exceedingly fine, \$2 50 per pound.

WILKES.—Common lugs, \$2 to \$4; good lugs, \$4 to \$6; bright wrappers, \$15 to \$40.

YADKIN.—Fillers, \$3; smokers, \$6; dark wrappers, \$10; bright wrappers, \$16; nondescript, \$2.

FORSYTH.—Sixth grade, lug fillers, \$2 to \$7; fifth grade, bright smoking lugs, \$8 to \$20; fourth grade, lower grade fillers, \$5 to \$7; third grade, best fillers, \$10 to \$15; second grade, wrappers, \$25 to \$40; first grade, best bright wrappers, \$40 to \$80.

WARREN.—Shipping lugs, \$2 to \$4; dark nondescript, \$4; shipping leaf, \$5 to \$6; dark wrappers, \$10; bright fillers, \$8; sweet sun-cured fillers, \$10; bright smokers, \$12; bright wrappers, \$30; fancy wrappers, \$80 to \$100.

ALAMANCE.—Dark lugs, \$4 to \$6; dark fillers, \$4 to \$7; good fillers, \$7 to \$18; good red wrappers, \$18 to \$30; common smokers, \$6 to \$8; good smokers, \$8 to \$12; fancy smokers, \$12 to \$25; common yellow, \$15 to \$25; good yellow, \$25 to \$50; fancy yellow, \$50 to \$75; extra yellow, \$80 to \$90; extra fine, \$90 to \$150; small choice lots, \$3 per pound.

HAYWOOD.—First grade, \$100 to \$200; second, \$50; third, \$30; fourth, \$20; fifth, \$10; sixth, \$5; seventh, \$4; eighth, \$3.

ROCKINGHAM.—Common grades, \$3 to \$6; good fillers, \$6 to \$12; bright leaf, \$15 to \$30; fine wrappers, \$30 to \$80. From the same county: First grade, \$50 to \$70; second, \$30 to \$40; third, \$12 to \$20; fourth, \$8 to \$10; fifth, \$6 to \$8; sixth, \$4 to \$6.

GRANVILLE.—Trash, \$3 to \$10; good lugs, \$10 to \$16; green tips, \$8 to \$15; dark mahogany, \$10 to \$15; bright mahogany, \$25 to \$50; bright tips, \$25 to \$50; fourth grade, \$30 to \$75; third grade, \$60 to \$75; second grade, \$60 to \$80; first grade, \$90 to \$100.

VALUE OF LANDS—COST OF PRODUCTION—MARKETING THE TOBACCO CROP.

Granville and Rockingham counties may be taken as fairly typical as to the character of the product, value of lands, cost of production, etc. Want of transportation facilities, nearness or remoteness of markets, and the cost of fertilizers as affected by freights, would alter some of the figures given if applied to other counties.

GRANVILLE COUNTY.—The price of the best lands is about an average of \$42 per acre; yield, 600 pounds. Inferior lands are worth \$5 to \$7; yield, 500 pounds of inferior tobacco. The rental value is one-fourth of the crop, or, for best lands, \$25 in money per acre. Wages, by the day, for field hands, 50 cents and board; by the year, \$100 to \$150 without board, or \$80 with board. Estimated cost on the best soils, \$10 to \$12 50 per hundred pounds. In the northern part of this county a considerable amount of red, coarse shipping tobacco is raised, which greatly reduces the average price for the county.

Estimate of crop of fine tobacco for one man, careful, skillful, and intelligent:

Rent, 2 acres .....	\$20 00
Laborer, six months .....	50 00
Board of laborer, six months .....	42 00
Horse and feed .....	10 00
Use of wagon and plow .....	3 50
Use of barn and packing-house .....	3 00
Firing-wood, 9 loads, at \$1 .....	9 00
Fertilizers .....	15 00
Hauling to market .....	2 00
<b>Total cost for 2 acres .....</b>	<b>154 50</b>
Product, 1,200 pounds, at 35 cents .....	420 00
<b>Profit .....</b>	<b>265 50</b>
Cost per hundred pounds .....	12 87½
Profit per hundred pounds .....	22 12½

Inspection and selling cost \$1 to \$1 50 per 100 pounds. When sold loose, the crop is placed in piles of separate grades upon the floor of the warehouse and sold by auction, and 2½ per cent. commission and 25 cents a pile, auctioneer's fee, are charged. The piles in weight range from 8 or 10 pounds to 300 or more. The following accounts of sales show the cost of marketing in Granville, as well as the proportions of grades and range of prices in a good crop:

<i>Sales of 311 pounds.</i>		<i>Sales of 1,127 pounds.</i>	
30 pounds, at 46 cents .....	\$13 80	54 pounds, at 88 cents .....	\$47 52
32 pounds, at 60 cents .....	19 20	149 pounds, at 67½ cents .....	100 57
194 pounds, at 38 cents .....	73 72	97 pounds, at 80 cents .....	77 60
55 pounds, at 13½ cents .....	7 55	228 pounds, at 67½ cents .....	153 90
	114 27	90 pounds, at 60 cents .....	54 00
Charges .....	4 77	34 pounds, at 51½ cents .....	17 51
	109 50	167 pounds, at 34½ cents .....	57 61
		308 pounds, at 40 cents .....	123 20
			631 91
		Charges .....	22 31
		Net proceeds .....	609 60

The usual average in Granville does not exceed \$150 to the hand, but there are frequent instances of profits of \$500 or more. From two to two and a half acres are planted to the hand, and the cost of production is diminished by such increase of crop as will employ a full set of tools and keep the team busy.

ROCKINGHAM COUNTY.—Price of good tobacco lands, \$10 to \$25 per acre; yield of such lands with manure, 500 pounds. Inferior lands are worth \$5 to \$7, and yield with manure 500 pounds of inferior tobacco. The rental is one-fourth of the crop. Wages by the day: Men, 40 cents; women, 25 cents, with board. Skillful tobacco hands command from \$15 to \$24 per annum more than ordinary farm laborers, and double what they could get in the shipping-tobacco regions. The following is the estimated cost of raising two acres of tobacco in Rockingham county:

Hire of hand and board, deducting time employed on other crops .....	\$75 00
Horse and feed while employed in crop .....	20 00
Use of plow, harness, and wagon .....	3 00
Fertilizers .....	10 00
Use of barn and fixtures .....	2 00
Hauling to market .....	2 00
<b>Cost of two acres .....</b>	<b>112 00</b>

Product, 1,200 pounds; cost per 100 pounds, \$9 33.

The cost of production decreases going west, and this may be regarded as about the average cost of growing tobacco in North Carolina. An account of sales of a small crop is given, which shows the proportion of grades, range of prices, and cost of marketing fine tobacco in this county:

152 pounds, at 10½ cents .....	\$15 96
224 pounds, at 12 cents .....	26 88
235 pounds, at 30 cents .....	85 80
37 pounds, at 53 cents .....	19 61
<u>639</u>	<u>148 25</u>
Charges:	
Warehouse .....	\$0 70
Auction fees .....	85
Commission, 2½ per cent .....	3 70
	<u>5 25</u>
Net proceeds .....	<u>143 00</u>

The following statement shows the production, acreage, yield per acre, value of the crop in farmers' hands or in primary markets, value per pound, and value per acre of the tobacco crops of North Carolina for the years 1876 to 1879, inclusive, only the figures for 1879 being from the census returns:

Year.	Production.	Acreage.	Yield per acre.	Value in farmers' hands.	Value per pound.	Value per acre.
	<i>Pounds.</i>		<i>Pounds.</i>		<i>Cents.</i>	
1876 ....	20,351,152	43,672	466	\$2,849,161	14.00	\$65 24
1877 ....	22,819,790	46,571	490	2,567,220	11.25	55 12
1878.....	21,801,525	46,885	465	3,270,229	15.00	69 75
1879.....	26,986,213	57,208	472	3,805,056	14.10	66 51

It will be observed that the quantity produced each year varies less than in most of the states producing tobacco. This is due, in part, to the practice among farmers of making artificial "seasons" by watering the hills when the weather continues dry at planting time. In this way they never fail to get a crop planted.

It will also be observed that the value per acre is very low. This arises from the fact that fully three-fifths of the product is of a very inferior brown nondescript leaf, bringing very low prices. No idea can be gained from this tabular statement of the profits of growing yellow tobacco on soils well adapted to its production. The value of the product upon suitable soils often reaches \$250 to \$400 per acre.

It is possible that the average price returned in the schedules is too high; but the average of all grades in the market at Danville for the year ending September 30, 1880, was \$11 38 per hundred pounds, and it is generally conceded that the finest tobacco, and that which brings the highest prices in that market, is grown in North Carolina. It is therefore believed that the prices given in the schedules are very nearly correct.

### GEOLOGY AND SOILS OF THE TOBACCO REGION.

The appended report, by the state geologist of North Carolina, discusses fully the geology and the soils of the tobacco regions of the state.

#### REPORT ON THE GEOLOGY AND THE SOILS OF THE TOBACCO REGION OF NORTH CAROLINA, BY PROFESSOR KERR, STATE GEOLOGIST.

Until very recently the area of bright-tobacco production was confined to less than half a dozen counties—Granville, Person, and Caswell, in North Carolina, and Pittsylvania and Halifax, in Virginia—and in these counties the industry was limited to a few supposed favored spots or patches of a few farms, or, at most, to a few square miles of territory here and there. But within half a dozen years it has been ascertained that the area of soils capable of producing it under proper management embraces not only a considerable portion of the territory of the counties above named, but also includes two or three tiers of counties in North Carolina and two in Virginia, and in the former state it has pushed up under the flanks of the Blue ridge and crossed over and occupied several counties on the French Broad and Nolichucky rivers. Beside this rapid lengthening and widening of the territory proper, experiments set on foot within one, two, and three years in the heart of the cotton section, and in several counties within a hundred miles of the sea, have demonstrated that nearly the whole of that section of the state is equally adapted to this industry, so that now this tobacco is actually produced this year through a range of territory more than 250 miles long and nearly 100 in width, including thirty counties in North Carolina (nearly one-third of the whole) and five in Virginia. While the experiments made in the middle of the eastern (cotton) section have shown that the cotton soils generally of that region are adapted to the production of the bright tobacco, the experiments made on a much larger scale in the Midland, Piedmont, and Mountain sections have demonstrated the

practicability of extending the culture over the whole of those sections, the result being the conviction that this grade of tobacco may be produced in every county of the state, the controlling and determinant condition of its successful and profitable production being found in the character and texture of the soil, and being quite independent of climate within this wide range. In the discussion of these soils the natural and obvious geographical division of the territory may be adopted. This will give us: First, the Champaign district of the east, embracing parts of three counties, as may be seen on the map; second, the Midland district, embracing seventeen counties, fifteen in North Carolina and two in Virginia; third, the Piedmont district, twelve counties, nine in North Carolina and three in Virginia; fourth, the Mountain district, three counties. The first has an altitude (above sea-level) of from 50 to 120 feet, and lies under the isotherm of 60°; the second has an altitude of from 400 to 800 feet, isotherm 58°; the third, an altitude of from 1,000 to 1,500 feet, isotherm 57°; and the fourth an altitude of from 2,000 to 2,500 feet, isotherm 54°. The rainfall does not differ greatly for the several districts, being a little less for the Midland and Mountain districts, and a little more than the average for the Eastern, the average being a little above 50 inches per annum. If the geology of the several districts is considered, there is a notable uniformity through them all, except the Eastern. This last lies in the region occupied by the latest formation, the post-Tertiary or Quaternary; the other three occupy the other geological extreme, the Archæan, with the exception of two narrow interrupting zones of Triassic rocks in the Midland district.

**THE CHAMPAIGN OR EASTERN DISTRICT.**—The Quaternary formation in North Carolina consists of nearly horizontal, uncompact strata of sand, sandy clay, clay and gravel, the latter often irregularly stratified and false bedded. The thickness of this formation varies from a few feet to 20 and 30 feet, and occasionally reaches 50 feet and more. It forms comparatively a very thin covering of the underlying Tertiary marls, clays, and sands, which often come to the surface, especially along the bluffs and flats of the water-courses. The surface of the region is nearly level, or only slightly undulating, except along the borders of the streams, where it is channeled into hills and bluffs.

The subsoil is generally a yellow, sometimes gray (occasionally brownish or red) sandy (occasionally clayey) loam, and is covered by a few inches of sandy, gray soil, often dark-colored, from the presence of vegetable matter when freshly cleared, but bleaching in the course of a few years' cultivation. The growth is a mixture of long-leaf and short-leaf pine (*Pinus australis* and *P. mitis*), sometimes the one predominating and sometimes the other; in either case a subordinate growth of oaks of various species, post oak, white oak, black oak, red oak, black-jack, and hickory, and an undergrowth or scrub of gum, dogwood, huckleberry, honeysuckle (*Azalia*), etc. On the slopes of the hills in the neighborhood of streams, and occasionally where there is a larger percentage of clay in the soil and in the river bottoms, the pines become the subordinate and the oaks the chief forest growth.

There is no occasion to describe here all the varieties of soil and forest growth of the region, the extensive tracts of river bottoms, or the swampy, peaty soils, with the growth peculiar to such lands, on the one hand, nor, on the other, the sandy "pine barrens", as they are called, or "sand-hills", with their open, glade-like forests of long-leaf pine exclusively, or pine and black-jack, as these soils are not adapted to tobacco culture or not yet used for this purpose. The features which are common to soils of this section on which the bright-yellow tobacco has been successfully grown are of an open, sandy texture and light-gray color, with a gray or yellow sandy subsoil, *i. e.*, permeable and naturally drained, with a mixed growth of pine (long and short straw) and oaks, chiefly post oak and white oak, with undergrowth as above described. These are, of course, not fertile soils. They belong to the medium and poorer class of upland or ridge cotton soils, that produce not more than 300 pounds of seed-cotton to the acre. This district includes as yet only three counties—Wayne, Lenoir, and Sampson—although it might extend itself over the whole cotton belt of the two states. In fact, a number of sporadic experiments, even as far east as the county of Gates, have demonstrated its feasibility.

Let it be noted that, geologically, these are drift soils, and belong to Professor Johnson's class of "transported soils"; that the materials of the decomposed and comminuted rocks in the up country have been transported, generally by full and rapid glacial currents, and have been effectually sifted and sorted; and that most of the finer particles, the clay and the iron oxide, have been washed out and carried seaward, leaving generally only the heavier, coarser, sandy, and gravelly materials, with but little adhering and intermingled clayey matter. The conditions which determine their adaptability to the production of the bright-yellow variety of tobacco seem to be these: First, thorough drainage and consequent warmth; and second, a very small proportion of clay, iron, and humus.

A very notable peculiarity of the growth of the tobacco of this district is its early ripening. The golden yellow hue which indicates maturity anticipates the beginning of August, and the crop is gathered and cured before the first cuttings are made in the more westerly districts, and it is essential to the success of this crop in all the districts that it shall acquire the proper golden hue, *i. e.*, ripen on the hill, before being cut. This gives an advantage of a full month and more in the matter of liability to damage from drought and from excess of rain.

Another peculiarity of this district is worthy of mention, *viz.*, that a much larger proportion of its territory is adapted to the culture of this crop than in any of the other districts, amounting probably to fully one-half the area of the cotton region of both states. Another advantage hitherto found in this district is the comparative freedom from the ravages of worms, two hands being able to "worm" 25 acres.

THE MIDLAND DISTRICT.—This is the most extensive and important of the four divisions, as it is also the oldest; the one in which this industry took its rise and reached an extended development before being transplanted to other regions. This division is strongly contrasted in several of its physiographical features with the one already described: in its topography, in the geological origin of its soils, in some of their physical characters, and in their indigenous forest growth. This region is generally hilly, and is often described as the hill country, the streams having cut their way down through the decaying and easily abraded strata to the depth of 50, 100, and often more than 200 feet below the water-sheds or summits of the intervening ridges.

The bright-tobacco soils are very irregularly distributed, forming, even in the most favored counties, a small proportion of the whole area, and even of the tobacco-growing area. So controlling is the constitution of the soil that a part of the same farm, and even of the same field, may produce the finest brands known in the market, and another part be wholly incapable of making anything better than the commonest article. The quality of the tobacco is determined absolutely in the field before the cutting, and no manipulation in the handling or curing will make a "fancy-bright" tobacco out of a plant of inferior texture and color of leaf, although, of course, the best grades may fail and be spoiled in the curing. As a general statement, the bright-tobacco patches and belts of land are found on the ridges and benches, the divides between the water-courses. Wherever there is found on these ridges a subsoil of a gray or yellowish, gravelly, or sandy loam, covered with a gray, sandy, or gravelly soil, the bright tobacco may be grown. These favorable conditions of soil are always indicated by the native growth, and are readily recognized by the experienced tobacco raiser; and even in riding over a region for the first time he can with unerring certainty point out the best bright-tobacco tracts. The most noted sections of the district, which have obtained the highest prices for their product, are commonly described as pea ridges, chincapin ridges, and huckleberry ridges. The forest growth is usually of stunted oaks, chiefly post oak and white oak, generally mingled with pines (*Pinus mitis*), and sometimes with an admixture of dogwood, hickory, black-jack, or sourwood (*Oxydendron*). All these characteristics of the best bright-yellow tobacco soils are obviously also those of leanness and infertility. In fact, such soils are generally nearly worthless for wheat or corn, or for any other of the ordinary crops of the country, and until this new industry developed their capacity they were valued at \$2 or \$3 per acre, whereas they are now the most valuable lands of the district, most eagerly sought after, and are valued at \$10, \$15, \$25, and often more, per acre. Here, as in the eastern district, the distinctive features of these favored soils are, first, an open texture of soil and subsoil, securing drainage and warmth; and second, the absence or low percentage of humus, of clay, and of iron oxide, with the same (consequent) unproductiveness as to other crops. In the former case these conditions were found to be dependent on the geological origin of the soils, the constituents which would have made a more fertile soil having been eliminated by the mechanical and the chemical agencies by which it was found. In the Midland district the geological conditions are very different. The soils here are of the other class of "sedentary soils", formed by the decomposition and disintegration of the underlying rock *in situ*; so that whatever this rock contains is in general to be found in the soil. This carries us directly to the question of the relation of geology to the origin and distribution of these bright-tobacco soils, and suggests the important inquiry: What are the favorable conditions of geological formation and structure under which such soils may be expected to occur?

As already stated, the rocks of the Midland district belong to the oldest formation, the Archæan, and consist of granites, gneisses, schists, and slates of various structure and composition, indicated even to the casual and un instructed observer by difference of color, bedding, texture, and other obvious physical characters. These differences of physical characters indicate profounder differences of lithological and chemical structure and composition. A little observation suffices to show that wherever the rocks consist of light-colored feldspathic, binary granites, as about Oxford, in Granville county, or of light-colored feldspathic and quartzose gneisses and slates, as in the eastern part of Granville, the northwestern corner of Person, the southeastern corner of Caswell, the northwestern part of Alamance, and much of the northern half of Guilford, the middle of Rockingham, about Reidville, eastward and westward, for example, and the section of Pittsylvania, in Virginia, lying north of Danville for several miles—wherever this geological condition is observed, we have exceptionally good bright-tobacco soils. The mineralogical elements are wanting (or present in small percentage) in these rocks, which give rise by their oxidation and decomposition, to the rich, red-clay soils, on which are the large oak forests, the black and red oaks and hickories.

These latter soils are found overlying gray or dark-colored granites, syenites, greenstones, hornblende, and chlorite schists, and the like, and to their lithological constitution the derived soils owe their distinctive characters. Again, the bright-tobacco soils are found prevalent on the ridges, benches, and higher levels, as already stated, and for two reasons: first, the feldspathic (and quartzose) granites and slates are less readily decomposed and abraded than the more complex hornblende and chloritic rocks of the red soils, and hence the valleys are chiefly hewn out of these; second, on account of their situation and open texture, they are subjected to a continual leaching process by meteoric waters charged with organic acids, which dissolve and wash out, and thus continually diminish the percentage of clay mechanically, and of iron chemically. In addition, owing to their situation, they are older, that is, have been subjected to this leaching, improving process longer, than the soils on the slopes and hillsides, which are subjected to a greater amount of abrasion, and the consequent continual exposure of new surfaces.

This genetic relation of the soil to the underlying rock explains the obvious fact that the irregular patches and zones of bright-tobacco soils have generally their longer dimension in a northeast and southwest direction. This is the direction of the outcrops of the rocks, which has evidently exercised a marked influence upon the topography of the district, determining in some and modifying in many cases the direction of the streams and valleys, and so the trend of the ridges. Herein also is found the cause why no considerable area produces bright tobacco exclusively, not often even an entire farm of much extent; and also of the other equally familiar fact, that in regions and on isolated farms outside of the recognized bright-tobacco areas not unfrequently some of the best crops are produced, and beds and patches and ledges of the rocks adapted to the production of the proper soils are intercalated here and there among masses of unfavorable composition, and *vice versa*.

Such are some of the conclusions to which we are conducted by a general study of the more obtrusive facts connected with the culture of the bright tobacco of this district.

But one important feature of the district remains to be considered. Two tracts of quite exceptional character occur within the limits of the district, very nearly bounding it, in fact, on the northwest and on the southeast. Topographically, these tracts are notable as basins or troughs, whose trend is northeast and southwest. They are marked almost everywhere by a considerable depression below the general level of the surrounding country. They are notable also as furnishing the channel-ways of many streams, and when the course of a stream lies across their track they commonly end by changing that course to conform to that of these troughs. Geologically, they will be noted on the map as narrow ribbons of Triassic rocks. Lithologically considered, they consist of alternating beds of sandstones, sandy-clay slates, and shales, sometimes indurated, generally soft and little compacted, and readily yielding to the erosive agencies of a climate characterized by a heavy rainfall. It will be observed that nearly the whole of these tracts is included in the bright-tobacco territory, and most of them in the choicest areas, as, for example, Granville and Pittsylvania conspicuously. This is due to the obvious fact that these rocks, by their decomposition, usually give rise to light, sandy soils, with subsoils of corresponding open sandy texture, and furnish in general the class of soils already described as especially favorable to the growth of the bright-tobacco plants. These rocks furnish a much larger proportion of such soils than the granites, gneisses, and schists of the older formations, and are comparable in this respect to the Quaternary rocks of the first district. These zones of Triassic soils, it hardly need be said, are everywhere recognizable, even when the rocks are concealed by the forest and undergrowth already described as characteristic of the bright-tobacco soils, the pine being an almost invariable element, the white oaks, black-jacks, gum, sourwood, etc., being very prevalent. Of course, there are exceptional areas of very different soils, often of high fertility; but the general fact remains conspicuous that these Triassic soils are generally better adapted than those of older formations to the special industry under consideration.

The soils of many of the counties southward are just as well adapted to this industry as those included.

**PIEDMONT DISTRICT.**—The bright-yellow tobacco culture has been extended gradually during the last eight or ten years into this region, receiving an earlier and larger expansion in the counties of the district lying in Virginia than in those of North Carolina. Specimens of the product of this region (Wilkes county) were taken to Vienna in 1873 as part of the exhibit made by the geological survey of North Carolina, and were pronounced by experts to be equal to the best from any part of the world. Buyers in Reidville, Lynchburg, and elsewhere place the best product of this region with the corresponding brand from the older sections.

The description of the soils which produce this tobacco in the third district would be a mere repetition of that for the second. The rocks which give origin and character to the soils are of the same age and description. The characteristic growths are also the same, with the exception that the chestnut and chestnut oak are to be added. A peculiarity of the product of several of the counties of this district, mostly in Virginia, is a substitution in large part of the bright yellow by the mahogany tobacco. This is notably true of the eastern part of Henry and most of Franklin, except the southeast, and a considerable part of Patrick, and to a smaller extent of the adjacent counties of North Carolina. The most common variety, the Orinoco (popularly Iron Oak), and to some extent the Flannigan, is grown, especially in Henry county. This mahogany tobacco bears as good a price (and finds as ready sale) as the average of the bright-yellow tobaccos, and is preferred to these by most of the manufacturers of these counties, although they do not reach the fancy prices of the brights. Henry county is the chief producer of this tobacco, Franklin coming next, but making also a considerable quantity of the brighter brand, chiefly in the southeastern section of the county. Patrick county produces also a mahogany, but inferior to that of the eastern half of Henry. The soils which produce this quality of plant are very similar to those of the bright-yellow district, but the subsoil is brown to reddish, and the forests contain a greater variety of oaks, black and Spanish, replacing in part and mingling with the white oak, black-jack, chestnut, etc. There is a less proportion of feldspathic and quartzose gneisses in these counties than is found generally in the second district, and less than in several of the counties of the third in North Carolina.

**MOUNTAIN DISTRICT.**—The culture of tobacco for market is of very recent introduction into this district. About five years ago the subject began to attract attention in Madison county, on the French Broad river, and in 1878 the tobacco product of that county was sold for some \$50,000; that of 1880 is estimated at \$225,000, which means about 1,000,000 pounds. The bright-yellow tobacco from this new quarter grades, both in texture and in color, in

Lynchburg and elsewhere with the best from the Midland district. A description of the soils and rocks of this region would be a mere repetition of that of the two districts preceding.

In Mitchell county this industry, as in the counties of the first district, at the other end of the state, is only three years old, but the success has been complete and the expansion enormously rapid, and a large proportion of the area of the county, as well as of the district, and of all the counties of it, is adapted to this culture. A very large part of Henderson county, and nearly as much of Transylvania, are to be added to the productive area. A few tentative experiments have already been made in these counties, more than sufficient to corroborate the conclusion suggested by the geology and the character of the soils.

It seems best to make a distinction between the bright-yellow tobacco region proper and that section of the Piedmont district, which, while entitled to be placed within the area of "bright-yellow" production, is especially characterized by its "mahogany tobacco".

## SOIL ANALYSES.

	1.	2.	3.	4.	5.	6.
Silica, soluble.....	2.67	1.24	4.35	1.10	0.07	3.84
Silica, insoluble....	89.00	91.00	90.85	90.10	76.88	77.00
Alumina.....	2.40	1.24	1.22	0.71	12.40	6.97
Oxide of iron.....	0.24	0.52	0.42	0.65	3.57	4.07
Lime.....	0.23	0.08	0.20	0.13	0.51	0.10
Magnesia.....	0.10	0.09	0.76	0.14	0.33	0.29
Potash.....	0.04	0.08	0.00	0.07	0.16	0.11
Soda.....	0.00	0.00	0.00	0.00	0.45	0.00
Phosphoric acid....	0.04	0.04	Trace.	Trace.	0.09	0.05
Sulphuric acid.....	0.01	0.03	Trace.	Trace.	0.02	Trace.
Chlorine.....	0.02	0.01	0.02	0.01	Trace.	0.00
Organic matter.....	4.90	4.15	2.50	2.40	4.00	6.65
Water.....	0.40	0.80	0.30	0.20	1.07	1.10

The first three of these represent the bright-tobacco soils of the first district, the first from Sampson county, the second from Wilson, and the third from Columbus. They are all just such soils as are described in the remarks on the Champaign district as producing the bright-yellow tobacco, and represent a large proportion of the lands of the district. No. 4 is from one of the most famous of all the bright yellow tobacco localities in the southeast corner of Person county. The sample was taken from a farm part of whose product was sold at \$2 per pound. It was taken one foot deep (as all the others) in the forest adjoining the field where the fine "fancy bright" had been raised. The growth is post oak and white oak of moderate size, hickory, dogwood, sourwood, and a few pines. The soil is sandy and gravelly, of a light-gray color, and the subsoil is of the same texture, but yellowish in color. The rock is quartzose, feldspathic, slaty gneiss.

No. 5 is from the bright-tobacco section of Catawba county, in the Piedmont district, in the town of Hickory. The growth is medium to small-sized oak, black-jack, sourwood, and pine; the soil yellowish gray, a little sandy; the subsoil yellowish brown, sandy.

No. 6 is from Mitchell county. It does not represent the precise variety of soils on which the fine tobacco of that county is produced. It is very much like the last in color and texture, but is much poorer. The growth is chestnut, Spanish oak, post oak, sourwood, and laurel (*calmia*). These last two soils resemble more the mahogany-tobacco soils of Henry and Franklin counties, in Virginia.

These are all virgin soils, and therefore contain a much higher percentage of humus than ordinary cultivated bright-tobacco soils, this element being subject to very rapid diminution on account of the sandy and porous texture of the soil, and of course but a small percentage of it is in an available condition.

All of these soils would be classed as poor from the analysis. The low percentage of clay and of iron is also notable, except in the last two, which are not bright-tobacco soils.

## CHAPTER XIII.

## CULTURE AND CURING OF TOBACCO IN OHIO.

A gentle, ridge-like elevation, whose slopes are scarcely perceptible, stretches diagonally across this state from Trumbull county, in the northeast, to Mercer and Darke counties, in the west, forming the "divide" in the hydrography of the state. The general elevation of the state is from 800 to 1,100 feet above the sea. The highest point, a spot in Logan county, is 1,540 feet above sea-level, and the lowest 433 feet, the latter being low-water mark of the Ohio river near Cincinnati. The streams which flow southward from the "divide" have cut out many wide and fertile valleys, which are not excelled in natural fertility by any on the continent. The southern slopes of the water-shed are well adapted to the production of the cereals, while the northern slopes furnish grazing lands of a very high order.

## CLIMATE.

The climate of Ohio is one of considerable extremes, being very cold, as low as  $-16^{\circ}$  in winter, and very hot, from  $94^{\circ}$  to  $100^{\circ}$  in summer, the thermometer marking an extreme range of  $116^{\circ}$ .

The annual mean temperature for ten years at Cleveland (latitude  $41^{\circ} 30'$ , elevation 660 feet above the sea) is 49.77 degrees. The annual mean for January, the coldest month, for the same period was 27.36 degrees; for the hottest month, July, 72.57. This will give the mean annual range of the thermometer 45.21 degrees.

Observations taken at Cincinnati (latitude  $39^{\circ} 6'$ ) for sixteen years by George W. Harper show the average annual mean temperature to be 54.67 degrees; the mean for the coldest month, January, 31.20, and for the hottest, July, 78.61. The greatest annual precipitation for the same period was 49.17 inches, in 1858, and the lowest 28.03 inches, in 1870. The highest average for any one month was for May, 4.12 inches, and the lowest, February, 2.33 inches.

For Cleveland, observations for ten years, taken by G. A. Hyde, show the average annual rainfall to be 35.59 inches. The greatest rainfall was in 1866, which reached 48.91 inches, and the lowest in 1863, which was 30.76 inches.

The amount of precipitation varies greatly in different portions of the state. The following table has been compiled from the geological survey of the state and from other sources:

Place.	Latitude.	Length of period of observation.	Average annual amount of precipitation.
		Y. M.	Inches.
Portsmouth.....	$38^{\circ} 45'$	20 0	38.33
Cincinnati.....	$39^{\circ} 06'$	31 0	44.87
Marion.....	$39^{\circ} 25'$	47 11	42.70
Urbana.....	$40^{\circ} 06'$	11 0	40.31
Cleveland.....	$41^{\circ} 30'$	11 8	37.61
Kelley's Island.....	$41^{\circ} 30'$	7 6	33.24
Hudson.....	$41^{\circ} 15'$	11 4	35.26
Toledo.....	$41^{\circ} 39'$	6 0	30.46

## GEOLOGY.

The geological formations of the state are mainly horizontal. An arch or slight anticlinal extends from lake Erie through Cincinnati into Kentucky and Tennessee. From this arch there is a slight dip westward to the Illinois coal-fields and eastward to the Appalachian range. The principal formations are the Lower Silurian, the Upper Silurian, Devonian, Carboniferous, and Glacial. The Silurian forms a belt from Cincinnati northward to the lake; the Devonian is found in the northwestern corner of the state, and also in a belt running through the state from north to south, separating the Silurian from the Carboniferous in the southeast. The eastern part of Ohio, constituting nearly one-third of the state, belongs to the Carboniferous era, the northern and western to the Devonian, the center to the Upper Silurian, and the southwestern to the Lower Silurian. The bed-rock of this region is the Cincinnati group of limestones, the blue limestone of the Trenton period being the chief; but for the greater portion of this latter area this limestone is covered by drift.

There are three well-defined tobacco-growing districts in Ohio. These districts may be called, for the sake of description: 1, the Burley district; 2, the Seed-Leaf district; 3, the Spangled Tobacco district.

## BURLEY DISTRICT.

The first, or the Burley district, is confined mainly to three counties, lying on the Ohio river, viz: Adams, Brown, and Clermont. These counties commercially belong with the great Burley tobacco-growing district of Kentucky,

It is not ascertained at what period tobacco began to be grown in these three counties. Unquestionably its culture has been carried on to a greater or less extent for half a century, but the type has been changed from a shipping leaf to an article suited to domestic manufacture. The following table exhibits the production in the district for each census year from 1840 to 1880, inclusive:

	1840.	1850.	1860.	1870.	1880.
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
The district.....	131,398	1,493,518	2,482,836	4,009,978	10,823,183
Adams.....	88	29,500	43,060	102,478	1,054,076
Brown.....	63,260	1,279,510	1,808,846	2,687,743	6,244,956
Clermont.....	68,050	184,508	630,930	1,210,762	3,524,151



From 1840 to 1850 there was an increase of 1,036 per cent.; from 1850 to 1860, the next decade, an increase of 66 per cent.; for the ten years ending in 1870 an increase of over 61 per cent.; and the decade ending in 1880 shows a still further increase in ten years of 170 per cent.

This rapid growth of the tobacco interest in these three counties is due to two causes: one, a fortunate development of a variety, and the other, the change in the demand of manufacturers and consumers for a milder type, in place of the heavier grades which thirty years ago were employed in making plug. Up to 1866 the farmers of the Burley district raised what is now known as Red Burley. This variety cured up a reddish or cinnamon color, was very light and chaffy and almost destitute of gum, and for that reason was used for cutting into fine shreds and making a particular brand of chewing-tobacco, being a mild, pleasant product. The White Burley had its origin in Brown county. A farmer named George Webb, living near Higginsport, in that county, in the year 1864 sowed his seed-bed with Red Burley seed, which is said to have come from the farm of Joseph W. Barkley, of Bracken county, Kentucky. The plants came up and except in one particular spot were very healthy. Here they had a whitish, sickly appearance, and when the time came for setting out his crop these were left in the bed, as they were thought to be worthless. Finding, however, that he still lacked enough to set two rows, he returned to his seed-bed and drew out the sickly-looking plants and used them, rather than go to a neighbor for a quantity sufficient to finish his crop. For two or three weeks the white plants seemed to grow but little, but when they became well rooted they grew with greater rapidity, and the tobacco grew rapidly to fine size, retaining all its creamy richness of color, and ripening two weeks earlier than any other tobacco in the field. When cured in the ordinary way, by atmospheric influences, it was discovered that on the under side of the leaf there was a whitish tinge, while the upper side was of a beautiful golden yellow. A few plants were cut and cured which measured near 6 feet in length, and were put on exhibition in the Bodeman warehouse, in Cincinnati. Buyers gave encouragement to its further cultivation, and the next year (1865) the gentleman on whose farm it originated planted 10 acres, from which 11,000 pounds of tobacco were gathered, which was very handsome and silky, and had all the characteristic marks in coloring which the sample of the previous year had displayed. This tobacco, when put on the market, brought from 25 to 45 cents per pound, and a premium of \$300 was awarded, in addition to this large price, to the successful grower. From this beginning the White Burley has gained the position noted in the description of other states, especially in that of Kentucky.

The district consists of a river valley, fringed by bluffs of modified drift, rising to the height of 500 feet above the low water of the Ohio river. These bluffs run off into a plateau, sometimes deeply gashed by numerous tributaries of the Ohio and the Little Miami, but generally the erosion has not been deep, and frequent instances occur where small streams meander through broad valleys. Broad stretches of level land are found, sometimes so flat that in times of excessive rains they overflow and form temporary inland lakes. The main axis of the Cincinnati group passes through Clermont county.

The limestones are even bedded, and vary in color from a dark-blue to a buff. These beds have a gentle dip to the north, as well as to the east or to the west, the latter especially in Clermont county, and many beds appear along the river, which lie below low-water mark at Cincinnati. Some of these beds are full of fossils, and analysis shows that potash, soda, and phosphoric acid enter largely into their composition.

The drift deposits are extensive, and contribute mainly to the formation of the soil. Every part of the district, except the slopes of the hills that border the streams and the more recent drifts of the Ohio river bottoms, is covered with them. It is a fact well established that the drift formations of this region contain much less imbedded gravel than the region on the Miami river and districts further north. This drift is composed largely of clays, and its thickness varies from 10 to 50 feet. Its usual thickness, however, is about 20 feet, and it is composed for the most part, according to a recent geological survey, of the following materials, beginning at the surface and descending:

1. Surface clays, generally white, sometimes darkened by an accumulation of humus, especially in swamps or basins.
2. Yellow clays, abounding with limestone gravel, forming the surface where the first has been carried away by denudation.
3. Forest bed, a dark carbonaceous clay, abounding in the remains of vegetable matter; often peaty; generally resting upon a bed of bog-iron ore 1 or 2 feet in thickness.
4. Hard-pan, a blue, compact, putty-like mass, with occasional layers of intercalated sand. This last generally rests upon the bed-rocks. This clay contains pebbles and boulders, mostly of limestone.

The soils of the district may be divided into four classes, viz: 1, native soils, formed from the disintegration of the bed-rocks of the country; 2, drift soils of the uplands; 3, black soils of swampy places; 4, alluvial of the river bottoms.

The soils of the first class are not widespread, but are confined to the slopes of the streams. Some of them abound in vegetable humus, and are dark in color, very friable, and exceeding fertile. When the soil is deficient in vegetable matter, it is of a reddish hue, though always fertile. This fertility is derived from the large amount of carbonate of lime, potash, soda, and phosphoric acid which often abound in the limestone rocks; and their fertility is still further increased by the arenaceous character of the limestone, which makes them open and light. They wash easily, however, on account of their slight depth and the general unevenness of the surface where they exist, but are preferred for tobacco. The chief trees are sugar maple and walnut.

The drift soils may be further subdivided into yellow clays and white clays.

The yellow-clay soil is derived from the weathering of the drift, which is largely composed of limestone pebbles. These soils contain occasional seams of sand and gravel. The surface, however, is made up of one or two feet of whitish, fine-grained clay, comparatively free from gravel, which is due in part to the decay of vegetable matter and in part to the work of earth-worms and animals, which bring up the fine particles from beneath.

The white-clay soil is identical in character with the last described, except as to its origin, and changes to a yellowish hue under the surface. Analysis shows a considerable amount of potash and soda in its composition, as well as phosphate and carbonate of lime and carbonate of magnesia. It also contains over 6 per cent. of the sesquioxide of iron.

The black soils of the swamps are for the most part composed of humus in a greater or less degree of decay, and when sweetened by aeration are very durable and highly productive.

The alluvial soils of the streams partake of the nature of the region whence their material has been derived, sometimes being very sandy, sometimes gravelly, and at other times highly argillaceous and stiff, but generally very productive; but the soils on the smaller streams are not generally so sandy as those on the Ohio river.

#### COMPARISON OF RECENT TOBACCO CROPS.

In Clermont county the increase in the acreage of tobacco has been very rapid. It was 20 per cent. greater in 1879 than in the previous three years, and the yield also is reported to have been 10 per cent. greater.

In Brown county the area planted in tobacco was 20 per cent. greater in 1879 than in 1878, 12 per cent. greater than in 1877, and 20 per cent. greater than in 1876. The yield for the census year is reported as 5 per cent. less than in 1878 and 8 per cent. less than in 1877, but 12 per cent. greater than in 1876. The crop of 1879 was greatly inferior in quality to that grown for the two years preceding, because of damage in curing, the season being a very unfavorable one. It was characterized by large stems and thin web or fiber, and lacked body, and was very much like the crop of 1876, though not of such a thin, flimsy character.

In Adams county the acreage was 20 per cent. greater in the census year than in the year previous, 25 per cent. greater than in 1877, and 50 per cent. greater than in 1876. The yield also was 5 per cent. greater for 1879 than for either of the two previous years.

Taking the whole district, it is safe to say that within four years the average of the crop has been increased by 25 per cent.

#### VARIETIES OF TOBACCO GROWN.

The White Burley, the only variety grown to any extent, is of medium size, the leaves usually attaining a length of about 24 inches, sometimes, however, on heavily-manured lots, reaching a length of 42 inches. It has generally in growing cream-colored leaves, but these run into various shades of green; so that a field shows a great variety of colors, from a milky white to a deep sea-green.

The Red Burley, which produces a greater number of pounds to a given area, is planted to some extent; but the quality is not so fine, nor does it command such ready sale as the white variety.

The White Burley is losing some of its distinctive features. At first the stalk and leaves were white, but each successive year shows a larger proportion of green. The original White Burley, when cured, had a golden surface; but this golden color is giving place to a yellowish-brown or red, and each successive crop shows a nearer approach to the Red Burley.

Nine-tenths of this product is taken for the home trade. It is used for making fine-cut, for plug fillers, for smokers, and very recently it has been used in the place of mahogany wrappers for plug, and these are said not to blacken under pressure, as many of the fine wrappers of the West do.

When this variety of tobacco is planted on bottom lands with a large admixture of sand it cures up bright in color, but is not so heavy in body as when grown upon a clayey, calcareous soil; but when planted upon a hillside it has a good body, a fine stem, a more delicate fiber, and a better flavor. The soils of the maple swamps, when cleared and well drained, are said to grow a very superior quality of tobacco, noted for its beauty and for its fineness of leaf. On strong limestone soils it grows heavy and cures a dark color, and this color can be improved by planting more closely, but it will have less body. Newly-cleared land, with a good proportion of clay, makes the most valuable leaf, but does not produce so many pounds to the acre.

In 1869 all the tobacco grown in this district was graded as cutting leaf and dark shipping, the latter constituting one-third of the crop. The grades for 1879 show a marked change, and are variable in different parts of the district, the extremes being as follows: Dark shipping, 0 to 10 per cent.; fillers for plug, 5 to 33½ per cent.; smokers, 16 to 25 per cent.; and cutting, 20 to 66 per cent. The average of the crop would probably be: Dark shipping, 3 per cent.; fillers, 30 per cent.; smokers, 17 per cent.; and cutting, 50 per cent.

Since 1869 the dark shipping has been reduced to almost nothing, and whatever of this grade is now produced results from accident, rather than from design. There were no fillers for plug in 1869. These constitute now 30

per cent. of the crop, and the demand for them is increasing so rapidly that much tobacco graded as cutting leaf is sold for fillers. The nondescript is wanting entirely, all suitable for that grade in other varieties being placed with the smokers, to which the significant name of "trash" is given.

The improvement in quality of the product of the same grade has not been very marked in the past ten years, though there is a better demand for the tobacco grown in the district, because it is used for more purposes than it was in 1869. The best crops of White Burley were grown in 1877 and 1878. Probably the change in the relative quantity of cutting leaf and fillers will amount within the past three years to 10 per cent., the fillers increasing and the cutting leaf diminishing. Nor is this the result entirely of natural changes. A few years ago, when there was a very limited demand for fillers, the object of the planter was to increase the proportion of cutting leaf and to diminish the quantity of fillers. Tobacco was planted thickly and topped high, so that the thin and gumless leaves, suitable for cutting, might be in excess. Now a wider space is given the plants, and they are topped much lower; and the consequence is that the growth has more gum, body, and sweetness, and is far preferable for fillers. Nine-tenths of all the Burley tobacco grown is taken at high prices in the United States. A little trash is exported, because it is needed in making bright smokers, and brings as much in the market as the good leaf of heavy export tobacco. There is no lack of inquiry abroad for the White Burley or the Red Burley, but the American manufacturers will pay higher prices for tobacco than the buyers of any other country will pay here.

The alluvial soils, both sandy and clayey, are cultivated extensively in tobacco. On the Ohio river the alluvial soils, in their primitive condition, are covered with sycamore, red maple, hickory, Spanish oak (*Q. palustris*), white oak (*Q. alba*), and burr oak (*Q. macrocarpa*). On the bottoms of the smaller streams are found sugar-tree, buckeye, beech, hickory, and various species of oaks. The northwestern slopes, characterized by a rich, black soil and a growth of walnut, linden, and sugar-tree, with an undergrowth of papaw and grape-vines, are often planted. The northeastern slopes have soils not so dark in color, but they are clothed with the same forest trees as the northwestern slopes, with the addition of ash and black locust. Both of these situations are selected for the growth of tobacco, but the latter is preferred. Of the crop planted in 1879, at least 15 per cent. was grown on freshly-cleared lands, which produce a brighter, smoother, lighter-colored leaf than the old lands, of a much finer fiber, and which will bring a higher price by 10 per cent. for like grades. The tobacco grown on level lands is generally coarser and of a darker color than that grown on rolling lands, and in seasons of extreme humidity it frequently suffers from "sunstroke" and "sore shin". These flat lands were originally maple swamps, and great care is necessary to secure good drainage.

While the soils of the Ohio bottoms produce excellent tobacco, the rolling lands are preferred, on account of their freedom from overflows of the river in summer and fall. For the Red Burley the bottoms are most suitable, but the white variety does best on uplands.

It is a source of solicitude that, though this district was at one time considered equal in fertility to any portion of the upland districts of the state, the diminution in the yield of staple crops within the past twenty-five years has been from 25 to 50 per cent. This is the more alarming because very few farmers even now pay any attention to the fertilization or the preservation of their lands. In many places the sides of the hills are scarred and ribbed with deepening gullies, which form channels, down which the rich plant food is carried by every rain. From the testimony at hand, even in the cultivation of tobacco—a crop which is well known to be a voracious feeder—not one farmer in twenty in Brown county considers it necessary to apply fertilizers to restore or to preserve the fertility of the soil. In Clermont county one farmer in five makes use of fertilizers in the growing of the crop, and in Adams county the number is so small as to be inappreciable.

The general practice with new lands is to plant two or three crops of tobacco in succession, the third crop showing a decrease in the yield of from 200 to 300 pounds per acre. If the land is able to endure this first heavy draft upon it, wheat follows tobacco in the fall of the second or the third year, and in the spring clover is sown on the wheat. The more thoughtful farmers will permit it to remain in clover for the two years following, when corn succeeds; many, however, only leave the clover for one year, when it is put in corn or in tobacco, at the convenience of the farmer. Tobacco grown on clover lands is coarse and heavy, and is greatly inferior to that grown upon fresh lands, or even after corn.

When fertilizers are applied in liberal quantities on the thin soils a very marked effect is produced in the yield, especially if the season is favorable, making it from one-fourth to one-half larger. The quality of the leaf, however, is coarser, but heavier even than upon river bottoms without fertilizers.

Rye is considered a good crop to rotate with tobacco and to prevent rapid exhaustion of the soil. In the succeeding spring clover is sown on the rye, and is allowed to stand one or two years, and it is said that on lands so treated a good crop of tobacco may be produced every third or fourth year. A few sow rye in the fall and turn it under just before planting the tobacco crop in the succeeding spring, and this practice is said to be very beneficial.

With the very small attention given to fertilizing it is not surprising that farmers complain that the average production per acre is rapidly declining. Ten years ago from 1,200 to 1,500 pounds per acre was thought to be a fair average crop. Enumerators' returns make the average yield per acre for 1879 only 961 pounds. This statement will probably correctly represent the deterioration in the productive capacity of the soils, and even this low estimate would be still further reduced but for the almost universal practice of planting from 10 to 20 per cent. of the crop on virgin soils each year.

## SEED-BEDS.

The management of seed-beds is mainly as described in chapter III. As soon as the land becomes dry enough in the spring—from the middle of February to the middle of April—a spot is selected in the woods on the northeastern slope of a hill and cleared. If no such slope can be had, any good moist (not wet) soil in or near the woods will do, but virgin land is preferred. In this part of the state the land is burned with wood or brush.

The extreme limit of transplanting is from the 15th of May to the 4th of July. Very little, however, is set out so early as the first date given or so late as the last, and the bulk of the crop is planted between June 1 and June 15.

## PREPARATION OF SOIL AND PLANTING.

The soil for tobacco is prepared by reversing the soil, either in the fall or early spring, with a turning-plow, going to the depth of 6 or 8 inches. Just before the plants are large enough to transplant the soil is again broken with a shovel-plow, usually so as not to reverse the soil, and by frequent harrowings afterward it is reduced to a fine tilth. The distance between the rows is variable, some farmers laying them off  $2\frac{1}{2}$  feet, others 3, others  $3\frac{1}{2}$ , and many others 4 feet apart. The latter distance is preferred when tobacco of good body is desired, but when a cutting leaf only is to be produced the shorter distances are adopted. When the field has been marked off, hills are made in the furrow, sometimes 2 feet apart, but generally 30 inches. The plants are usually set out after a shower, but in dry seasons, when they are liable to become overgrown in the seed-beds, they are set in hills artificially watered. This is generally done in the cool of the evening, and when done properly very few of the plants perish.

The amount of cultivation which the tobacco receives varies much with the weather. The land should always be stirred after every rain as soon as it is in proper condition to work, either with a shovel, turning-plow, or with a cultivator, and the dirt should be drawn up to the tobacco with hoes at least twice, so as to make a broad, flat hill. Two or three plowings and as many hoeings are always sufficient to bring it to the period of topping.

## TOPPING TOBACCO.

This is done when the blossom buds appear, which, on new land, is in about forty days, and upon old land from forty to fifty days, after transplanting. The number of leaves left to the plant is determined by the fertility of the soil, the time at which it is topped, and the character of the tobacco which the planter desires to produce. If the season is early, and the land very fertile, to make the best cutting tobacco from sixteen to eighteen leaves should be left to the plant, but if the season is advanced it becomes necessary to top low, in order that the tobacco may ripen before killing frosts. If the planter, however, wishes to make tobacco of good body, best suited for fillers, no more than ten or twelve leaves should be left to the stalk, however early the plant may come in top, and this number must be decreased as the season advances.

No "priming" is done, and when cut and cured the lower leaves, often half burned by the parching heat of the ground, are put in the trash grade.

## SUCKERING, CUTTING, AND CURING OF TOBACCO.

After the process of cultivation has been finished and the field topped the suckers are carefully removed from the plants as they appear and the horn-worms are diligently sought and killed. This is kept up until the tobacco is ready to be harvested, which varies from four to seven weeks after topping, the time being governed by the season, kind of soil, number of leaves left on each plant, and the character of tobacco desired. A large proportion is cut within six weeks from the time it is topped, but on new land it will ripen sooner. Sandy soils will mature the plant a week or two earlier than clayey soils.

The cutting is done with a knife, the blade of which is placed at right angles to the upper two leaves, and a split is made down through the middle of the stalk to within 4 inches of the ground. The knife is then withdrawn and inserted under the lower leaves and the stalk severed. When cut, it is straddled over a stick stuck in the ground, conveniently placed for the person cutting. From five to seven plants are put upon each stick, the number being regulated by the size of the plants. When the plants have wilted sufficiently to handle without breaking they are taken to the barns and arranged on the tier poles, so as to permit the free circulation of air. A great many planters scaffold in the field, and when the weather is open and bright it facilitates the curing process greatly and economizes barn room, for after remaining on a scaffold for four or five days a third more may be hung with safety in the same space. Scaffolds are made with round poles and forks, the latter being driven in the ground and the poles placed on them 4 feet apart, and upon these the sticks are hung 5 or 6 inches apart.

The time of day preferred for cutting is the afternoon, as at this time there is no risk of sun-burning; and by the following morning the tobacco will be wilted sufficiently to be handled with safety.

In seasons of great humidity two causes conspire to make the curing of tobacco without fire very difficult. Though well ripened, in long continued wet weather the tobacco will become full of sap, and after it is put in the barn it requires a much longer time to effect a cure, even though the weather should be favorable.

The barns, many of them constructed of rough logs, with the spaces between left open, are too little secured against the invasion of dampness to make successful cures in very bad weather without resort to artificial heat, and this is only used as a preventive of house-burn or mildew, and not for curing. The cost of the largest and best barns in the district does not exceed \$500 or \$600, and the majority not even \$100 each.

A certain amount of dampness is desirable, in order that the plant may attain its highest perfection of color. Whatever the cause, if the leaf is entirely cured without becoming pliant during the process it becomes harsh.

During the past decade there have been two years in which the planters have had great difficulty in curing their crops. One of these was 1876, and the other 1879. Much "house-burned" tobacco was placed on the market, and much that was mildewed and "funked", estimated to equal one-fourth of the crop. House-burned tobacco is easily recognized by its rigid, lifeless appearance, never coming in condition even in the warmest and dampest weather. It retains only the form of the leaf, with all the valuable properties destroyed.

A large majority of the farmers in this district sell their tobacco loose to dealers at a stated price through, and it is delivered to them in hands, each one containing eight or ten leaves. The tobacco is stripped as early after the process of curing is finished as possible, and is hung up closely in the barns, where it remains until the weather is suitable, when the sticks containing it are put wider apart, to bring it into condition for packing in bulk.

Tobacco should remain in bulk several weeks, for nothing else improves the flavor and equalizes its condition so much. If it should go through the sweat while in bulk, so much the better, as it can be watched, and all danger from excessive fermentation can be avoided.

Farmers, as a rule, do not grade their tobacco very closely in stripping. A few who understand the best grading find their profits quite as great in handling, packing, and "prizing" the crop as in growing it.

Dealers and the best informed planters usually assort into five grades. The first grade consists of the bright perfect leaves of the crop; the second of the red perfect leaves. The third grade consists of the tips or top leaves of the plant, which, though perfect in form, have a greenish tinge, and are generally immature when the plant is cut. This grade is greatly lessened by low topping. The fourth grade is the worm-eaten and slightly damaged leaves; and the fifth grade, or trash, is made up of ground leaves. The second, third, fourth, and fifth grades are often thrown together.

After the tobacco has been properly assorted and has remained in bulk for a sufficient length of time it is taken up and packed in casks, 52 inches high and from 42 to 44 inches across the head. Some 500 or 600 pounds are first packed in the hogshead, when it is placed under a screw press, worked by hand with levers or sweeps, much like a cotton-press, and pressed down to about half the space it first occupied. The hogshead is again filled and pressed, and this process is continued until about 1,000 or 1,200 pounds are put in the hogshead. It is then headed up and sent to market. These hogsheads cost from \$1.75 to \$2 each.

The average price of the crop for the district in 1879, sold loose to dealers, was about \$12 per hundred pounds through. This, divided into grades, would give about 5 cents for trash, 10 cents for red fillers, and 18 cents for fine leaf. Local markets are established at every convenient shipping place, Higginsport and Ripley being the principal points.

COST OF TOBACCO PRODUCTION.

Good tobacco soils are rated very high in the Burley district. Lands capable of producing 1,500 pounds to the acre readily bring from \$75 to \$100 per acre, and inferior soils, those that will yield from 500 to 800 pounds per acre, are worth \$25. Wages by the year for field-hands range from \$12 to \$20 per month; by the day, in summer, from \$1 to \$1.50, the highest prices in both cases being paid for hands skilled in the cultivation and management of tobacco. A good hand can easily manage from 4 to 5 acres when the horn-worms are not troublesome.

To cultivate 5 acres and prepare it for market will require the constant work of a good man for twelve months. This quantity of land will make 7,000 pounds. The following estimate of the cost of growing tobacco on the best soils was made by four tobacco-growers of Brown county:

Dr.	
Hire of hand, twelve months.....	\$200
Board of same.....	108
Use of team for breaking land and feed.....	15
Use of team, harrowing, preparing for planting, etc.....	15
Use of team for three plowings.....	7
Use of tools, wagon, barns, etc.....	5
Rent of land, general price.....	40
	390
Cr.	
By 7,000 pounds tobacco, at 12 cents.....	840
Profit on 5 acres.....	450
Cost per hundred pounds, \$5.57.	

This estimate indicates a profit of \$90 per acre; but the average yield of the district is only 961 pounds per acre. At the same outlay for cost of production as that above given the cost per hundred pounds would be \$8 12. This estimate, however, is for a first-class crop, upon good land, and with best cultivation. The reduced yield is probably produced at less expense for labor, rent of land, etc., with a corresponding reduction in cost of harvesting and preparing for market—say 5 per cent.; making the average cost of production about \$7 70 per hundred pounds.

Dealers estimate the expense of prizing and marketing tobacco, including freight, insurance, inspection fees, and warehouse charges, at from 1½ to 2 cents per pound. The cost of selling is 1 per cent.; warehouse charges, \$2 upon every hogshead; inspection fee, 35 cents per hogshead; insurance, one-third of 1 per cent.

There is at Cincinnati, the principal market for Burley tobacco, a tobacco association chartered by the state of Ohio. A board is elected, one of whose duties is the election of an inspector. This inspector appoints a weigher for each warehouse, but such appointments must be confirmed by the board. A commission of reclamation is also appointed by the directors. This commission assesses all damages where the samples drawn by the inspector fail to represent the quality of the tobacco in the hogshead. These damages are paid by the inspector, who has recourse upon the dealer or planter who sells the tobacco. The last has the privilege of rejecting all bids within a limited time, so that, should the sample be inferior to the tobacco in the hogshead, he can have another taken. These checks and balances are happily adjusted to protect every interest, and but few complaints of unfair dealing are made by either buyers or sellers.

The following statement shows the production, acreage, yield per acre, value of crop in farmer's hands, value per pound, and value per acre of the tobacco crops of the White Burley district of Ohio for the years 1876 to 1879, inclusive. The figures for 1879 are from census returns; for the other years they are from state assessors' returns:

Year.	Production.	Acreage.	Yield per acre.	Value of crop in farmers' hands.	Value per pound.	Value per acre.
	<i>Pounds.</i>		<i>Pounds.</i>		<i>Cents.</i>	
1876.....	7,900,089	9,085	870	\$632,055	8	\$69 57
1877.....	9,596,096	9,772	982	671,709	7	68 74
1878.....	8,874,751	9,281	956	976,223	11	105 18
1879.....	10,826,083	11,255	962	1,209,202	12	115 43

#### SEED-LEAF DISTRICT.

The Seed-Leaf district occupies the largest portion of the two Miami valleys, and embraces the northern parts of Butler and Warren, a small area in the northwestern corner of Clinton, the western halves of Greene and Clarke (in the southern part of Greene, extending eastward so as to include New Jasper and Painterville), the southwestern corner of Champaign, the southern part of Shelby, and all of Darke, Preble, Montgomery, and Miami counties. Several adjoining counties in Indiana belong commercially to this district. Seed-Leaf is also grown to a limited extent in Wayne and Medina counties, in Chippewa valley, and in Defiance and in small parts of other counties in the Maumee valley.

#### HISTORY OF TOBACCO CULTURE IN THE MIAMI VALLEY.

About the year 1838 Mr. Thomas Pomeroy, from Suffield, Connecticut, moved to the valley, carrying with him some tobacco-seed from his native place. He planted a small crop in Miami township, Montgomery county, and its cultivation gradually spread to the neighboring farms. The only tobacco, however, reported for the census of 1840 from the present Miami valley district was 75 pounds from Clarke county.

The cultivation of the Seed-Leaf was confined to Montgomery county until 1850, when some farmers in the neighborhood of Alpha, in Greene county, began to grow it, the first persons engaging in its cultivation being George and Solomon Glatfelter. In 1851 a small quantity was raised in Butler county, in Dick's Creek valley. Within the next three or four years the cultivation of the Seed-Leaf extended successively into Warren, Preble, and Miami counties, and a few patches were grown in several of the counties from Virginia seed for domestic use previous to 1850. The census of that year reports 2,500 pounds for Butler, 1,460 pounds for Clinton, 135 for Champaign, 7,132 for Darke, 2,500 for Miami, 50 for Preble, and 2,601 for Warren. Montgomery county for the same year reported 196,971 pounds, or about 500 cases, which shows that its culture as a standard crop was becoming fixed.

The crops grown in Miami valley in 1850 and 1851 were estimated each year to amount to 2,000 cases, or 800,000 pounds. The crop in the succeeding year was largely increased, reaching 4,000 cases, or 1,600,000 pounds: an increase of 100 per cent. in a single year. All of these crops were marketed in New York. That grown in 1850 brought from 9 to 10 cents per pound, but that grown in 1851 only brought an average of 4½ cents.

The following statement of the crops grown in the valley up to 1880 was furnished by Mr. A. H. Nixon, of Dayton, Ohio, who has been a successful dealer in the valley for thirty years, and has kept memoranda of each crop :

Crops.	Planters' price.	Amount.	Remarks.
	<i>Cents.</i>	<i>Cases.</i>	
1852.....	8	4,000	
1853.....	5	7,500	
1854.....	4 to 8	2,500	Very poor crop.
1855.....	4 to 7	3,500	Beautiful and silky.
1856.....	12 to 18	4,700	Much pole-sweat.
1857.....	5 to 8	7,500	
1858.....	8	9,000	Over-sweated.
1859.....	6 to 7	12,000	
1860.....	5 to 6	13,000	
1861.....	5 to 6	1,400	Result of the civil war.
1862.....	5 to 6	1,400	Do.
1863.....	12½	40,000	High prices caused by scarcity.
1864.....	4 to 5	18,000	Tax and poor crop diminished production and price.
1865.....	5 to 6	20,000	
1866.....	7 to 8	13,000	Very good.
1867.....	5	13,500	White stem.
1868.....	10 to 13	15,000	
1869.....	8 to 9	18,000	
1870.....	12½	33,000	Quality medium.
1871.....	8½	35,000	Quality fair.
1872.....	6	20,000	Quality poor.
1873.....	8	40,000	Quality fair.
1874.....	6	25,000	Quality poor; want of body.
1875.....	5	25,000	Do.
1876.....	7	35,000	House-burned or pole-rotted.
1877.....	5½	35,000	Quality medium; some flea-bitten.
1878.....	8	30,000	Quality good.
1879.....	6	32,000	Quality common.
1880.....		40,000	Quality common; some flea-bitten.

AREA, GEOLOGICAL FORMATIONS, AND SOILS.

The counties and parts of counties in Ohio which have their drainage in the Great and the Little Miami rivers comprise an area of about 7,500 square miles. The total length of the valley is not far from 150 miles, and its greatest width 60 miles. The Great and the Little Miami flow nearly parallel, and their valleys are often united. The Great Miami is navigable for a considerable distance, and the Miami canal runs along the river for a distance of 70 miles, furnishing an easy outlet for the products of the soil. Beside these means of transportation, several lines of railroad have been constructed, which pass through the very heart of the valley.

Almost the entire region is covered with the drift formation, ancient or modified. The underlying bed-rock of all the lower valley is the Cincinnati group of the Lower Silurian. Farther up the Clinton and the Niagara rocks of the Upper Silurian form the rocky bed. The soils, with a few local exceptions, are formed from the weathering of the drift formation, and vary in fertility in proportion to the commingling of the sands, clay, and gravel and the amount of accumulated humus. A few places occur where a fine-grained clay, impermeable to water, forms the surface. Such places have physical defects that render the accumulation of humus impossible, and they form the most sterile soils in the lands adjoining the valley. These places occur on the sloping ridges, and are characterized by a deficiency of limestone pebbles.

The lands adjoining the river in the lower part of the valley are usually divided into three classes: 1, the alluvial bottoms; 2, the second bottoms; and 3, the gravel beds, or third bottoms.

The alluvial bottoms owe their origin to causes now in operation. They are formed of the sedimentary sands, clays, gravel, silt, and decayed vegetable matter gathered by the surface waters from the second and third bottoms and deposited in times of overflow upon the present flood plain. These various materials are deposited sometimes very irregularly, making sandy bottoms, loamy bottoms, clay beds, or gravelly bottoms, the manner of deposit being governed by the swiftness or the gentleness of the stream and by the currents and counter-currents produced by interfering obstacles. Most frequently, however, all the ingredients are mingled so as to form a very fruitful soil, and the regularly recurring deposits keep up a high fertility. Land shells are very common on this soil.

The second bottoms form a terrace about 30 feet above the first bottoms. The widespread plains of this terrace are the very best farming lands of the valley, and here are found the best tobacco and wheat soils of the region. The soil is loamy, and is characterized by the growth of sugar maple, walnut, oaks of various kinds, ash, hickory, mulberry, hackberry, elm, locust, buckeye, linn, soft maple, sycamore, tulip-tree, cherry, cottonwood, ironwood, white walnut, gum, and beech.

Rising above these second bottoms by gentle slopes, in which remains of the gravel beds appear, are the uplands, which are in the main highly productive, but have not the original strength of constitution of the soils of the first and second bottoms. Sometimes these lands are stubborn, and when there is a predominance of clay they are sterile. Boulders lie scattered in considerable quantities even upon the highest points, and in such abundance in some places as to preclude cultivation. The yellow, gravelly clays often form the main element of the drift, and are regularly stratified. There are also beds of blue clay underlying these, as well as the forest beds, 20 feet below the surface, in which stumps of ancient trees are still found, with roots firmly fixed in the hard pan.

Near the "divide", in the upper part of the valley, the soils are divided into—

1. Clayey soils, well adapted to the production of wheat and tobacco. This is the soil of the uplands and higher portions of the region. Its color varies from yellow to red and brown, but upon the water-sheds it is almost white. Free and porous usually, it is sometimes compact, tenacious, and difficult of tillage. The physical condition of the darker soils makes them produce more kindly, but they are not more durable than the white soils of the ridges.

2. The second class of soils is alluvial, generally confined to the river basins. Greenville and Stillwater creeks are bounded by wide stretches of these soils. They are usually dark in color, very loamy and friable, on account of the large admixture of sand or gravelly deposits, are rich in vegetable mold, and produce very large crops of corn.

3. A third class is ashen in color, light and friable, with a clayey subsoil. This soil is generally found in well-drained, low situations. Its excellence results from the character of the subsoil and from the large amount of decayed vegetable matter which has been incorporated with the clay by the untiring industry of insect life. Though limited in extent, this peculiar soil is held in very high esteem for the production of wheat, tobacco, hay, and corn. It will probably produce a greater diversity of crops than any other in this section.

4. The peat deposits are enumerated as constituting a fourth class of soils. They occupy depressions supposed to be the beds of marshes or ancient lakes, and the half-decayed vegetable remains, when well drained and aerated, become highly productive. Tobacco is sometimes planted upon these peat beds, but never until they have been relieved of superfluous water, when it is said to grow well and to exhibit qualities of high excellence. The material which makes up the peat beds is often used as a fertilizer, and when properly combined with stable manure it acts with readiness on all standard crops.

The soils in Shelby county are composed largely of vegetable matter, and are not all alluvium. Mr. John Hussey, of the geological survey, asserts that in some of the tributaries of the Miami the width of the bottoms is disproportioned to the size of the streams, the latter being very small and the former very wide. He attributes the width and the exuberant fertility of the lowlands to the fact that before the clearing away of the forests, owing to the very slight fall toward the streams, the water was impeded by rubbish and underbrush and stood on the ground for at least a portion of the year. The consequence was a large accumulation of vegetable mold, the vegetation which produced it growing up in swamps and along the sluggish courses of the streams. This soil is very fertile and very durable.

There are two classes of upland soil: first, the black soil, composed of the clay of the drift, intermingled with vegetable matter in a state of decay; and, second, the light-colored, thin soil, with but little vegetable material in its composition. The dark soils are of a kindred nature with the bottom soils, and result from the accumulation of vegetable matter in low places. In due course of time the vegetable matter became intermixed with the clay, and formed a rich, dark-brown loam. The clay of the light-colored, thin soils is very compact, is composed of a fine-grained material, which sheds water readily, and is deficient both in limestone pebbles and in greenstone boulders.

Montgomery county is the center of the tobacco interest of the district, and Miamisburg and Dayton furnish the largest primary markets, much of the tobacco produced in adjoining counties finding its way to these markets.

Probably the proportion of the clayey uplands and gravelly soils is somewhat less than in several of the counties of the valley lying near the "divide" between the waters of lake Erie and the Ohio river, with a corresponding larger proportion of second bottoms and black upland soils. The yellow and the black loamy soils are preferred for tobacco, and when in good tilth, and not partially exhausted by overcropping, they are very friable and produce kindly. A large preponderance of clay, unless ameliorated by turning under green crops, clovering, or high manuring, makes the soil too stiff, and, though some crops are grown with success on such soils, tobacco proves a comparative failure.

The timber trees, named in the order of their predominance, are sugar-tree, hickory, white ash, white oak, red oak, burr oak, walnut, beech, elm, blue ash, poplar, hackberry, linn, red maple, sycamore, butternut, dogwood, ironwood, and buckeye, all denoting a very high fertility; indeed, it is to be doubted if any other equal area can be found in the United States where so many kinds of trees grow, all indicative of the very best soils.

We find in the drift almost every variety of hard rock to be found on the continent, and a metamorphic series—feldspar, hornblende, diorites, schists, quartz, sandstones, and limestones, argillaceous clays tinged with the protoxide and the peroxide of iron—mingled in a thousand varying proportions, form the base of the soils. To these the leaves and decayed trunks and branches of a myriad generation of deciduous trees have been added, making a combination filled with all the elements of plant food.



Under excessive and long-continued cultivation the yellow upland soils become white and poverty-stricken. The black upland soils differ from the last only in the fact that they occupy more favorable positions for catching and retaining vegetable humus. This renders them light, friable, productive, and easy to work. They are always found in depressions, and are excellent corn and tobacco soils. Some analyses made of the various soils by Professor Wormley for the geological survey are here tabulated:

	Bottom soils.	White clay— unproductive.	Yellow clay, or common upland soils.	Upland black prairie soils.
Soluble in hydrochloric acid .....	<b>60.84</b>	<b>5.20</b>	<b>4.80</b>	<b>13.20</b>
Organic matter and water .....	3.53	0.80	1.13	5.18
Silicic acid .....	0.23	0.06	0.08	0.08
Iron, sesquioxide .....	1.80	2.80	2.09	2.50
Alumina .....	0.00	0.50	0.02	1.85
Manganese .....	Trace.	0.09	0.02	Trace.
Lime, phosphate .....	0.24	0.07	0.10	0.21
Lime, carbonate .....	50.87	0.21	0.35	2.48
Magnesia, carbonate .....	2.80	0.20	0.20	0.38
Soda and potash .....	0.59	0.10	0.10	0.10
Sulphuric acid .....	0.12	0.03	Trace.	0.06
Soluble matter found .....	60.07	4.95	4.18	12.70
Insoluble in hydrochloric acid .....	<b>39.16</b>	<b>94.80</b>	<b>95.11</b>	<b>86.80</b>
Organic matter .....	0.03	2.05	2.02	8.02
Silicic acid .....	26.05	85.52	80.12	64.12
Alumina and traces of iron .....	4.23	2.43	8.91	10.70
Manganese .....	Trace.	0.22	Trace.	Trace.
Lime .....	0.92	0.79	0.91	0.59
Magnesia .....	0.34	0.03	0.20	0.45
Soda and potash .....	1.40	2.62	2.84	3.00
Phosphoric acid .....	0.34	0.18	0.02	0.13
Insoluble matter found .....	39.31	94.54	95.62	87.07
Soluble matter found .....	60.07	4.95	4.41	12.70
Total matter found .....	99.08	99.48	99.80	99.83

The hills which surround the Chippewa valley reach a height of 1,200 feet above the sea. These great rolling hills rise up in gentle slopes. Their tops are supposed to indicate the surface of an original table land, which has been deeply eroded and cut into ravines and valleys, giving a wonderful diversity to the surface. The soils are clayey and adhesive, and are more suited to grazing than to tillage. The soil of the Chippewa valley is a very fertile sandy loam, exceedingly friable and generous, and is from 10 to 20 inches deep. It has a dark ashen color, and in consistency is rather fine-grained, though mellow. The trees indigenous to the valleys are elm, ash, beech, white oak, and sugar-tree. The second bottoms are the soils preferred for tobacco, being free from the dangers of overflow, and generally warm and dry. Some gravelly lands in Medina county are cultivated, but not with the best results.

#### COMPARISON OF CROPS.

The seed-leaf crop of Ohio was about 10 per cent. greater in 1879 than in 1878, and less by 12 per cent. than the crop of 1877, and 5 per cent. less than that of 1876, and the quality was greatly inferior to that of the two years previous. It was planted late, grew badly, had a greenish smell when cured, with but little gum, and in appearance looked as though it had been drenched in water. The crops of 1878 and 1877 were not only of large growth, but of excellent quality, ranking with the best ever grown in the state. The growth of the year 1876 was good, but the weather was unfavorable for curing, and much of the crop pole-sweated in the houses. Indeed, so excessive was the moisture, that in order to prevent an almost total destruction of the crop after it was harvested many planters during the curing season of that year had to resort to light firing.

#### VARIETIES OF TOBACCO GROWN.

Many varieties of tobacco are cultivated in Miami valley, the principal being the long-leaf Baltimore Cuba; Connecticut Seed-Leaf, five or six varieties, including Pennsylvania Seed-Leaf; Washington or Zimmer Seed-Leaf, probably the Baltimore Cuba, or a modification of that variety. All those mentioned are large and leafy. The Baltimore Cuba is generally preferred, because it yields well, sweats a uniform dark color, has a fine, silky texture, is tough, and has a good body. The Connecticut Seed-Leaf, while everything that could be desired as to size and delicacy of texture, does not cure up so readily with the dark color most desired by manufacturers, nor does it yield so much per acre as the Baltimore Cuba. The seed of the latter variety was grown by Sinclair & Son and sold to the Department of Agriculture, from which it was distributed. Still another variety was sent out by

this department, called the Graham. This has a good body, but on account of its narrow leaf is not so much liked by the manufacturers. By the farmers, however, it is regarded with much favor, because it will bear rough handling, wilts quickly when cut, and is not so liable to house-burn or pole-sweat. Little Dutch, a sweet-scented variety, grown principally around Miamisburg, was introduced into the valley by Mr. Rayendorf, who brought the seed from Germany. It has a narrow leaf, grows small and short, but is very popular with cigar manufacturers for fillers and binders, making a cigar with a flavor highly pleasant and odorous, resembling the Yarrow more than any other tobacco grown in the United States, and usually commands a very high price, selling for nearly one-third more per pound than the other varieties. The yield is not so great as that of the Baltimore Cuba by one-half. The chief reason assigned for raising it is that it is always in active demand. It requires great care in sweating, the leaf being very thin and easily damaged by that process. The production does not exceed 500 cases. There are probably thirty or forty local names produced by the interfertilization of these leading varieties, but they all resemble the parent plants in some leading characteristic. The most noted of these sub-varieties is known as the Black Leaf, but within the past two or three years the Spanish variety has been introduced from Wisconsin, and promises well.

Nearly all the tobacco grown in the Miami, Maumee, and Chippewa valleys is employed in the manufacture of cigars, and a considerable proportion is exported to Bremen and to Amsterdam, it being preferred to any other seed-leaf tobacco grown in the United States for exportation, because it retains a smaller proportion of water in its composition, and will bear the ocean sweat with less injury.

#### PREFERRED TOBACCO SOILS.

Tobacco grown upon the sandy soils of the first bottoms will attain fine size, but the leaves are rough and wanting in tenacity and fineness. Nor does it sweat well, coming out of that trying process brittle, with a dead lifeless appearance. When grown upon second bottoms or upon the yellow uplands it attains its highest perfection, being fine fibred, well bodied, elastic, and with good sweating qualities. It is exceedingly important that the soil be warm, dry, and well drained. Where it is very fertile, black, and charged with organic matter, tobacco sometimes fires, especially in a dry summer, and is apt to be coarse. There must be a fair proportion of clay in the composition of the soil, enough to give a certain degree of plasticity. This gives fineness to the tobacco. The soil preferred is a clayey loam, mulatto or yellowish in color, either upon the second bottoms or upon the uplands, where the original forest growth was, in the main, sugar-tree, walnut, and tulip-tree. When grown upon freshly-cleared lands, before the vegetable matter has been thoroughly incorporated with the soil, tobacco is fine but flimsy, and wanting in gum and toughness. Herein appears the difference in soil required for the best Burley tobacco and for the best seed-leaf. New soils, other things being equal, will always produce tobacco that will cure of a brighter color than that grown on old. The plug manufacturers using the Burley type demand a bright leaf, with but little substance, and the grower selects new land as best adapted to meet the wants of his customers; but the cigar manufacturer requires a leaf dark in color and strong enough to withstand the strain of rolling. The farmer, to supply this want, must take old land, clayey loam, highly manured if possible, and the larger the application of manure the better the seed-leaf becomes adapted to the purposes for which it is grown.

Rolling lands grow a finer leaf than level lands, for the latter, having oftentimes tenacious clays, are compacted by heavy rains to such a degree as to check the growth of the plant.

In the best seed-leaf crops grown there will be about two-thirds wrappers and one-third fillers and binders; but these proportions vary greatly with the variety planted.

Whether the quality of the tobacco produced now is equal to what it was twenty years ago is a mooted question among dealers and planters, and some believe that the quality has deteriorated in consequence of planting the same land so often in the crop. This has caused a decrease in the amount of gum, and a consequent want of body; so that the transfusion of the juices through the pores of the leaves is not so perfect as formerly, and the glossiness, suppleness, and finish of leaf have given place to a harsher, "shucky" feel. There is, in other words, a comparative lack of oily substance in its composition. In its greatest perfection the seed-leaf has the appearance of a dark-colored sand-paper, the minute pellicles covering thickly the entire upper surface. These globulous pellicles are charged with the gums and oils that give pliability, glossiness, "stretchiness," and life to the leaf. When these are imperfectly developed, or where they are wanting in resinous compounds, the tobacco becomes brittle, and cannot withstand the heat of the sweating process. Others among the growers and dealers of the valley maintain with a considerable show of reason that the quality has been gradually improving; that there has been no deterioration of quality, but that the sharp competition has raised the standard. They assert that every appliance for the handling of tobacco is better than it was twenty years ago; the barns are better; the varieties grown are better; the farmers better understand its culture and management; and that, so far as the soil is concerned, though the amount produced per acre may not be increasing, the virgin soils, which were then chiefly planted in tobacco, were so rank that the product was large, coarse, and bony. It is probable that the real truth lies between the two. In some sections of the valley very little attention is paid to fertilizing tobacco lands, and each successive crop shows a deterioration in quality.

Scattered here and there a few tobacco-houses may be seen well adapted to their purposes. The great majority, however, are temporary structures, with posts set in the ground, sides more or less open, often leaning to one side or to the other, and entirely out of keeping with the other buildings of the farm. Oftentimes a vacant space in a stock-barn, corn-crib, or chicken-house is the only provision made by the planter for harvesting his crop; and it cannot be expected that the profits, under such circumstances, will always be satisfactory. Indeed, the wonder is that so much excellent tobacco should be marketed from a district where so little preparation is made for properly curing and handling the crop.

The best farmers of the seed-leaf district pay great attention to fertilizing tobacco lands, and from twenty to forty loads for a two-horse wagon are frequently applied in the spring to every acre to be planted in tobacco. Occasionally, but rarely, some stimulating fertilizer is applied, to give the plant a good start; and it is estimated that the yield of tobacco is increased, even on lands of good fertility, fully one-third by a free use of manure. But an equal profit comes from the superiority of the tobacco produced, it being much richer, tougher, and of better body. It is a rule long established by experience that the quicker seed-leaf is grown, the soil and situation being the same, the better the quality; and in this is observed another marked contrast in growing this type and in growing the heavy shipping leaf. The best qualities of the latter are made by long but healthy growth. It must stand until the secretory glands have developed the globular structure of the plant to its utmost capacity, filling the vesicles with gums and other proximate elements. The value of export tobacco often depends upon its strength, as it is largely used for mixing with the inferior and milder kinds. The practice of fertilizing is, however, not universal. Two-thirds of the number growing tobacco fertilize but little, and many not at all. The greatest amount of manure is applied in Montgomery and Miami counties, where also the largest quantity of good tobacco is grown.

It is customary in the Miami valley, where land has been freshly opened, to grow tobacco five or six years in succession, and so great is the inherent fertility and strength of the soil that no perceptible difference is seen in the yield for three or four years; in fact, there is a positive improvement in the quality of leaf produced up to the fourth year. Upon old lands it is generally rotated with other crops in the following order: Tobacco, wheat, clover, corn, and tobacco. Clover is sometimes allowed to remain two years before the land is put in corn. Tobacco rarely succeeds clover, as damage from the cut-worm is more decided after clover than after any other crop.

#### PREPARATION OF LAND FOR PLANTING AND CULTIVATION OF THE TOBACCO CROP.

Usually the land intended for tobacco is broken up the preceding fall with two horses to the depth of 8 or 10 inches. Manure, if used at all, is applied broadcast in the spring, when the land is rebroken, and all the tobacco stalks on hand are cut up fine and placed on the land at this time, along with the other fertilizers. Sometimes the manure is plowed in, and again it is put on after the second breaking and harrowed in. Should the weeds grow very luxuriantly on the land intended for tobacco, or should heavy rains occur after the second breaking, it becomes necessary to break a third time.

After the last breaking, and just before the plants are large enough to set, the land is harrowed and marked off in rows, 3 or  $3\frac{1}{2}$  feet apart. The furrows are sometimes thrown on these, making a bed, and the hills made on the beds—if for the larger varieties, 3 feet apart; if for the smaller varieties,  $2\frac{1}{2}$  feet. Sometimes the hills are made in the furrow, the plant, when set out, being level with the general surface of the field. In dry seasons this, perhaps, is the better method, but in wet seasons it is better to have the plant elevated somewhat above the general level.

When the leaves of the plant are 3 inches long they are sufficiently large to transplant, and this generally takes place from the 1st to the 20th of June. If the weather is very dry, the hills are watered artificially; but on new lands this is not necessary, as the moist condition of fresh land is generally sufficient to insure the vitality of the plants, especially if the hills have been freshly made.

The amount of cultivation which the crop receives is sufficient to keep the land mellow and clean. A cultivator, a small harrow, or a double shovel is run between the rows three or four times, followed each time with the hoe, by means of which a small amount of dirt is pulled up to the plant.

No priming is done in the district, and the plant is topped in from fifty to sixty days after it is transplanted, when the blossom bud appears; but some wait until it blossoms, under the impression that it will ripen sooner. From twelve to eighteen leaves are left to the plant, and in a week the suckers are long enough to pull off. It is again suckered just before cutting, which for the seed-leaf varieties is from two to three weeks after it is topped; but the Little Dutch and the Spanish varieties improve in flavor by standing a week longer. The worming is constant, and a good tobacco-raiser never ceases to hunt for the worms from the time they appear until the tobacco is safely harvested in the shed. It is thought that when the seed-leaf stands too long upon the hill it is more liable to be injured by the presence of white veins, for which no satisfactory cause has yet been assigned.

The crop is cut from the 15th of August to the 20th of September. No bad effects result from rains just before cutting; in fact, it is thought by some to be advantageous in washing off any dust that may have settled upon the leaves. Heavy dews are also desired, not so much to thicken the leaves as to keep the tobacco from ripening too

rapidly. The seed-leaf is never permitted to ripen fully, but when yellowish spots begin to appear on the leaves, shading away into a ground of green, it is thought to be ripe enough to cut. When it ripens more fully, the color, after being cured, is too bright for wrappers, and the leaves are too thick.

The cutting in the seed-leaf district is done with a hatchet or a corn-knife, and sometimes with a saw, the stalk being severed near the ground and the plant laid back on the row. Here it lies until it wilts sufficiently to be handled without breaking, being carefully watched to prevent sun-burn. It is then speared on the laths in the same manner as in Connecticut, from six to ten plants being put on each lath, and after this it is carried to the sheds and hung upon the tier poles, the laths being placed 6 or 8 inches apart on the tiers, and the plants being evenly distributed on every lath as it is put in position.

A few planters still adhere to the old method of tying the plants with twine alternately on each side of the tier poles, a full description and drawing of which method is given in the article on Connecticut valley.

Whether scaffolding in the field is, on the whole, an advantage or a disadvantage depends entirely upon the weather and upon the quantity of available shed room. Where the latter is ample, it is thought best to carry the tobacco directly to the shed and place it in position; but if, on the other hand, a planter has a large crop and but little shed room he is compelled to resort to scaffolding or run great risk of damage from pole-sweat.

When the shed has been filled, the doors are kept open day and night, until the plants, by evaporation, have become thoroughly wilted and yellow; after which they are closed during the day and opened at night, so as to check the process of curing. Curing too rapidly injures the quality of the tobacco, and for this reason frequent rains are desired, so that the plants may come in condition and a transfusion of the juices through every portion of the leaf may take place. It is said to be a favorable sign in the process of curing when a delicate purplish color appears on each side of the midrib, and indicates that the land upon which the tobacco grew was well manured, and dealers who go through the country to inspect the crops during the curing process look to this as the most favorable sign by which to judge of its future quality.

In 1876 nearly one-fourth of the crop was lost by pole-sweat or house-burn after it was harvested. This was caused by overcrowding in the sheds and by continuous damp weather. Thorough ventilation, or drying of the atmosphere by artificial means, is the only effective preventive.

The best tobacco-houses in the district are built four tiers high, the tiers being placed  $4\frac{1}{2}$  feet apart, and the largest are probably 200 feet long and 32 feet wide, with a capacity of 20,000 pounds. The bents are from  $1\frac{1}{2}$  to 18 feet apart. The roof is covered with shingles, and vertical doors are constructed to open on the sides and ends. By far the largest proportion of the crop of tobacco is cured in open sheds; but it does not cure so well, and is liable to be weather-beaten and mildewed. Beside, the tobacco is not within the control of the grower. In dry seasons the evaporation is too rapid, and the circulation of the juices from the stem and stalk to the leaves is checked, and in very wet seasons it pole-sweats. Many of the essential oils are also wasted by being first extracted from the leaves by the excessive moisture and then lost by dripping or by evaporation.

It is believed that the more frequently the tobacco goes in and out of condition during the process of curing, other things being equal, the better will be the quality, and this has given rise to the custom of closing the doors of the sheds during the day and opening them at night; but it should never become so damp as to drip. The warm sun shining upon the roof and sides of the shed during the day will dry the tobacco out slowly, while the process is reversed when the doors are opened at night.

The changing conditions of the weather and of the plant itself make curing one of the most troublesome operations connected with the tobacco industry, and a little mismanagement may result in the almost total loss of the crop.

When the tobacco has hung in the sheds until well cured, which requires about eight or ten weeks, it is taken down in damp weather, when it is pliant, and assorted into grades, stripped and tied into bundles or hands, from twelve to twenty leaves being put in each hand, and carefully assorted into four grades, viz: long wrappers, short wrappers, binders, and fillers. After being tied in bundles, each grade kept to itself, it is packed in bulk, as illustrated in the chapter on New England.

The tobacco, while in the bulks, grows sweet, the heads dry out, fat stems disappear, and after remaining for a month or two it is sold to dealers or packed in cases; and it often happens that dealers take the tobacco as fast as it is stripped, and the trouble of bulking is obviated. About one-fourth of the whole crop is packed by the farmers. This is usually done in February and March, in boxes 42 inches long, 30 inches wide, and 30 inches deep. The amount packed in each box is 400 pounds, and a lever press, such as is described in the chapter on the Connecticut valley, is required to get this quantity into the box.

When the crop has been tied in bundles or packed it is usually sold to dealers at a fixed price through. These prices are variable, depending both on the character of the leaf as to color and substance and on the relative amount of wrappers. The range for the crop of 1879 was from 4 to 10 cents through. Of the inferior crops, when the grades were sold separately, wrappers brought from 7 to 8 cents, binders 3 to 4 cents, and fillers 2 to 3 cents, and wrappers of the better crops brought from 12 to 15 cents. The range in prices for fillers and binders is very small; the average is put at from 6 to 7 cents through.

while two others bring them to the wagon. So, in putting up in the shed, two men in the shed and one on the wagon can place the tobacco in position in one-fifth the time required for one man to do it alone. The same rule holds good in stripping, assorting, and bulking.

Inspectors' fees are 25 cents per case. The method of inspecting is very simple. The top of the box is taken off, and the box containing the tobacco is turned upside down. It is then gently lifted up, leaving the tobacco exposed of the size and form of the box. Six bundles are then pulled out, each bundle being drawn from a different place. These are carefully tied and labeled, and the tobacco is sold from the sample so drawn, the inspector in every case guaranteeing the sample to represent correctly the quality and condition of the tobacco in the box. The cost of cases varies from 90 cents to \$1 50; tobacco presses, from \$10 to \$50.

As to the quality of Ohio Seed-Leaf, as compared with that grown in other states, Mr. E. H. Griest, an extensive dealer in Cincinnati, says:

In the markets of the world the Ohio Seed-Leaf takes about the third rank as to quality. Just at present (1880), on account of its dark colors, Pennsylvania is ranking first, Connecticut, notwithstanding its light colors, coming second. In burning qualities Ohio Seed-Leaf is entitled to stand in the first rank, but it is not equal to the other two in uniformity and desirableness of color. Ohio Seed-Leaf is a favorite for export to Germany, and a small quantity is taken experimentally in France. The average export amounts to between 20,000 and 30,000 cases, and it has happened, when there has been an accumulation of stocks, that 70,000 cases have been exported in a single year.

The following will give the comparative prices for the different grades of the principal growths of seed-leaf when put in casks and sweated and sold in open market:

States.	Best wrappers.	Common wrappers.	Best binders.	Best fillers.
	<i>Cents.</i>	<i>Cents.</i>	<i>Cents.</i>	<i>Cents.</i>
Ohio.....	18	12	7	5
Pennsylvania.....	36	20	14	10
Connecticut.....	25	18	10	7
Wisconsin.....	15	10	5	4

Little Dutch, a small tobacco, probably from the Baden seed of Germany, is growing in favor, notwithstanding its tendency to produce white veins. This variety burns well, but is easily injured in fermentation, and must be stripped and put in bulks until the butts of the leaves are thoroughly cured. When packed in boxes before the butts are well cured it butt-rots, and is greatly damaged. It brings one-third more than the same grades of seed-leaf.

Tobacco dealers claim that the handsomest tobacco grown in Ohio is raised in the Chippewa valley, but it is not so well sweated, and consequently does not burn well. The appearance of the leaf is perfect in length, breadth, and texture, but the color is too bright at present for cigar purposes. It very much resembles the leaf of the Connecticut valley, and, having gum enough to give elasticity, in this respect it is much superior to that grown in some other portions of the state.

The following statement shows the production, acreage, yield per acre, value of crop in farmers' hands, value per pound, and value per acre of the seed-leaf tobacco grown in Ohio for the four years from 1876 to 1879, inclusive:

Year.	Production.	Acreage.	Yield per acre.	Value of crop in farmers' hands.	Value per pound.	Value per acre.
	<i>Pounds.</i>		<i>Pounds.</i>		<i>Cents.</i>	
1876.....	18,251,402	10,010	1,140	\$1,277,598	7	\$79 80
1877.....	19,064,695	10,409	1,210	1,098,058	5½	66 55
1878.....	15,762,574	13,246	1,190	1,201,006	8	95 20
1879.....	17,580,512	15,870	1,108	1,054,830	6	66 47

Of the total amount of seed-leaf tobacco grown in Ohio in 1879 the acreage and production of the several districts are as follows:

District.	Acreage.	Pounds.
Miami valley.....	15,017	16,879,526
Maumee valley.....	204	182,411
Chippewa valley.....	96	120,846
Eastern Ohio.....	143	120,000
Detached districts.....	410	277,729

The amount grown in forty-three counties in various parts of the state—small crops of a fraction of an acre to three or more acres—is embraced in the above statement. This product, although of no special type, is usually of the seed-leaf or Cuba varieties, and is most properly included in this statement. Most of it is retained by farmers for home consumption, though a small proportion may find its way to market in near-by cities or towns. Only the figures for 1879 are from census returns.

## SPANGLED, OR EASTERN TOBACCO DISTRICT.

The counties and parts of counties embraced in this district are the southern part of Harrison, eastern part of Athens, eastern part of Gallia, the southeastern half of Guernsey, the eastern part of Morgan, and all of Belmont, Monroe, Noble, and Washington. Vinton and Lawrence are also referred to this district.

## GEOLOGY AND SOILS.

Nearly the entire region of the Eastern Ohio tobacco district belongs geologically to the Carboniferous period. Its surface is high and rolling, and contains a very small proportion of level lands, confined, for the most part, to the alluviums of the river basins. The highest lands attain an elevation of nearly 1,200 feet above the sea.

The rocks of the region are sandstones, shales, and limestones, and in their dissolution give rise to soils of varying fertility. Whenever the underlying rocks are of limestone, the soil is dark in color, with a yellowish subsoil, and sugar maple, walnut, and white oak are the prevailing timber growth. Where the underlying rocks are sandy shales or sandstones, the soil is thin, but kind, and is well suited for pasturage, but washes very rapidly when cultivated, and chestnut, chestnut oak, and in places yellow pine are the predominating trees. Where the limestones and sandstones both have, by weathering, produced the soil, it is very friable and productive, and probably is better for growing tobacco than any other soils in the region. In such places the timber growth is much more varied, and indicates great fertility. The alluvial bottoms on the larger streams, as on the Muskingum and Ohio, will equal in fertility any lands in the state. The second bottoms, or gravel terraces, on these larger streams have a warm, rich soil, but are not so durable as the lower bottoms.

The rolling surface of the country adapts it better for grazing than for tillage, and it is estimated that at least two-thirds of the improved lands are devoted to the production of grasses, either for hay or for pasturage. The tobacco crop is usually grown upon freshly-cleared lands on the slopes of the hills. The sandy soils are said to produce the finest leaf, but the argillaceous, loamy soils are better adapted to the growth of a heavy leaf, and will yield more pounds to the acre. On preferred tobacco soils the timber growth is chestnut oak, hickory, and maple.

The soils may, for convenience, be divided into: 1, alluvial; 2, black soil, with sugar-tree and walnut; 3, white oak, sandy soil; and 4, white oak, clayey soil. The alluvial soils are composed of varying proportions of sand, clay, and vegetable matter, and are enriched by the washings of the adjacent hills. They are very deep and durable, and some of them have been cultivated in regular succession for over half a century without showing the least signs of exhaustion. They rest for the most part on a substratum of gravel, clay, and sand, intermingled oftentimes with fragments of limestone and sandstone. The black soil is highly calcareous, and has been derived from the crumbling down of the limestones, which make up a large part of the rocky structure of the country. This soil shades off into lighter colors, and may be taken as the best type of the calcareous soils, which abound in almost every part of the district. It rests generally upon a yellowish clay, and, though strong in constitution, its occurrence on slopes makes it liable to be carried away by heavy rains to the lower alluvials. This black soil generally occurs on the eastern sides of hills, and for the growing of heavy tobacco is preferred above any other. The third class of soils results from the disintegration of the argillaceous shales and limestones, and, though stiff, is fertile. They are characterized by a dense growth of white oak, and are often cultivated in tobacco. The fourth class is only a modification of the last, the sandstones taking the place of the limestones. These are more friable than the last named, and occur on the tops and slopes of hills, where the underlying rocks are sandstone and shales. These lands will produce from 1,000 to 1,200 pounds of tobacco per acre when freshly cleared.

The southwestern part of Belmont county constitutes the principal tobacco area of the district, and the principal crops are corn, wheat, and grass. The prevailing timber is oak, sugar tree, and beech, though hickory, walnut, ash, gum, poplar, and locust grow in considerable abundance, and sycamore is found near the streams. The district is likely to be rapidly denuded of its forests wherever the soil is suitable for growing tobacco. Fresh lands are greatly preferred for making the high-priced spangled leaf, which is sought for by the nobility of Russia.

Tobacco is cultivated on the tops of the hills and on the eastern slopes mainly. Wherever there is a mixture of sand and clay and calcareous deposits, into which has been incorporated vegetable matter, the soil will produce tobacco of excellent quality, the white oak and chestnut lands being selected for growing a fine leaf, the sugar-tree lands for growing a heavy leaf. The sugar tree is generally associated with beech, ash, walnut, poplar, hickory, and sometimes buckeye. The soil of such lands is black, deep, friable, of great strength of constitution, but unfortunately situated for constant tillage, being liable to be swept away to a greater or less extent by every heavy rain. These black soils often produce 2,000 pounds of tobacco per acre without manure. The sandy calcareous white-oak lands will yield 1,200 pounds, and the sandy chestnut and white-oak lands, where there is a deficiency of calcareous matter, will yield, when fresh, from 800 to 1,000 pounds of very fine tobacco.

## HISTORY OF TOBACCO CULTURE IN THE DISTRICT.

Tobacco as a staple was cultivated in the Eastern Ohio tobacco region as early as 1825. At that period it was all cured on the stalk and handled by the planters, as is now the practice in many parts of Virginia, Tennessee, and Kentucky. The prices received by the planters from 1825 to 1840 ranged from 4 to 7 cents per pound, but in 1841

the average price was 3½ cents per pound. From 1842 to 1846 the price ranged from 3½ to 6 cents per pound. After 1846 farmers ceased to prepare their tobacco for market, but sold in the leaf to dealers, who assorted, packed, pressed, and shipped it to Baltimore.

The following statement, taken from the books of Mr. John Bradford, of Barnesville, Belmont county, an old dealer, will give the prices paid for loose crops since 1845. The quantity produced in the district was furnished by Messrs. Gierke & Niemann, tobacco merchants in Baltimore:

Year inspected.	Amount of crop in hogsheads.	Average price paid farmers for loose tobacco.	Average price in Baltimore market, gold.	Premium on gold.	Year inspected.	Amount of crop in hogsheads.	Average price paid farmers for loose tobacco.	Average price in Baltimore market, gold.	Premium on gold.
		<i>Cents.</i>	<i>Cents.</i>				<i>Cents.</i>	<i>Cents.</i>	
1845.....	26,700	4 to 5	.....	.....	1863.....	17,000	6 to 8	7½	\$1 37
1846.....	29,600	4	.....	.....	1864.....	22,000	7 to 14	7½	1 56
1847.....	9,700	2½ to 4	.....	.....	1865.....	15,500	6 to 10	7	2 02
1848.....	13,600	3½ to 0½	.....	.....	1866.....	15,500	4 to 7	6½	1 41
1849.....	13,900	3½ to 6	.....	.....	1867.....	21,500	5 to 12	6½	1 41
1850.....	16,800	3 to 5	.....	.....	1868.....	9,500	5 to 12	7½	1 40
1851.....	17,700	3½ to 5	.....	.....	1869.....	15,500	5 to 7	5½	1 33
1852.....	17,900	3 to 4	.....	.....	1870.....	13,500	4½ to 6	6½	1 23
1853.....	10,300	3½ to 5	.....	.....	1871.....	14,500	5 to 7	7½	1 12
1854.....	10,100	4½ to 6	.....	.....	1872.....	10,500	5 to 7	8½	1 13
1855.....	12,900	3½ to 6	.....	.....	1873.....	24,000	3½ to 5½	7	1 16
1856.....	13,000	3 to 6	7	.....	1874.....	20,000	6 to 10	7	1 12
1857.....	7,500	4 to 8	11	.....	1875.....	0,000	5 to 8½	8	1 15
1858.....	22,000	3½ to 7	7½	.....	1876.....	17,500	4½ to 8	6½	1 12
1859.....	15,000	3 to 6	6½	.....	1877.....	23,000	3 to 6½	5½	1 06
1860.....	23,000	3½ to 6	6	.....	1878.....	15,500	3½ to 8½	5½	.....
1861.....	14,000	3½ to 6	6½	.....	1879.....	10,500	4 to 8½	6½	.....
1862.....	13,500	5 to 8	7	\$1 02	1880.....	8,000	3 to 8	6	.....

In the above table is included all the eastern Ohio and West Virginia tobacco inspected and sold in Baltimore for the years named, the proportion of West Virginia tobacco being estimated at a yearly average of 1,000 hogsheads. The table represents, not the year the tobacco was grown, but the year in which it was inspected, the inspection generally comprising the crop of the previous year.

About the year 1875 the White Burley was introduced into this district, and it has extended until it has become the principal variety grown in Belmont and in the counties immediately surrounding. About 300 cases of Connecticut Seed-Leaf are produced annually, but the culture of this variety is not extending rapidly. On the Muskingum the Peartree tobacco is principally grown. There are three sub-varieties of this, namely: the White Stem, the Yellow Stem, and the Large Peartree. The first two get their names from the color of the stem while growing. These varieties are characterized by a wider space between the leaves than in the Burley or other compact varieties, resembling more the Connecticut Seed-Leaf in their habits of growth. The White and Yellow Peartree, when planted upon sandy white-oak soils, will make yellow tobacco, but the Large Peartree produces a heavy red leaf. In Vinton county the Maryland Thickset is principally grown. It grows a large, heavy leaf of fine texture. In Athens county the Four Stem is the favorite. This variety is said to be thick set, leaves close on the stalk, large and slender, and is preferred because of weight.

Of the varieties now planted in the district the White Burley is preferred on account of its tendency to cure fairer and more easily than the older ones. It yields from 1,000 to 2,000 pounds per acre when well cultivated, newly-cleared lands producing the finest colors and quality.

The tobacco grown upon heavy limestone soils is mostly "red" and "brown"; but on the clay soils it makes finer colors, such as go in the grades known as "bright reds", "yellow spangles," and "fine yellows", the latter being the highest grade made in the district.

The Connecticut Seed-Leaf is planted only to a limited extent, and, being cut before fully ripe, cures a dark brown and goes into a separate classification, the grades being wrappers, fillers, and binders.

The crops of 1874 and 1879 were the smallest that have been grown for twenty-five years. That of 1874 failed for want of plants, which were destroyed by frost in April, and by the ravages of the flea-beetle, but the comparative failure of the crop in 1879 resulted from the extreme drought that prevailed during the planting season. The knowledge gained as to the influence of particular soils and exposures has aided in improving the quality, and no one would now attempt to grow a fine leaf on bottom lands. The gradual substitution of air-curing for fire has modified many grades, and made them more suitable for domestic manufacture, rather than for export trade.

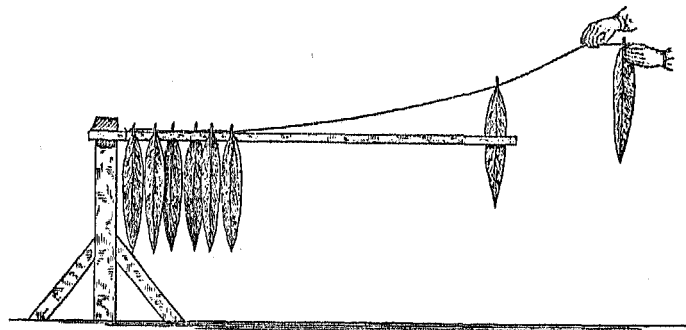
Fertilizers are applied upon old soils to a larger extent than formerly, and the size and body of the leaf have been greatly improved. The question of fertilization is one, however, that demands more attention than it is receiving, for a wise policy ought to restrict the further cutting away of timber for growing tobacco.

## PREPARATION OF THE SOIL.

It is well understood by the best tobacco-growers that thorough preparatory work is essential to the growing of a heavy crop of tobacco. The more the soil is pulverized by frequent plowings and harrowings the more rapid will be the growth of the plants when transplanted. In old land a turning plow is used, which reverses the soil to the depth of 6 or 8 inches. Frequently the plowing is done in the fall, and one or more plowings are given in the spring, so as to keep the soil loose and free from grass. On new lands a "gopher-plow" is considered best for breaking and preparing the soil, and frequent harrowings are necessary to pulverize the new soil sufficiently to induce an even and rapid growth. Winter breaking is necessary on soils which have a large admixture of clay, in order that the frosts may ameliorate their physical condition. Stable manure is applied broadcast on old land in the spring, and is either plowed or harrowed in at the last working before the soil is prepared for the plants. New lands are not manured, and the quantity of manure applied to old lands is governed by the supply made at home. Commercial fertilizers, as a general rule, are not applied. After the preparation of the soil, it is lined out 3 feet apart, and no hills are made to receive the plants, which are set on the sides of the furrows, 2 feet asunder. In this practice, which must be called a slovenly one, the farmers of this district stand almost alone. If the plants are large enough, they are set out after the first rain that falls after the land is prepared. The scarcity of plants often retards the planting, and many crops have been curtailed by the failure of the planters to provide a sufficient number of seed-beds. When plants are abundant, the best can be selected and the delicate ones rejected, and a crop set out with strong, thrifty plants will come on rapidly, mature early, and have a much larger proportion of those colors which command the highest prices. As soon as the young plants are well rooted and begin to grow the soil should be stirred often. The tobacco plant is a great absorber of moisture, and, while an excess of humidity is fatal to its vitality, the moisture brought to the roots by capillary attraction is exceedingly important to its healthy growth. On hard, lumpy soils the plant shows its starving condition by turning yellow, and if a drought should then occur it will bloom, after putting out six or eight leaves. When the land is kept loose and light and free from grass and weeds the plants will not suffer greatly even in a drought, for the condition of the soil not only brings up moisture by capillary attraction from below, but condenses moisture in its infinity of pores from the atmosphere. The farmers having the greatest success in growing the crop work it often, and do not cease until the plants are large enough to top. After this it is difficult to work it without breaking the leaves.

## TOPPING AND SUCKERING TOBACCO.

On new land from six to seven weeks, and on old land from seven to eight weeks, are required for tobacco to come into top. The time preferred for topping is when the bud appears, but before it blooms. As to the number of leaves that should be left to the plant there is a great diversity of opinion. When the purpose is to make heavy tobacco fewer leaves are left, say from ten to fourteen; but if a light leaf is wanted, from sixteen to twenty are left to the stalk. The suckers are pulled off generally in about a week after the plant is topped, and about the same time, sometimes before, the first gathering of leaves is made. The method of harvesting tobacco in eastern Ohio is practiced in but few other places in the United States: around Gadsden, Florida, in some parts of North Carolina, and among the Kite-Foot growers of Indiana. The harvest begins by pulling from the plant four or five of the lower leaves after they are fully ripe. This is done in the morning after the dew is off, and the leaves are strung in the field and put upon scaffolds or taken immediately to the curing-house and strung. The work of stringing is done by girls or women. A needle with a strong thread, somewhat longer than the lath or stick upon which the tobacco is to be hung, is employed. Two leaves are then pierced in the midrib, about an inch from the end, and slipped down on the thread to the point where it is fastened to the lath. These two are hung on one side of the stick. Two more are then strung in the same manner, and hung on the opposite side of the stick, and so on, two being placed alternately on each side of the stick, until it is full. The other end of the thread is then fastened, and the stick is ready to be hung up.



From seventy to one hundred leaves are strung on a stick, the number being regulated by their size. The usual weight of a stick of tobacco after it is cured is  $1\frac{1}{2}$  pounds, though with some of the heavier varieties it has been known to weigh 4 pounds. These sticks are placed upon the tier-poles of the barn 10 or 12 inches apart; but if tobacco has been scaffolded in the fields for two or three days a less distance is required, 6 to 8 inches being ample. In about ten days after the first gathering five or six leaves more are plucked and strung in the same manner. Usually about four gatherings are made, from a week to two weeks apart, before all the leaves are harvested, the object being to give every leaf time to ripen well. The first plucking makes inferior lugs and trash, the leaves



being more or less soiled with dirt and punctured with holes, and sometimes half burned up by the heat of the ground. The last plucking, which embraces the tops, is the next inferior, curing up a dingy green if the leaves are harvested late in the season. The best portion of the crop comes from the second and third gatherings. Tobacco planted upon newly-cleared lands ripens about two weeks in advance of that planted upon lands long cleared. The occurrence of bad weather during the period of gathering induces a second growth, filling the leaves with fresh sap, which militates greatly against the production of fancy colors. Heavy dews, however, stimulate the secretory glands, and assist in the formation of the gums and oils that give elasticity, flavor, and other desirable qualities to the leaf.

The growers in this district claim many advantages from gathering the leaves instead of cutting the stalk. No leaves are plucked until they are fully ripe, and this insures a larger number of pounds per acre. The different qualities are kept separate, and the comparative quantity of each grade can be estimated, so that less time is required to prepare it for market. The crop is cured in a much shorter space of time, less fuel being required, and the risk of burning the barns is greatly reduced. There is great economy in the saving of barn room, the same height required for four tiers when the plants are housed making six when the leaves only are harvested, and all the trouble of stripping after it is cured is saved. Cheaper labor can be employed in harvesting, and girls, who would be of little service in the housing of a crop in the ordinary way, are by this method of more service than men, since they are more dextrous in the use of the needle.

#### CURING THE TOBACCO CROP.

It is estimated that about one-third of the crop of the district is air-cured, and the proportion is regularly increasing every year with the introduction of the White Burley. About half of this variety is now cured by fire, and a fine, bright leaf is made; but the use of fire unfits it for American consumption.

To cure red tobacco slow fires are kept up for four days. The heat is then gently raised for three or four days more, but at no time exceeds 125° F. This is kept up until the leafy part is cured, and the product is thought to be of a little better quality when the fires are drawn before the stem is fully cured. To make yellow tobacco slow fires are kept up for a day or two, and the heat thereafter is increased more rapidly and carried to a higher degree than in the case of red tobacco. The leaf and the stem are thoroughly cured, and as soon as the tobacco comes in condition it is taken down to prevent the running of the sap.

#### TOBACCO-HOUSES.

The log-pen "tobacco-houses" of the Eastern tobacco region of Ohio are erected at a cost not exceeding \$25 each, and are made of round logs, most frequently with the rough bark left on them. They are from 14 to 20 feet square, four to five tiers high, and are daubed with clay on the outside. Some of them are open. Their capacity is from 500 to 1,000 pounds. It is impossible, in badly constructed buildings, to prevent injury to the crop, even after it has been cured, and farmers are obliged to hurry it off to market, whether the prices prevailing are satisfactory or not.

In Vinton county and parts of Gallia and Noble the largest proportion of the crop is packed in hogsheads by the farmers themselves.

In almost every part of the district, except the section above named, the farmers prefer to sell loose to dealers without assorting. It is taken down, the ends of the strings are cut, and the leaves from two sticks, with the strings, are rolled up, packed in wagons, and thus taken to market. Dealers assort it into all the grades mentioned, and it is by them pressed into hogsheads and shipped to Baltimore, and thence distributed to markets in the Old World. Of the fancy-bright tobacco from 600 to 750 pounds net are packed in a hogshead 50 inches high and 40 inches in diameter; of the darker tobacco the number of pounds varies from 800 to 900. The rule is, the brighter the tobacco the less the number of pounds to the hogshead. One-fourth of the whole crop grown in the district is put up or shipped from Barnesville, in Belmont county; the remainder, with the exception of a small quantity of air-cured White Burley that goes to Cincinnati, is shipped by the Ohio river to Parkersburg, and thence by railroad to Baltimore. Hogsheads cost \$1 each. The commission for selling is 2½ per cent., and an additional sum of 20 cents per hogshead is paid for insurance.

The average crop of the district is about 16,000 hogsheads, of which 1,000 should be credited to West Virginia. In stripping it is graded carefully, about one hogshead in a thousand being fancy yellow tobacco. The Yellow Spangled has generally a red edge and red and yellow colors, interlacing one with another in the central parts of the leaf, and usually makes 5 per cent. of the crop; the Red Spangled has the red predominating in the center of the leaf, relieved by frequent yellow spots, and embraces 10 per cent. of the crop. Spotted Red is a grade in which the general color is red, with occasional spots of yellow. This grade constitutes 10 per cent. of the crop. Fine and medium reds are made from the middle leaves of the plant without blemish. The color is a bright brown or red, and the proportion in an average crop is 10 per cent. Brown and unripe old-ground tobacco and nondescript make 18 per cent. of the crop; green and brown tips, made from the undeveloped and partly green leaves of the top, make 20 per cent. The remainder of the crop, classed as ground leaves, being imperfect, trashy red and spangled leaves, will make 27 per cent. of an average crop.

PRICES OF TOBACCO.

The bright crops, containing a fair proportion of yellow and yellow-spangled brights, brought in the winter of 1879-'80 from \$6 to \$8 50 per hundred pounds, loose, through; red and red-spangled crops, from \$5 to \$6 per hundred pounds; common and unripe crops, \$3 50 to \$4 50. The average value of the crop in farmers' hands for Belmont, Harrison, Guernsey, Noble, Monroe, Washington, Morgan, and Gallia counties is estimated to be: For 1879-'80, \$5 50 per hundred pounds; in Athens county, from \$3 to \$6; in Vinton county, \$4. The quotations in Baltimore in June, 1880, for the various grades were as follows:

	Cents.
Fine spangled to yellow.....	10 to 18
Common to medium spangled.....	6½ to 9
Medium to fine red.....	7 to 10
Greenish and brown.....	5½ to 7
Inferior ground leaves to common.....	3½ to 5½

USES OF TOBACCO.

The bulk of the tobacco grown in this district is used for smoking, while a small quantity raised from White Burley seed and air-cured is manufactured into chewing-tobacco in the United States, and a few hogsheads are occasionally used for cigar wrappers. The Connecticut Seed-Leaf, amounting to about 300 cases, is used also for cigar wrappers and fillers. The demand for the main distinctive type, however, is from France, for 5,000 hogsheads; from Germany, for 7,000 hogsheads; from Austria, for 500 hogsheads; from Italy and Spain, for 1,000 hogsheads, irregularly; and in the United States, 2,000 hogsheads. The fine yellow and yellow-spangled are taken in Bremen, where most of it is rehandled and put into lighter casks for the Russian markets. Part of the yellow and yellow-spangled is taken in Austria and in England, which take also the red-spangled, and England also takes some of the fine red. Germany takes all grades, except the fine yellow and the leafy dark-brown colors, and France and Italy take the leafy brown and red grades. The unsound and nondescript are often bought for Spain. Scraps or trash are used in this country for making smoking-tobacco.

COST OF PRODUCTION.

The cost of raising tobacco in the Eastern Ohio district is variously estimated, and depends so much on the original fertility of the soil and the difference in the amount of preparation required for the different soils that it is a very difficult task to give an estimate that may not in some portions of the district be fairly criticised. After a comparison of several estimates, however, the following may be considered approximately correct for well manured old land. The price of old land adapted to the growth of tobacco has in the district a range of from \$30 to \$75 per acre. The rental value is more uniform, being about \$5 per acre, and the average yield for such lands is not far from 1,200 pounds per acre. On this basis the following estimate of the cost of raising one acre of tobacco is given:

Dr.	
Making seed-bed.....	\$1 00
Plowing one acre.....	2 50
Manure, and spreading same.....	20 00
Harrowing and lining out.....	1 25
Planting.....	2 00
Plowing and hoeing three times.....	5 00
Topping, suckering, and worming.....	5 00
Harvesting.....	8 00
Wood for curing.....	1 50
Attention while curing.....	2 00
Taking down and rolling.....	1 50
Carrying to market.....	1 50
Rent of land.....	5 00
	56 25
Cr.	
By 1,200 pounds of tobacco, at 5½ cents.....	66 00
Profit.....	9 75
Cost to produce, \$4 69 per hundred pounds.	

The profits increase very rapidly as the yield per acre is increased. Putting the yield at 2,000 pounds, the profit would be \$53 75, and the cost of production per hundred would be reduced to \$2 81. This virtually agrees with the statement of Mr. John Bradford, a large planter and dealer, who thinks the cost on old land will vary from 4 to 5 cents per pound.

In Vinton county, where good tobacco soils, that will make from 1,000 to 1,200 pounds to the acre without manure, may be bought for \$25 per acre, the cost may come within the estimate made by Mr. J. N. Randall, of McArthur, of from \$2 to \$3 per hundred pounds.

The estimated cost of production for newly-cleared lands is from \$5 to \$7 per hundred. This arises from the fact that, independent of the cost of clearing, which should not be charged alone to the first crop grown, the labor of preparing the land for planting is greatly increased. There is a compensation, however, in the larger proportion of high grades in such a crop.

#### WAGES.

Men are hired at \$15 per month and board from spring until autumn; sometimes the price is as high as \$20 or as low as \$12. In harvesting tobacco boys are paid from 50 to 75 cents per day for plucking off the green leaves, and girls are paid half a cent per stick for stringing them. It is considered a fair day's work to string 100 sticks. Dealers pay for assorting and tying 50 cents per hundred pounds, and the price paid for receiving, weighing, "ordering," packing in hogsheads, and pressing varies from 37 to 40 cents per hundred pounds. Packers are sometimes paid \$1 per day. Renters furnish tools and teams, and pay to the landlord from one-third to two-fifths of the product, delivered in market.

The dealers are generally provided with comfortable rooms, in which the work of assorting, tying, and bulking goes on all winter. About the 1st of March the packing season begins, and continues until the whole amount in the dealers' hands is pressed and shipped or sold.

One item in relation to the method of bulking deserves notice. In bulking seed-leaf, shipping leaf, and almost every other leading type grown in the United States the bundles are passed through the hands and made cylindrical in shape. Those of leading grades in this district are flattened out when bulked, and even when packed in hogsheads, so that when drawn they are fan-shaped, and this form displays all the gaudy colors peculiar to the tobacco.

The farmers of the Eastern Ohio district raise a great diversity of crops, so that a failure in the tobacco crop is not felt to the same degree as in some other tobacco districts. It is rather an extra crop, and extra hands are employed to work it. Frequently a farmer having in his employ two grown men, with families of children, will plant 8 or 10 acres in tobacco. The wives and daughters are employed in stringing the leaves for a month or two in the summer, and the small boys strip the leaves from the stalks. When plucked from the stalks, they are put in bunches in the middle of the rows. These are gathered up by other boys and put on sleds or wagons, and are taken to the barns and strung in the manner already described. So the raising of tobacco may be considered profitable in so far as it furnishes a certain class with employment who otherwise would probably be idle.

The following statement shows the production, acreage, yield per acre, value of crop in farmers' hands or in primary markets, value per pound, and value per acre of the tobacco crops of the Eastern Ohio (Spangled) district for the four years from 1876 to 1879, inclusive. One hundred and twenty thousand pounds of seed-leaf tobacco, grown upon 143 acres in this district, are not included in this statement, having been already embraced in the statement for the Seed-Leaf district. Only the figures for 1879 are from census returns:

Year.	Production.	Acreage.	Yield per acre.	Value of crop in farmers' hands.	Value per pound.	Value per acre.
	<i>Pounds.</i>		<i>Pounds.</i>		<i>Cents.</i>	
1876.....	10,987,280	10,320	1,224	\$840,400	4½	\$52 05
1877.....	13,173,297	12,534	1,051	658,665	5	52 55
1878.....	14,081,053	13,260	1,062	774,507	5½	58 41
1879.....	6,328,040	7,551	838	310,402	5	41 00

#### INSECT ENEMIES AND DISEASES.

The horn-worms are more numerous some seasons than others, and in 1877 and 1878 about one-third of the crop was very much damaged by them. Tobacco-growers, especially those of the Miami valley, are usually industrious and energetic enough to prevent serious injury to their crops, but now and then their vigilance is severely taxed.

In the Burley district seed-beds are protected from the flea-beetle by covering with canvas, and plants are rarely wanting to set out the crop in good time.

"Frenching" occurs during wet seasons in crops planted on cold, stiff uplands, having a stiff clay subsoil.

"Red speck" or field-fire prevails on the black lands of the Miami valley during hot, dry weather, and "white speck" or "frog-eye" appears occasionally, but the injury from this cause is small.

"Walloon" is of very common occurrence. The best preventive for this disease is good drainage of both soil and subsoil.

"Scab", or "brown rust", said to be produced by hot weather, at certain stages of the growth of the plant is reported as sometimes appearing in the White Burley district. This appears to be the result of soil and atmospheric conditions acting unfavorably at the same time.

"Frog-eye" or "white speck" sometimes occurs in tobacco thoroughly ripe. This disease is, however, much less injurious than "scab". No "fire" or "white speck" is reported from the Eastern Ohio district.

The following statement shows the production, acreage, yield per acre, value of crop in farmers' hands or in primary markets, value per pound, and value per acre of the tobacco crops of Ohio for the four years from 1876 to 1879, inclusive. The figures for the first three years are made up from the most reliable data to be obtained, and are believed to approximate the actual results very closely. For 1879 the statement is made up from the returns of the census enumerators:

Year.	Production.	Acreage.	Yield per acre.	Value of crop in farmers' hands.	Value per pound.	Value per acre.
	<i>Pounds.</i>		<i>Pounds.</i>		<i>Cents.</i>	
1876.....	46,139,374	41,424	1,114	\$2,750,113	5.98	\$60.00
1877.....	42,734,088	38,865	1,101	2,428,492	5.68	62.58
1878.....	38,719,278	35,787	1,082	3,011,736	7.77	81.10
1879.....	34,735,235	34,670	1,002	2,670,434	7.68	77.00

## CHAPTER XIV.

## CULTURE AND CURING OF TOBACCO IN PENNSYLVANIA.

## ITS CULTIVATION IN COLONIAL TIMES.

The colonists brought over by Penn early engaged in tobacco culture, and as early as 1689, only seven years after the proprietor came over, no less than fourteen cargoes of tobacco were exported from the colony to the mother country. It is impossible to say what the tonnage of the vessels was, or how many pounds of tobacco were grown in the youthful colony, but we may safely conclude it was no inconsiderable amount.

In time, however, tobacco ceased to be extensively grown in Pennsylvania. Some doubtless was grown for home consumption, but not as an article of export.

## ITS CULTIVATION IN RECENT YEARS.

There are men still living who grew tobacco as early as 1828 in Lancaster county, in the vicinity of Ephrata. An old grower asserts that it was planted in those days about the season of haymaking, or about the middle of June. The ground was prepared very much as it is now, and a second crop was sometimes raised when the season was favorable, the later product being exclusively used as fillers. The planters had a portion of it made up into cigars for their own use, and if there was a surplus the cigars they were sold or exchanged at the country stores, as was the practice also in Connecticut. These cigars were of a very common kind, and were generally retailed at the rate of four and five for a cent.

In 1840 the total production returned for the state was 325,018 pounds, of which York county produced 162,748 pounds, Lancaster county 48,860 pounds, and Dauphin county 46,730 pounds.

The culture began to extend more rapidly in 1845, but the occurrence of the Mexican war the following year made the production of wheat far more remunerative, while the prices for tobacco declined, until it was no longer a profitable crop. The census of 1850 did not report a pound for Lancaster county. The amount grown for the state reached 912,651 pounds; a result due, no doubt, to the partial inflation of prices immediately after the close of the Mexican war. York county took the lead in the census of 1850, reporting its production at 418,555 pounds, or over 45 per cent. of the whole. Lawrence county is credited with 378,050 pounds, and Dauphin county with 50,200 pounds.

A very rapid increase in production took place between 1849 and 1859, the returns for the latter year showing for the state 3,181,586 pounds, or an increase of over 248 per cent. in ten years, while Lancaster county rose from nothing in 1849 to 2,001,547 in 1859, making about 63 per cent. of the whole production of the state. In the same year York county produced 695,405 pounds, each of the other counties in the state falling below a production of 40,000 pounds.

The next ten years show an inconsiderable increase, due to two causes mainly: the high prices which prevailed for breadstuffs and provisions, and the heavy draft made upon the laboring population for army purposes. The increase in production was very rapid from 1866 to 1870, the amount reported in the census of 1870 exceeding that reported in any previous year, reaching for the state 3,467,539 pounds; for Lancaster county, 2,692,584 pounds; for York, 527,808 pounds; and for Bucks, 151,372 pounds.

Since 1870 the acreage has gradually increased, and the limits of tobacco culture have extended until nearly half the counties now grow it as a staple crop. All varieties have been abandoned for the seed-leaf and domestic Havana, and Pennsylvania has reached the third rank as a tobacco-producing state.

The census of 1880 shows a production of 36,943,272 pounds, an increase of 965 per cent. in ten years.

## PHYSICAL AND GEOLOGICAL FEATURES.

The surface of the state is generally level in the southeast, the level areas being wide and often separated by flanking hills or ridges, which rise 200 feet or more above the river basins. In the interior the surface is mountainous, but in the west it is generally broken or rolling. The southeastern counties, in their cultivated portions, are but little elevated above tide-water, but in going westward and northward several parallel ridges, running northeast and southwest, reach an elevation of 1,500 feet and upward, forming the Appalachian range.

The geological formations of the state are confined to three of the principal divisions of rocks. In the southeast are found the Eozoic rocks, which form a belt having a general course northeast and southwest, along which, on the eastern side mainly, in a belt 20 to 30 miles wide, lie the Mesozoic. The Paleozoic series come next, including the Carboniferous, in the western third of the state, extending north nearly to the state line, the Devonian rocks running east and west all along this line, and the Silurian, with alternating belts of Devonian, between the Eozoic and the Carboniferous rocks. The drift covers the north and northwest tiers of counties, and gradually thins out in going south, and it is even wanting on the table lands along the middle portion of the northern boundary of the state. The gneissoid rocks are mainly confined to the southeastern counties. They are succeeded on the northwest by a belt of metamorphic limestones of the Silurian age, after which come the red sandstones of the Mesozoic.

The principal tobacco area from north to south rests first upon the Devonian rocks, covered with their beds of drift on the lowlands, then on a small arm of the Carboniferous rocks, these two occupying a third of the distance across the state. Next succeed the Silurian rocks for a distance of 75 miles, giving place 35 miles south of Harrisburg to the Mesozoic and Eozoic rocks, which supply the best tobacco soils in the state.

The soils of the state are very fertile, except where the face of the country is rugged, and where sandstones or shales alone abound. The best soils of Lancaster county rest mainly upon limestone and chloritic slates, and are noted for their great strength and durability. In the counties south and east the abundance of limestone assures a high productiveness for the soils. Limestones abound in the mountain valleys, and give rise to good soils. On the upper Susquehanna, in the northeast, the soils are rich, but they are poor and thin and cold on the highlands in the central counties of the north, and become fertile in the northwest.

The counties of the state that produce 100,000 pounds of tobacco and upward each are Bradford, Tioga, Clinton, Lycoming, Union, Northumberland, Snyder, Dauphin, Cumberland, York, Lebanon, Lancaster, Chester, Berks, and Bucks. The eastern edges of Adams, Perry, Juniata, Mifflin, and Centre also produce some tobacco. The tobacco counties form a belt from north to south across the state. Midway north and south the belt is about 40 miles wide, and the Susquehanna divides the lower half. That portion of the belt lying east of the Susquehanna produces over 75 per cent. of the entire amount of tobacco grown in the state; and that portion extending from the center of the state southward, on both sides of the Susquehanna, will be found to produce over 90 per cent. of the whole. Lancaster county is the producing center, making two-thirds of the whole product of the state, taking the first rank in 1879 among all the counties of the United States.

## CLIMATE.

The climate of Pennsylvania is very hot during summer in the southeastern part of the state, but cool and pleasant in the mountainous region. Observations continued by the signal service for nearly ten years show that the average temperature of the spring months at Philadelphia is 50.1 degrees; summer, 74; autumn, 57.7; winter, 33.3. The greatest difference between the highest and the lowest temperature recorded in any one year during the period of observation was 100 degrees; the average yearly fluctuations in temperature, 44.8. For the same period the mean annual precipitation was 42.95 inches, and the mean of the prevailing winds was northwest.

The deep, wide gorges through which the Susquehanna and its tributaries flow, and the slight elevation of the valleys above tide-water, make the summer very severe at times, the temperature ranging from 90° to 100°. The summer heat is prolonged late into autumn in southeastern Pennsylvania, and frosts rarely occur before October, giving ample time for the tobacco to come to maturity, even though planted as late as the 1st of July. The seasons are shorter in the northern parts of the state, due both to increased elevation and to latitude. In this section the tobacco crop must be harvested ordinarily before the 25th of September.

## LANCASTER COUNTY.

In Lancaster county there is constant improvement in the fertility of the soil, notwithstanding the heavy drafts that have been made upon it. This improvement is shown by a comparison of the yields of the crop within the past five years with the five years previous. The increase has been fully 12 per cent.

The methods of managing the crop in Lancaster county furnish a guide which other counties follow more or less closely, and there is a gradual improvement throughout the state, Lancaster county taking the lead.

## SITUATION AND EXTENT.

Lancaster county is situated in the southeastern part of the state, the Susquehanna river forming its southern and western boundaries. The area of the county is 970 square miles, or 620,800 acres. The extreme length of the county is 33 miles, and its greatest width 28 miles. Its central latitude is 40° 3' north. Its surface is diversified, its soils good, and abundantly watered by small streams.

## GEOLOGICAL FEATURES.

The surface of the country presents three separate and prominent geological features. The northern portion belongs to the Triassic or new red sandstone formation, and this extends along the entire northern boundary. It gives evidence of once having covered much of the surface, from which it is now entirely eroded. In the heart of this formation, and entirely inclosed by it, are several basins of limestone. Along the margins of these basins, as indeed over the great part of the new red sandstone, the beds are broken up into what is called "gravel" by the country people, or small angular fragments of hydro-mica schists.

The next formation, and the one to which Lancaster county may be said to owe its great agricultural importance, is the limestone belt, which traverses the county from east to west, covering more than 300 square miles of territory. This limestone has great masses of hydro-mica schists, argillites, rhomboidal slates, and other rocks associated with it. In many places it is shivered, which contributes largely to give the soil an excellent drainage, and renders it dry and warm.

The last and lowest of the formations found in the county is the Eozoic, taking in the mica-schist and gneiss belt running through the southern part and bordering on the Susquehanna. Blocks of quartzite are found loosely imbedded, and argillite or roofing slate also occurs. Quartzite is also found within the limestone belt, but generally only in blocks and fragments. Both within the limits of the limestone and gneissic belts vast deposits of iron are found, sometimes in beds, and again loosely scattered through the soil. There are also extensive trap dikes, and some serpentine ridges, carrying chrome ores.

The general surface of the country is rolling, and is diversified by several timbered ridges, the principal ones being the Conewago hills in the north, the Martie hills in the south, and the Welsh mountains in the eastern part of the county. The average elevation of Lancaster city is 359 feet above the mean level of the ocean, although portions of the county rise to the height of 611 feet.

There is a wide range in the temperature, the readings of the thermometer running from 100° F. during the heats of summer to 10 or more degrees below zero in winter. The rainfall is generally pretty evenly distributed throughout the year, the annual average being about 38 inches.

The entire surface of the county was at one time densely wooded with hickory, various kinds of oak, chestnut, and other timber. These have been nearly all cut away on the Martie hills and Conewago hills. On the Welsh mountains there is still an abundance of chestnut timber, which begins to renew itself, as often as it is cut down. Most farmers still have small patches of woodland on their farms, which have been carefully preserved, but even these are gradually disappearing.

## THE SOIL.

In the limestone region the prevailing colors of the soils are gray and grayish brown, while in the sandstone districts red prevails. The soil varies in depth from a few inches on the hillsides to as many feet in the alluvial bottoms along the streams. Whatever its depth or general character, it responds freely to manurial applications, whether natural or artificial, and whatever its character, it is everywhere throughout the county adapted to the cultivation of tobacco. There is a current belief that the soil embraced within the limestone belt will grow a better and finer article of tobacco than any other portion of the county, and the product, it is alleged, when made into cigars, will burn with a white-ash residuum. There are reasons for believing this to be a mistake. The soil, as a rule, is richer within the limestone limits than out of them, but this is largely the result of careful farming. The sandstone soil is generally thin, but where it is as heavily manured as in the best limestone sections the results compare favorably with those of the latter. This has been notably the case during the present year (1880), when the sandstone districts had the finest crops in the county, while in limestone townships of the highest reputation it was comparatively inferior. This is, however, a matter that will bear further investigation, and perhaps it is too soon to pronounce authoritatively on the question. At the present time the light, gravelly soils are not so highly esteemed, and they bring much smaller prices.

It is indisputable that the islands in the Susquehanna and the alluvial lands along the banks of that stream, as indeed along those of most other rivers and streams in the county, are naturally the best tobacco lands, as the silt of which these islands are mainly formed is exceedingly rich and the soil has a fine and sandy composition. No doubt the moister atmosphere that prevails in the immediate vicinity of such a large water-course, the more numerous fogs, and the low-lying situation all contribute their share to the general result. Another advantage is their greater exemption from frosts in both the spring and the fall, which naturally results from the presence of so large a body of water. Island lands that are cultivated command large prices.

## VARIETIES OF TOBACCO CULTIVATED.

So many kinds of tobacco have from time to time been tried by the growers that perhaps no single variety is grown in its purity. Every farmer has his favorite, which is now one kind and then another. There are what is known as the Pennsylvania Seed-Leaf, the Glessner, the Connecticut Seed-Leaf, and others named after the individuals who claim to have originated them; in fact, nearly all the varieties cultivated in the seed-leaf districts have been tried. Whatever the kinds cultivated, unless renewed with fresh seed every few years they seem to lose their distinctive features and eventually to become hardly distinguishable from what is known as Pennsylvania Seed-Leaf.

Cuba tobacco has been tried frequently, but the inferior yield in pounds has always more than counterbalanced the increased price received for it. Latterly it has not been grown to any extent. In a few years it loses its distinctive features and some of the qualities that give it the most value. A few acres grown by Mr. Fendrich near Columbia, Pennsylvania, in 1879 attained a development of leaf that was astonishing, some measuring 18 by 40 inches.

At the present time the Glessner is the principal favorite. It develops a very large and handsome leaf, and yields more pounds to the acre than the others. The great size and weight of the leaves sometimes cause them to break when blown about by a strong wind.

Seed is constantly brought from other parts, and growers make frequent changes. Where a foreign variety is cultivated, this is no doubt necessary; but some of the old growers believe that changes in domestic kinds are not necessary. They hold that all the plants intended for seed should be standing near each other, instead of being scattered here and there over the field. In that way they fertilize each other and bear prolific seed true to the original variety. A few of the more advanced growers are in the habit of removing one-half or more of the seed pods from each stalk left for seed.

## THE SEED-BED.

A southern or southeastern exposure is always preferred for the seed-bed, and the same plant-bed is used for several years in succession. Very few farmers burn over the seed-bed, the frosts of winter, heavy manuring, and the most careful preparation of the soil being relied upon to secure a good stand of plants, free from the intrusion of weeds.

The bed is prepared for seeding in the latter part of March or the beginning of April, and the seed is sown immediately upon the freshly-prepared soil. Under favorable circumstances, the seedlings are ready for transplanting about the middle of May, and the planting is usually completed by the 1st of June. Plants set as late as the middle of June generally mature well and make a fair crop, but early planting is the rule.

There is a current belief that early-cut tobacco cures into a lighter color, because the juices dry out more rapidly, and it is thought the late cut cures darker, because it cures more slowly. For this reason some growers do not plant till about the 10th of June. Their tobacco will then be ready to cut in September and cure in moderately cool weather.

## PREPARATION OF TOBACCO GROUND.

As a rule, any land that will grow a good crop of corn or wheat will produce a good crop of tobacco. It is not necessary that any particular system of rotation should be followed. Grass lands are generally selected, although some growers prefer fields planted in corn the previous year, as when planted on sod trouble from the dreaded cut-worm is always expected, and the tedious and wearisome task of replanting is sure to be necessary.

It is customary to turn the ground in the fall, and manure should be put on at that time. This is especially desirable when it is sod or clayey soil. A sandy loam is preferable to a stiffer soil, and it is an axiom with the tobacco-growers of Lancaster county that tobacco ground cannot be made too rich. The amount of manure which farmers can afford to put on an acre varies with individual cases. From eight to twenty loads is the customary amount. Colonel James Young, who is one of the largest growers in the county, in 1879 drew 100 six-horse loads on a seven-acre field. The ground was more than covered, but the results justified the expenditure. Well-rotted barn-yard manure is preferred to all other fertilizers, tobacco-growers not taking kindly to artificial fertilizers. There are several reasons for this. In the first place, such fertilizers require a large outlay of money; and secondly, their use is discouraged by the tobacco buyers, who assert that tobacco raised by means of artificial fertilizers, when made up into cigars, does not burn with a pure white ash, which fashion at present demands, and which stable manure yields; and they further declare that the flavor of the cured leaf is also inferior. The fact that the tobacco raised in Lancaster county is preferred to any other grown in the state would seem to lend color to these views.

Thorough preparation of the ground having been made, the earth is thrown up into hills or into ridges, the latter being almost universally the practice. The ridges are  $3\frac{1}{2}$  or 4 feet apart; when the ground is rich the latter distance, although the former is thought sufficient on thin soils. Along the ridges indentations are cut. The distance between these varies with the different planters, generally from 22 to 28 inches being allowed between the plants. In a good season the latter is not too much. The indentations are not cut down to the general level of the field, as in that case the plant might be flooded during heavy rains. The ground is never marked out two ways or checked, the after cultivation being sufficiently thorough to render this unnecessary.

## SETTING OUT THE PLANTS.

The field should be ready to receive the plants when the latter have put forth four leaves and are about 4 inches across. There is diversity of opinion as to planting in dry weather, some being in favor of planting just so soon as the plants are of the proper size, whether the ground is wet or dry, while a large majority prefer to wait days, and even a week or more, for rainy weather. When plants are set in dry ground the work is tedious and costly, and great care is required in every detail of the operation. The water-cart accompanies the planters, and water is poured about the plants when set out, this being repeated a number of times in dry seasons, the inevitable consequence of which is that the ground about the tender plants becomes hardened and the surface baked, retarding growth and delaying cultivation. Set out in moist soil, under favorable conditions the plants grow off quickly and are soon out of danger from the cut-worm; less replanting is necessary, an even stand is more surely obtained, and cultivation can be commenced much sooner.

In order that the plants should have a good start great care is exercised in setting them in the ground. Formerly a pointed stick was used to punch a hole in the ground, into which the roots of the plants were crowded without order or arrangement. Now, however, more attention is given to this matter. The roots are spread out into their natural position, and then covered with earth, which is gently pressed down upon them. A few successful planters in dry seasons put about half a pint of water on the ground where the plant is to be set, and when this has well soaked into the ground the plant is put in place. No second watering is necessary. This method seems to possess very decided advantages over that of watering simply after the plants are put in position.

A hot sun, long continued, often renders some artificial covering for the plants necessary. Small pieces of paper are generally used, as being most convenient and easily obtainable. The leaves of other plants or pieces of shingles are also frequently called into service. This is continued until the plants are well set and in no further danger from this source. Plants are very often set out while still too small, but nothing is gained by such a course. They will make more growth in the seed-bed in two days than in a week after transplanting, and a large, strong plant not only has more chances of growing in the field, but will grow faster.

## FIELD CULTIVATION.

The cut-worms in some seasons destroy many plants, and these must be replaced. In 1879 many planters were compelled to replant their fields three times, owing to the ravages of these destroyers, they being far more numerous in some years than in others. Any sickly-looking plant is also removed, or another one is set by its side to supply its place in case it should die. The search for the cut-worm is continued until the plant is too large to be injured by it.

The cultivator or the shovel-plow is run twice through each space between rows, and care is taken that the earth is not thrown upon the plant. The hoe is used in making nearer approaches to the plant, as well as to pulverize the large lumps of earth that may be lying near it. All the weeds are carefully cut down, and particular care is taken to keep the ground around the plant loose and in good order.

These earliest stages of the life of the plant are regarded as requiring the utmost care. The hoe and the cultivator are kept going constantly, and destroy the weeds so effectually that they give no trouble later in the season; and, beside, the looser and finer the soil is, the more moisture it will absorb from the atmosphere, which in dry seasons is a consideration of no little importance. This cultivation continues until the great size of the leaves finally puts an end to it.

## WORMING THE TOBACCO.

When the danger from the cut-worm has been passed successfully attention is directed to its immediate successor, the tobacco-worm, as, if left undisturbed, it will soon ruin the most promising field. Pennsylvania tobacco being used almost entirely for cigar-making, defective leaves, unfit for wrappers, materially depreciate the value of a crop. The earlier worms appear about the 1st of July, and it is well understood that thorough work at this period secures comparative exemption from them later in the season. The plants are examined two or three times a week, so that the eggs of the moth may be found before the worm is hatched out or the young worms killed before inflicting any injury upon the leaf. Various devices are employed for killing or entrapping the moth, some of which have proved fairly successful; but no plan has been devised so certain and reliable as hand-picking. The use of poisons, mixed with sweetened waters and dropped into the blooms of the Jamestown weed, planted for the purpose, is more or less practiced; but, as bees are kept by many farmers, this method is regarded as somewhat hazardous.

## TOPPING AND SUCKERING.

The hunt for worms continues until the day the tobacco is carried from the field. Topping is a matter into which so many considerations enter that every man makes a rule for himself, modified by the several kinds of tobacco, the varying soils, the season, and the condition of the crop. The custom is to top about the time the blossom bud makes its appearance, which in Pennsylvania is about the 1st of August in an average season; others top when the desired number of leaves has appeared. Where the soil is thin and the plants backward, or when



the season is dry, low topping becomes a necessity. From eight to ten leaves are left on the plant under these circumstances, the top being pinched out, not cut, thus causing less bleeding of the plant. When the soil is rich, the growth strong, and the season favorable, from twelve to fourteen leaves are allowed to each plant. This growth is generally so unequal that all cannot be topped at the same time; but if plants of the same size are set out at the same time the period of topping will not vary much in a field. This is a great advantage, as the crop will mature more evenly, and the color be more uniform.

Dry weather is most unwelcome as topping time comes on. When such weather occurs, topping is deferred a short time. Some growers wait until the last possible moment, preferring rather to let the lower leaves drop off than to top in a period of drought. By deferring topping ripening is retarded, which under the circumstances is a very important advantage. The cupidity of the grower too often leads him to top too high, leaving more leaves on the stalk than it is able to mature. When this is done, and a season of drought comes on, the tobacco is apt to ripen prematurely and cure up a bad color—"foxy," as it is termed. Topping after a warm, soaking rain is of much advantage.

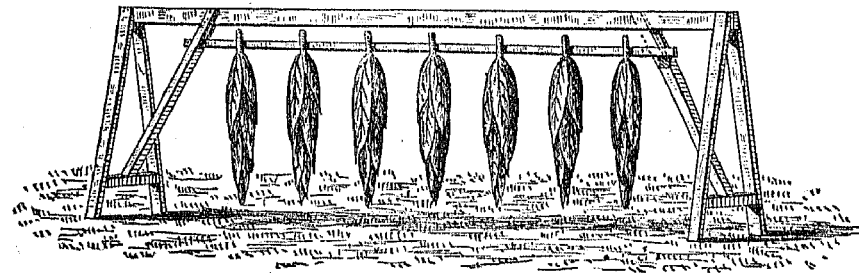
Close upon the operation of topping follows the first crop of suckers. These are removed when they attain a length of 3 or 4 inches. It is believed that the sooner they are removed after they make their appearance the better.

#### CUTTING THE CROP.

Some years ago the tendency was to let the plants become fully ripe, and in many cases overripe. The careful grower has several ways of determining maturity. The time selected by some is when the lowest leaves send out suckers of good size. A far better evidence of maturity is when the leaves assume different shades of color and become brittle, and if, when they are doubled over, they show a tendency to break, the sooner they are cut the better. Of late years, however, planters have been accustomed to harvest their crop before it is ripe, just when it is on the point of ripening. Experience has demonstrated that if cut at this juncture the color will be darker and more acceptable to manufacturers, fashion at the present time running almost entirely in that direction. Beside, such early cutting places the crop beyond the reach of hailstorms, heavy rains, and early frost. It is deemed inadvisable to cut immediately after a rain, as the gum or resin secreted by the numerous hair-like glands of the leaf is dissolved and, in a measure, washed off. A few days' sunshine restores this gum, and the tobacco may then be cut.

#### THE FIELD SCAFFOLD.

The proper time for cutting having arrived, from twenty to thirty days after the process of topping, some transfer the tobacco at once from the field to the barn; but the custom of scaffolding in the field is almost universally practiced. It is conceded that scaffolding in the field is not so important to early-cut tobacco as to the later harvested, because the weather being warm at that time it is not likely to suffer danger in the barns. As the later cut dries much less rapidly, it is in more danger from pole-burn or from freezing. There are those, however, who, when they have ample storage-room, scaffold neither the late nor the early tobacco.




The accompanying cut gives a representation of the field scaffold, and shows how it looks when loaded with tobacco. Sometimes it is made of ordinary fence posts, sunk in the ground, with common rails inserted in the holes of the posts. In other cases large trestles are made, across which timbers of the proper size are laid. A spot shaded by trees is generally chosen for it. The engraving represents the latter kind. They can easily be preserved from one season to another. Both side and end views are exhibited.

#### CUTTING OFF AND PLACING ON LATHS.

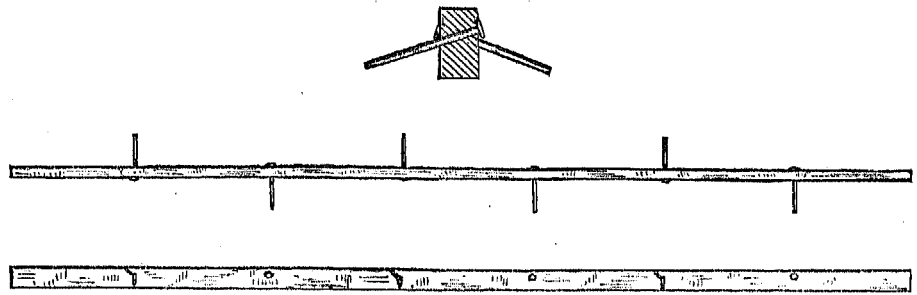
The tobacco plants are either cut off carefully with a sharp hatchet or sawed off with a short, sharp saw. The morning and the evening are chosen for this work; generally the latter. When cut in the morning, the dew, and, if it has rained, the rain water, are first allowed to dry from the plants, the valuable qualities of the leaf, it is believed, being best secured by this method. The plants being cut off, they are laid down carefully to prevent injury to the leaves. A short time to wilt is usually given, but sunburn must be guarded against by turning the plants when there is danger of it.

When sufficiently wilted to be handled without injury the stalks are speared on the laths, as illustrated in the chapter on Maryland, and, when small, six and seven plants are strung on a single lath, while not more than five are put on when the plants are large. When the tobacco is left on the scaffold for some time it can be more crowded than when taken from the field direct to the barn.

## NEW METHOD OF HANGING TOBACCO ON LATHS.

During the past three or four years several new methods of attaching the tobacco stalks to the laths have come into use which possess many advantages over the method of spearing them. Laths of a heavier size than those ordinarily employed are used for this purpose. This size is three-fourths of an inch thick and  $1\frac{1}{2}$  or 2 inches wide, made out of pine, poplar, or some other light wood, and is of the usual length, 4 feet. Into this stout lath six iron or wire hooks are driven, resembling this shape: , three on each side, the first one 4 inches from the end, the next one 16 inches from the first, and the third 16 inches from the second, leaving a space of 12 inches from the last to the end of the lath. Hooks are driven at points midway between those on the opposite side of the lath, thus giving room for six large stalks, 8 inches apart from side to side, hanging alternately on one side or on the other. In this way they do not interfere with each other, and can be hung much more closely, for there is no waste of space, the alternate hanging filling up not only all the space on the same lath, but also between all the laths when they are hung up in the barn. The hooks are clenched on the opposite side to prevent their drawing out. In several cases wire hooks, shaped like the letter S, were used, but they did not give satisfaction, as the laths that were used were the ordinary laths, and could not stand the strain at the ends, and were often broken; beside, the hooks being loose, required frequent adjustment. There were several objections to these hooks, which have prevented their general introduction. They were too expensive for the majority of tobacco farmers, costing about \$22 per acre. The principle, however, is so excellent that growers were not long in finding out a substitute equally effective and far cheaper. The following cut explains the entire process.

Laths of the same size,  $\frac{3}{4}$  by  $1\frac{1}{2}$  inches, are used, but instead of iron hooks or wire five- or six-penny nails are used. These are driven through the laths at alternate intervals on both sides, with a slight upward inclination, to prevent the tobacco from falling off readily. This method is far cheaper and equally efficacious, and no one who has ever tried it thoroughly will be likely to give it up; indeed, many of the most careful tobacco-growers take it up every year more and more.

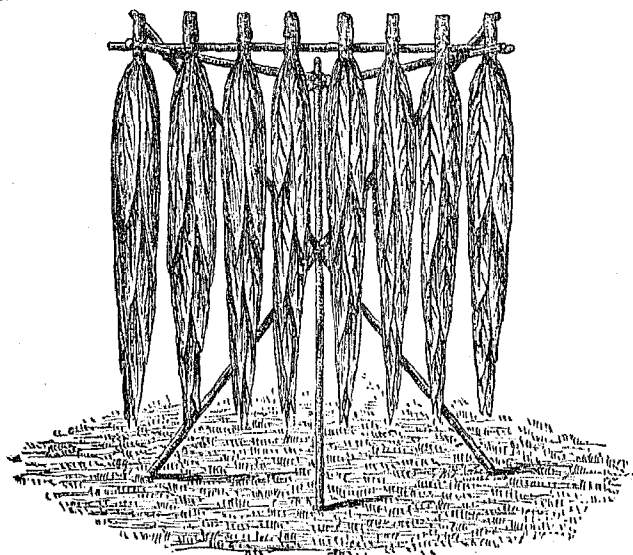


The advantages possessed by this system over that of spearing are as follows:

1. The large hole made in the tobacco stalk by the spear has a tendency to dry out the stalk too rapidly at that point, and the more slowly the stalk dries the better and more uniform the color of the leaf is likely to be. The leaves nearest the spear hole are generally "off-color".
2. Tobacco can be hung on hooks or nails much more quickly than speared upon laths. At least nine stalks can be hung on nails while six are strung on laths, thereby causing a great saving in time.
3. It is far easier to fix the stalks on nails than on laths. The tobacco stalk is not hard, and a slight pressure will drive the nail through it. A boy can easily do this, whereas spearing tobacco is man's work.
4. The tobacco is preserved in far better condition by the new than by the old method. The spear so very often comes into contact with one or two of the leaves where the orifice is made that they are ruined as wrappers, which cannot occur with ordinary care by the new method.
5. The tobacco is far more easily removed when stripping time comes, hardly an effort being required to remove it from the nails, which is not the case when it is withdrawn from the laths.
6. When once hung on the nails no further adjustment of the stalks is required. Their places are definitely fixed, and they cannot get out of place, which is by no means the case when hung on laths, for then the utmost care must be observed that they are at their proper places when finally hung up in the tobacco-barns to cure. This also is a saving of time and labor.
7. It has led to the invention of several other devices which have a tendency to preserve the leaves from damage.

Some farmers have a place on the tobacco-wagon, commonly an arrangement beneath the hind axle, where the empty laths are carried. At the rear end of the wagon-scaffold are iron hooks or other contrivances, upon which the lath is hung and firmly held while the stalks are attached to the nails. As fast as a lath is filled it is removed to the usual place on the tobacco-wagon, and another is placed on the hooks, to be filled in turn. In this way the tobacco need be handled but once, and is not thrown on the ground at all, to the great damage of the leaves. Where it is not desirable, or when it is impossible to take the tobacco-wagon through the field, another contrivance, in the form of a tripod, with arms above the point of junction as well as toward the ground, is called into requisition. This is about 4 feet high, and at the top of the upper arms are attached iron hooks, to hold the laths firmly in place while the tobacco is hung upon them. A boy can take the stalk from the man who cuts it off and place it

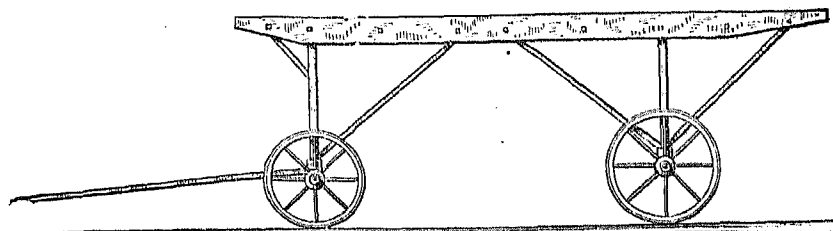
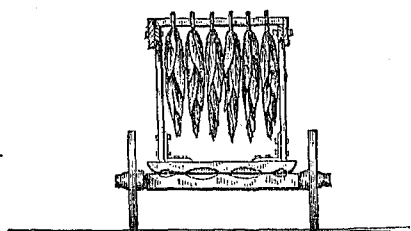
where it belongs on the lath. The tripod holds three laths. In driving the nails into the laths a measure is used which indicates where they are to go, so the work can be done regularly and rapidly.



A small trestle is sometimes used in the field for the same purpose as the tripod already described, which, although intended for a single lath, answers the purpose admirably.

There is no special period during which the tobacco is allowed to hang on the scaffolds, but from three to ten days is the usual time. While on the scaffold the access of air on all sides effectually prevents injury to the crop. The removal from the scaffold to the barn was a few years ago accomplished in any way the farmers found most convenient, but the exigencies of the situation have led to the production of a wagon specially adapted to this work. A frame, 18 feet long and a little narrower than the length of the laths, the upper rails of the frame having a cleat nailed or bolted on the outer edges and projecting above them an inch or more to prevent the laths shifting endwise, is placed upon a low-wheeled wagon, and the laths are transferred from the scaffold to the wagon and hung

upon the framework, and are easily removed to the shed or barn without injury to the plants. The illustration gives a good idea of this tobacco-wagon.



When the tobacco is taken from the field it is at once hung in the barn. The barn is filled from the top downward in sections; that is, a certain space, 10, 12, or 16 feet long, and as wide as the barn, is filled up at a time. The wagon is drawn into this section, and directly beneath the place where the tobacco is to be hung. By an arrangement of ropes and a pulley the laths are hauled to their places at the top of the barn (which may be 40 feet high) and carefully put on the cross-pieces arranged for that purpose. The careful planter observes, before the lath is fixed in its place, that the leaves do not adhere, but that they are well separated, in order that each individual leaf shall receive its due share of ventilation. A final adjustment of the plants on the laths is also made, as they may not have been originally so carefully placed as they should, or they may have been moved out of place during the subsequent stages of removal. Placing the laths at proper distances is also important. If too close, "pole-burn" will result, and much may be destroyed; or, if discovered in time, it often necessitates the removal from the barn for a time and the rehangings of the crop. The size of the plants, other things being equal, governs the distance at which they are placed, usually from 6 to 8 inches. In the process of curing proper ventilation is the all-important factor. The barn must be capable of being closed tightly when need be, and of affording thorough ventilation to all the tobacco in it, as rapid drying is not desirable. The plan generally adopted is to keep it closed during the day and to open it at night. Especially should it be kept closed on damp, foggy days, in order to exclude the moisture, although a few thorough dampenings from this cause are by no means objectionable, but are believed by some to be beneficial in fixing the color.

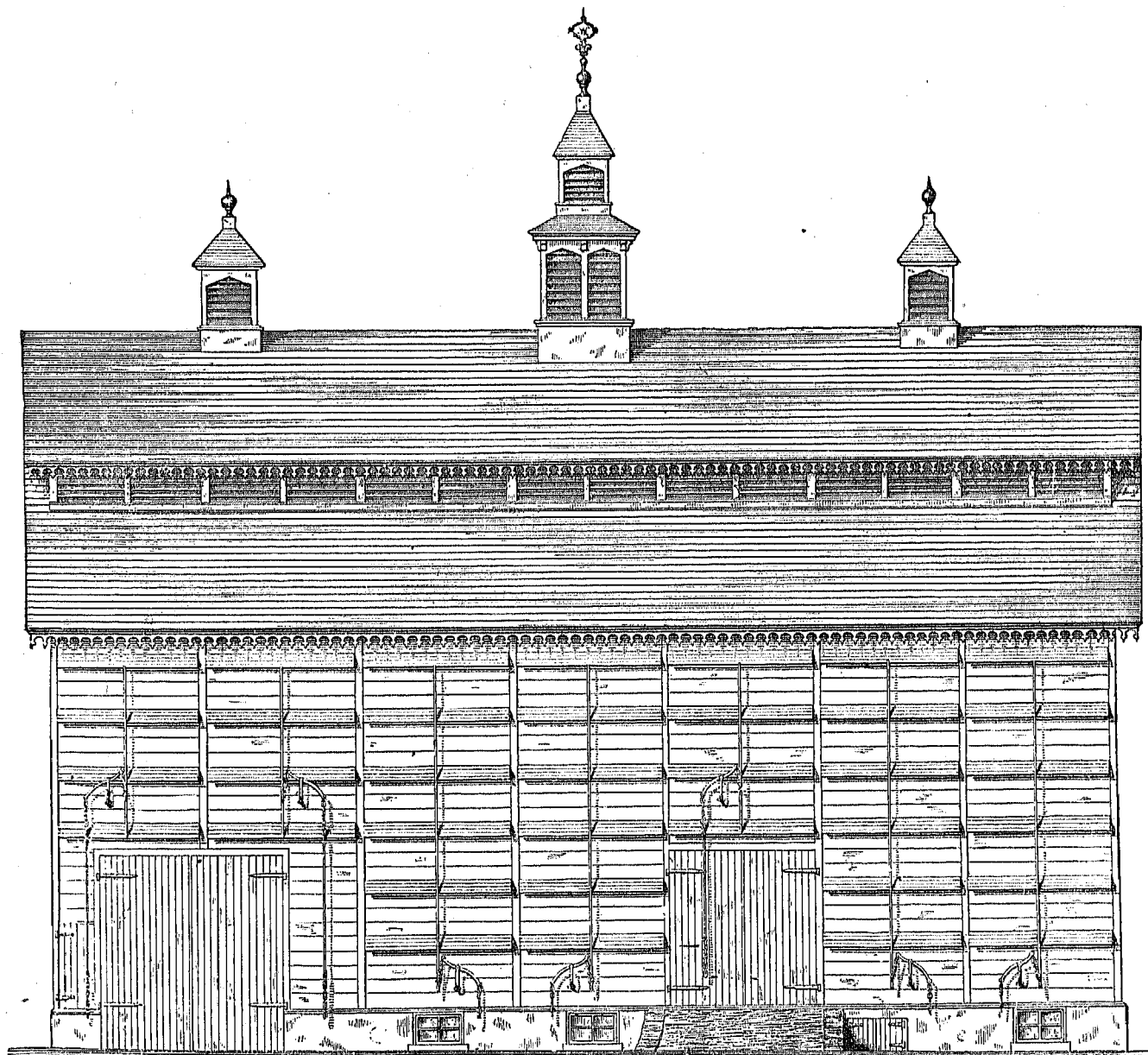
#### STRIPPING AND BULKING.

Under favorable circumstances tobacco cures rapidly. During the year 1880 some that was cut unusually early was stripped on the 1st of September, but generally very little tobacco is stripped until the middle of December, by which time the stems are thoroughly dried out and the tobacco is cured. Advantage is taken of wet, damp weather, when the laths are lowered into the cellar under the barn and the work of stripping begins. If there should happen to be no damp days when it is desired to strip, a few days in the cellar will impart the necessary moisture. Perhaps as many as three-fourths of all the growers assort their crops into three kinds, known, respectively, as "fillers", "seconds," and "wrappers". This is done not because it is the most profitable, but because it entails far less labor than when several additional grades are made. Sometimes the wrappers are reassorted into two kinds as to length, and these again as to evenness of color. This, however, is rare. Such lots

command high figures, as the buyer sees at a glance the full character of the crop. The leaves are tied into what are called "hands", from ten to twelve being put into each. More attention is given each succeeding year in tying up these hands carefully, and the more neatly and systematically the work is done the more attractive the hands look and the more salable they are. After the stripping has been finished, bulking comes next in order, for which a platform is made in the tobacco cellar about 4 feet or less in width and slightly raised from the ground, to prevent mold and undue dampness. If bulked in warm weather, say in October or November, it is apt to undergo the sweating process. This produces no bad results, but care must be taken that the bulks are not disturbed during the sweat. If not bulked until cold weather has set in, the tobacco is not likely to sweat until the warm weather of spring begins.

#### TOBACCO-BARNS.

However well the soil of Lancaster county may be adapted to the growth of good tobacco, it may well be doubted whether the product would ever have reached its present excellence except for the careful handling it receives after being taken from the field. In the early days of tobacco culture in this county, while it was still regarded as an irregular crop, little attention was given to proper buildings for its storage; in fact, few knew what was really needed. After being cut, it was hung up wherever there was any room, any vacant place in the barn, the poultry-



No. 1.

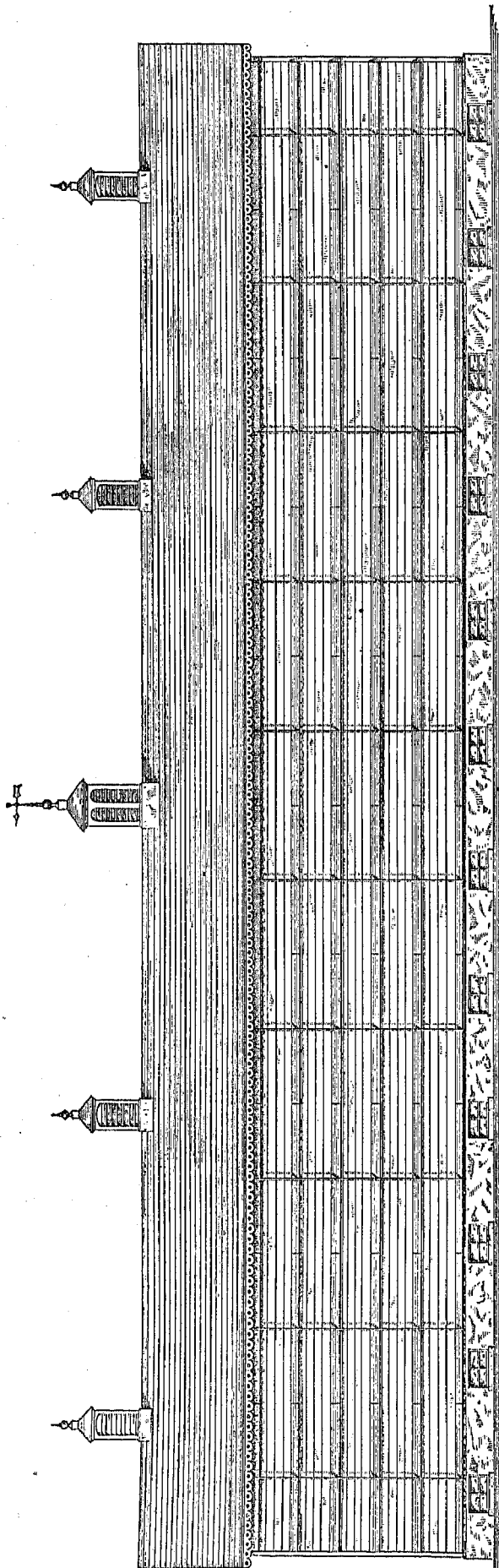
house, and the garret, or unused rooms in the dwelling, being utilized for this purpose. But as the crop grew in importance these make-shift conveniences were found to be totally inadequate, and common wooden sheds were built, without any particular reference to anything except their capacity to house the crop. Ventilation was very imperfectly understood, and was provided for by hanging some of the vertical boards of the building at

certain intervals upon hinges, which left continuous openings from the bottom to the top, with no place above for

the hot air to escape. Cellars underneath the structure were unthought of, and when stripping time came it was necessary to wait until the needed wet weather to make stripping possible.

As a knowledge of tobacco-growing spread among the farmers improved buildings began to be erected everywhere, with an eye to better results. Cellars were found to play so important a part in the preparation of the product for market that all good tobacco-barns were built with them, but now almost every farmer has his improved tobacco-barn. These are of all sizes, from 20 feet square to 40 feet wide and 150 feet long, but a well-proportioned tobacco-barn is thought to be one that is 36 feet wide by 72 or 80 feet long. Some of these are model structures of the kind, and present a fine appearance. The cost varies with the size. From \$500 to \$1,500 may be considered the ruling figures, but some of the more elaborate structures cost twice the latter sum; and barns costing in the aggregate about \$200,000 were erected in the year 1877. With prudent foresight the farmers have built them so that should the time come when tobacco-growing shall cease to be desirable these structures can be utilized for general farm purposes. The cut No. 1 shows what is perhaps the finest structure of the kind in the state. It stands on the farm of B. J. McGrann, who owns 145 acres immediately outside the eastern limits of the city of Lancaster, and who has recently purchased 70 additional acres adjoining, at \$300 per acre. Mr. McGrann some years ago built the tobacco-barn marked No. 2, 28 feet wide and 150 feet long; but having increased the size of his tobacco-field to 28 acres during the present year, the old barn was unequal to the demand made upon it, and the erection of another (No. 1) was begun and completed during the past fall.

The plans and several elevations give an excellent idea of what these barns are, but only a written description can do full justice to their model arrangement. Beginning with the cellar of No. 1, it will be seen that the excavation extends beneath the whole length and width of the building, 41 by 84 feet. This is divided by a partition into two apartments of unequal size. The larger of the two is used as a dampening room, into which the tobacco is lowered through trap-doors in the floor. Here it is also bulked after being stripped. The second and smaller apartment is used exclusively as a stripping room. Arranged around its four sides are permanent tables or counters, with a raised wooden floor immediately behind them, on which the men engaged in stripping stand. Elsewhere throughout the whole cellar the floor is of earth. The stripping room communicates with the larger room by a door, while a second door communicates with the outside. There are seven windows, affording all the light desired. There is also a smoke-flue running to the top of the building, and a stove to keep the place comfortable in cold weather. The cellar is 9 feet high in the clear. Upon this is erected a wooden superstructure, 29 feet high from the floor to the square or eaves. This space is so divided that seven tiers of tobacco can be hung one above the other, while the central portion of the building, being considerably higher, furnishes accommodations to three additional tiers, making ten in all. The ventilation is provided at the sides, at the gables, and also at the roof. At intervals of 4 feet there are horizontal openings along the entire building, the lowest one being at the floor and the rest above it, each one opening just where the tier of tobacco begins. These openings are about a foot wide, and are operated by a series of vertical levers, running from



No. 2.

the floor to the eaves, across a space of 12 feet, each one acting independently. The slatted openings along the roof, and those in the cupolas, give a draught, which insures a steady supply of fresh air, and will prevent any damage to the tobacco near the roof. The patent levers work so easily that a boy can work them, closing all the openings in one section at a single operation. At one end of the building arrangements have been made for a corn-crib, which, however, can at any time be utilized for tobacco-curing purposes. The building is somewhat embellished with ornamental work, and the outside has received three coats of paint. The cost of this barn was \$4,000.

Barn No. 2, while it combines most of the features of No. 1, is not so well ventilated, having no ventilation in the roof proper, but only through the slatted cupolas. It is less elaborate throughout in its appointments, and cost about \$1,500. Barn No. 1 combines in itself every valuable feature so far developed among the planters of Lancaster county as successful aids to tobacco culture and curing.

The tobacco-growers have not yet secured the best ventilation possible in their tobacco-barns. The plan of admitting the air through the horizontal openings is almost universally adopted, but every one who studies the principles of ventilation must see that unless some means are provided at the apex of the roof for the escape of the heated air the circulation throughout the building must needs be imperfect. Of late a modification of this plan has been introduced, which promises better results. But two openings are provided on the sides of the building, one at the floor and the other at the eaves, but these openings are three or more feet wide, and admit a large volume of air, which the opening at the eaves at once induces to rise and escape at that point. A series of slatted openings along the comb of the roof will divert a portion of the current in that direction, and a better ventilation than by the more numerous narrow openings would seem to be assured.

It is possible to secure better and more satisfactory results by another method, as yet untried by growers. By admission of a current of air directly beneath the hanging tobacco, instead of at the sides, this could easily be done. With the cellar so far out of the ground as to admit of windows several feet high on every side the floor above could be provided with numerous trap-doors, instead of the one or two now allowed, while ventilators could be placed in sufficient numbers at regular intervals upon the roof, running from the eaves to the comb; or, instead of trap-doors in the floor, the floor might be laid with strips a few inches wide, with open spaces of equal width between. When the cellar windows are thrown open the air from without would enter, pass directly beneath every plant in the barn, rise through every tier, and make its escape at the openings in the roof. There being no openings at the sides, there would be nothing to interfere with the ascent of a steady current. By the present system the outside air is driven against the sides of the outer leaves, instead of coming into contact with each one of them, as it should do, to secure uniform curing and color throughout the whole crop. This would also prevent the beating in of rain, as sometimes happens, or the ingress of heavy winds to break the dry leaves.

#### MARKETING THE CROP.

It is only when growers are unable to sell the crop at what they believe it to be worth that they pack it in cases themselves. The planters prefer to be clear of the old crop before they begin with the new, and probably not one case out of every hundred raised is packed by the growers. There is no particular time for the purchasing season to begin. Buying is done altogether by sample. Farmers take advantage of favorable weather at any time after October to prepare their goods for market. Buyers begin their operations generally in November, but often not until December. They congregate in Lancaster, thirty and forty at one time, and come from all parts of the country: from Baltimore, Saint Louis, Philadelphia, and San Francisco, but principally from New York. There is beside, a large number of local buyers and packers, and during the season these men visit every out-of-the-way nook and corner and search out every lot of tobacco in the county. Many packing-houses send their agents to spy out the ground while the tobacco is still in the fields and mark choice lots. If the price is agreed upon, a contract in duplicate is drawn up, the buyer retaining a copy and the grower receiving the other. At the time specified, or, if none is specified, when the grower is ready to deliver the crop, it is taken to the packing-house of the purchaser and done up in bales of varying sizes, generally of 100 pounds' weight, and it is there weighed and paid for on the spot. Occasionally, however, the packers do not wait until the crop is stripped before they begin purchasing. If the crop is a very desirable one, they begin operations before the farmers are ready to sell, or before their tobacco is ready for the market. This was notably the case in 1879, when the season opened before the growers had commenced to strip, and while the tobacco still hung in the barns. It was examined while still on the poles, and much of it was bought in that condition. This method does not always result satisfactorily. Sometimes the buyer is deceived by the crop as it hangs in the barn and offers more for it than it afterward proves to be worth, in which case there is likely to be dissatisfaction and dispute. The planters, as a rule, prefer to sell their crops after they are stripped and fully ready for the market.

#### PACKING TOBACCO.

There are upward of fifty firms engaged in packing stationed at Lancaster, or with agents there to represent them. The cost of buying, receiving, assorting, casing, and storing tobacco, including the cases themselves, may be put down at from 1½ to 2 cents per pound. The shooks for the cases come from the pine regions of Michigan,

although many are made in the lumber regions of Pennsylvania. The cost of cases is about \$1.05 each at the present time (1880); the size is 2 feet 6 inches high, 2 feet 6 inches wide, and 3 feet long, and will easily hold 400 pounds of tobacco. Generally only about 375 pounds of fine wrappers are packed in a case, close packing being considered objectionable to that part of the crop, while rather more than 400 pounds are packed into a case of the other grades. Some packers, however, put in exactly 400 pounds. The loss on tobacco incurred by the sweating process after it is cured is from 9 to 15 per cent. Sometimes the tobacco is sold at the marked weight, that is, at the weight of the tobacco at the time it was cased, at which time the weight of case and tobacco are plainly marked on the box; and sometimes by reweight, that is, with the loss from the sweating deducted. The cost of sampling, including labor for handling, opening, and shutting of cases, is 50 cents per case. The average wages of hands engaged during the winter season to receive, handle, assort, and pack the tobacco is \$9 per week; the foreman gets about \$12. The only tax (a) packers are required to pay is the government tax of \$25 as dealers, irrespective of the quantity bought and sold.

#### TOBACCO WAREHOUSES.

The warehouses and packing establishments are brick structures from 75 to 150 feet long and of corresponding width, and from two to three stories high, and their capacity runs from 500 to 5,000 cases. On one short street in the eastern part of the city of Lancaster there are six of these structures standing side by side. This street is appropriately named Tobacco avenue. Often the adjoining streets for several blocks are crowded with double rows of vehicles of all descriptions, from the wagon with a single horse to the "Conestoga wagon" with its six magnificent horses. Teams that have twenty or more miles to come leave their homes on the previous evening, and as early as one o'clock the train of wagons begins to pour in, each driver being anxious to be the first comer, in order to secure a favorable place, and, consequently, an early discharge of his load. During the receiving season from ten to eighty hands are constantly employed, and sometimes a night gang is taken on in addition. As many as 1,000,000 pounds have been received by the packing-houses in Lancaster in a single day, while as much as \$175,000 has been paid to the growers in the same time by the packers. A single firm has purchased \$400,000 worth of tobacco in a season, while many buy to the value of \$100,000 each.

#### DOES TOBACCO IMPOVERISH THE SOIL?

Tobacco is a voracious feeder and makes heavy drafts on the soil, but the growers in Pennsylvania do not believe it is harder on the soil than the ordinary farm crops. For more than thirty years it has been continuously grown on their fields, and yet there is not a single acre in the county that has been worn out from this cause. Under the system of cultivation practiced in Lancaster county the tobacco lands are growing richer, instead of becoming impoverished. It will be observed that one of the gentlemen who have furnished estimates of the profit on an acre of tobacco, Mr. H. G. Rush, claims a credit of \$25 because of the increased fertility of the soil. That should settle this matter very effectually so far as Lancaster county is concerned.

Where careless farming prevails the case would, no doubt, be very different. To crop tobacco year after year without returning an ample equivalent to the soil can, of course, have only one ending. All the money realized from the tobacco crop remains in the farmers' hands, and they are at little expense, except for labor. Few artificial fertilizers are purchased, the great aim being to produce as much home-made manure as possible. No straw, hay, or corn is sold by the best farmers; all is fed on the farm. Large numbers of stock cattle are purchased in the fall, fattened during the winter, and if the farmer only realizes a fair price for the corn fed them he looks for no other profit for his trouble, well aware that the increased size of his manure pile will make him ample amends, and that the fertility of his farm will be maintained.

Another fact must not be forgotten. Great care is exercised in the amount of land set out in tobacco. While there are three or four persons who have planted as many as 50 acres in a single year, a few only plant as many as 10, while by far the greater number grow only from 1 to 5 acres each. In 1879 the acreage which a farmer might safely plant was discussed at a meeting of the county agricultural society, and, an expression of opinion being taken, the limit was placed at 5 per cent. of the tillable acres of the farm, but a large minority of the members thought 3 per cent. enough. As the farms run from 75 to 100 acres, it will be seen that the danger of ruining the farms through tobacco-growing is not a contingency that gives much alarm.

#### LABOR AND WAGES.

It cannot be said that there is any appreciable difference between the cost of labor employed in tobacco culture and that paid for ordinary farm work. This rule holds good throughout the state. On page 159 is given the ordinary wages paid to farm laborers, which will represent the cost of hands employed in tobacco culture. Most farms of the average size employ at least one hand throughout the entire year, and when such labor is employed only during

<sup>a</sup> More recently a modification of this law has been made, so that by paying a tax of \$5 a merchant may buy tobacco to the amount of 25,000 pounds.

the summer the wages are but very slightly higher. Most farm laborers prefer to contract their services for the entire twelve months, rather than for a shorter period. The following are the rates that have prevailed during the past four years :

	By the month for the whole year.	By the month for the summer months.
1877.....	\$12 39	\$15 10
1878.....	11 24	14 50
1879.....	10 58	13 40
1880.....	11 79	14 90

There has been a growing tendency in some places to hire help who will board themselves, although the custom cannot be said to be at all general. In such cases the rates averaged as follows:

	Whole year.	Summer months.
1877.....	\$20 97	\$26 07
1878.....	18 41	24 07
1879.....	17 44	21 25
1880.....	18 32	22 35

Transient labor during the same period, harvest time excepted, has been as follows per day:

	With board.	Without board.
1877.....	\$0 80	\$1 15
1878.....	75	90
1879.....	63	88
1880.....	71	98

Board on an average is estimated at about 30 cents per day.

COST AND PROFIT OF TOBACCO-GROWING IN LANCASTER COUNTY.

Tobacco has proved to be the most profitable of all Lancaster county farm crops, and, although generally considered a precarious one, it has proved quite as certain as any other grown during the past twenty years.

The high-priced lands of the county, and the labor bestowed upon the tobacco crop, require not only that a heavy crop be grown on the land, but that a good price be obtained when it is marketed. Both these conditions have been realized for a long series of years. The average price of good farm land is about \$200 per acre; sometimes the price is not higher than \$175, but it frequently runs up to \$250. To get at the true cost of growing an acre of tobacco four of the best known and most successful growers were invited to make estimates, which are here given. It will be observed there is considerable difference in some of the estimated items.

The estimate of Mr. J. M. Frantz, of Wabank, is as follows :

Dr.		
Making seed-bed and attending plants.....		\$1 00
Plowing one acre of ground.....		1 50
Manure.....		50 00
Preparing ground for planting.....		2 00
Planting.....		2 00
Cultivating and hoeing after planting.....		5 00
Topping, worming, and suckering.....		10 00
Harvesting, cutting, spearing, and housing.....		5 00
Use of shed, laths, wagon, etc. (interest on cost).....		5 00
Stripping, bulking, and preparing for market.....		12 00
Rent of land (interest on value of).....		10 00
Hauling to market.....		2 00
		<u>105 50</u>
CR.		
1,000 pounds tobacco, at 25 cents.....	\$250 00	
500 pounds tobacco, at 10 cents.....	50 00	
300 pounds tobacco, at 5 cents.....	15 00	
		<u>315 00</u>
Net profit.....		<u>209 50</u>

Cost per pound, 5.86 cents.

Mr. Frantz further says that in his opinion an additional expenditure of \$50 for manure would give this result:

Dr.		
For labor, manure, and interest on investment.....		\$155 50
CR.		
1,500 pounds of tobacco, at 25 cents.....	\$375 00	
500 pounds of tobacco, at 15 cents.....	75 00	
		<u>450 00</u>
Net profit.....		<u>294 50</u>

Cost per pound, 7.77 cents.



The latter estimate, moreover, favors the idea that it is far more profitable to cultivate fewer acres, cultivating them more highly, making more pounds and a better article, a larger gain being the result.

Mr. H. G. Rush makes the following estimate:

DR.	
Making seed-bed and care of plants .....	\$5 00
Plowing one acre twice .....	4 00
Manure and cost of application .....	50 00
Harrowing and preparing the ground .....	3 00
Planting and replanting .....	5 00
Harrowing and hoeing three times, each \$2 .....	6 00
Topping, suckering, and worming .....	12 00
Harvesting .....	10 00
Use of barn, laths, etc. (interest on cost) .....	6 00
Taking down and stripping .....	18 00
Rent of land (interest on value) .....	12 00
Taking to market .....	2 00
	133 00
CR.	
1,200 pounds of tobacco, at 20 cents .....	\$240 00
200 pounds of tobacco, at 8 cents .....	16 00
400 pounds of tobacco, at 3 cents .....	12 00
Value of stalks as manure .....	2 00
Increased fertility of the soil .....	25 00
	295 00
Net profit .....	162 00

Cost per pound, 7.39 cents.

Mr. Rush adds the following remarks:

On the debit side it will be observed that \$68 apply to the farmer as owner and \$65 as cultivator. The cost of labor is rated at \$2 per day for a man and team, and \$1 for other labor, board included. The ordinary cost of cultivation is not nearly so high, as much of the work is done by hired help at lower rates, and by children; but then it is also claimed that the credit side is somewhat above the average. I think, for the kind of tobacco sure to command the prices given, the expenses are not much too high. It may not be amiss to say that efforts to curtail expenses would almost certainly result in a triple reduction on the credit side of the account; a saving of \$10 losses \$20, and not seldom \$100.

Joseph F. Hershey, president of the Lancaster County Agricultural Society, makes this estimate:

DR.	
Making seed-bed and care of plants .....	\$8 00
Plowing ground twice .....	4 50
Manure .....	30 00
Preparing the ground .....	3 00
Planting .....	3 00
Harrowing and hoeing .....	12 00
Worming, topping, and suckering .....	15 00
Harvesting .....	5 00
Rent of barn, wagon, laths, etc. (interest on value) .....	20 00
Taking down and stripping .....	20 00
Rent of land (interest on value) .....	9 00
Marketing .....	6 00
	135 50
CR.	
1,400 pounds of tobacco, at 20 cents .....	\$280 00
200 pounds of tobacco, at 10 cents .....	20 00
400 pounds of tobacco, at 5 cents .....	20 00
	320 00
Net profit .....	184 50
Cost per pound, 6.77 cents.	
Or, for a poor crop, 800 pounds of tobacco, at 16 cents .....	128 00
150 pounds of tobacco, at 8 cents .....	12 00
250 pounds of tobacco, at 3 cents .....	7 50
	147 50
Deduct expenses .....	135 50
Leaving a profit of only .....	12 00
And costing 11.29 cents per pound.	

The fourth and last estimate is made by Mr. M. D. Kendig, of Creswell, and is as follows:

Dr.	
Making seed-bed and care of plants .....	\$3 00
Plowing one acre twice.....	5 00
Manure, 15 tons, at \$4 per ton.....	60 00
Harrowing and preparing the ground.....	4 00
Planting.....	4 00
Harrowing and hoeing three times.....	8 00
Topping, worming, and suckering.....	9 00
Harvesting .....	5 00
Use of barn, wagon, laths, etc. (interest on value).....	15 00
Taking down and stripping.....	17 50
Rent of land (interest on value) .....	12 00
Taking to market .....	3 00
	145 50
Cr.	
1,300 pounds of tobacco, at 20 cents.....	\$260 00
150 pounds of tobacco, at 8 cents.....	12 00
300 pounds of tobacco, at 4 cents.....	12 00
	284 00
Net profit.....	138 50
Cost per pound, 8.3 cents.	

Taking the foregoing estimates and grouping them as the basis of a calculation, and including the poor crop, we find that the cost of growing a pound of tobacco in this county is 7.68 cents. It is considerably less in other portions of the state, as a reference to the other counties will show. This is owing to the cheaper lands, cheaper barns, and various other items that enter into the general account. None of the foregoing calculations give an idea of the amount of money that has in a favorable season been realized from an acre of Lancaster county seed-leaf tobacco. In 1879, when the crop was unusually heavy and the prices were very high, \$300 was no unusual sum to be realized from a single acre. The best result heard of was from 15,800 plants, set out on 3 acres of ground, which produced 7,681 pounds of merchantable tobacco, or nearly half a pound to the stalk. This crop was sold at 25 cents through, the fortunate owner receiving \$1,920 25, or \$640 08 per acre. The expenses of growing it are not known, but the net profits could hardly have been less than \$450 per acre. This certainly shows high farming.

THE YIELD PER ACRE.

The average yield of 1879 per acre, as shown by enumerators' returns, was 1,409 pounds. From 1,800 to 2,400 pounds were grown to the acre by many planters, while 2,000 pounds was not regarded as a very heavy crop among good planters. At the present rate of production, Lancaster county, if its whole area was planted with tobacco, would grow nearly double the entire crop of the United States.

The crop of 1879 was good as well as large. Although there was an extraordinary development of leaf—40 to 50 inches in length having been common—its rapid growth toward the close of the season resulted in giving it that soft, pliable, silky character so much sought for by cigar manufacturers. The average price realized by the growers was also large, having been about 15 cents. All this is the more surprising, as the early part of the season was very unfavorable on account of drought, and several hailstorms did damage in some parts later in the season.

INSPECTION OF TOBACCO.

All tobacco is sold strictly upon its merits. No public system of inspection is desired at the present time, but there is a system of voluntary inspection, which has been found to work admirably. After the work of casing the crop is done the tobacco is carefully stowed away in the large packing establishments, where it is allowed to undergo the final process of sweating. When that operation is completed, which is in August and September, experts are brought out from New York, who perform the work of sampling. Every case is opened, and a number of "hands" are drawn from it, from which a fair average is selected. The samples are marked with the number of the case, and the sampler's signature is attached, and nearly all transactions are made on that basis. These samplers receive 35 cents per case for such service, and when a case of tobacco is found not to correspond with the sample he is held responsible for any damage or loss that may be sustained.

STALKS AS FERTILIZERS.

Tobacco stalks are considered an excellent fertilizer. They are cut into short pieces, and then either thrown on the manure pile or plowed under. Lard scraps are also used by some. In 1878 General Simon Cameron and his neighbor, Colonel Duffey, both large tobacco-growers, used 50 tons of lard scraps on their tobacco lands with

satisfactory results. A few planters are accustomed to throw a handful of hen droppings wherever a plant is set. It is found, however, that chicken manure, when applied uncomposted to seed-beds, has frequently a tendency to burn the tender plants.

#### BLACK-ROOT.

In some years the plants, both in the seed-bed and after being set out, are affected by a disease known as the "black-root". The plants so affected do not die, but after standing comparatively still for a long time revive later in the season, but do not make a good quality of tobacco. It is not known what the agencies are in producing this disease, nor has there been a remedy discovered for it. By some it is believed to be the result of sowing seed continuously in old seed-beds. Seed-beds in newly-cleared ground are said to be entirely free from it.

#### FOXY TOBACCO.

Loose, sandy soil is the kind where "foxy" tobacco is most found, but all soils and localities, uplands and bottoms, occasionally develop it. Some think it more likely to be the result of drought, accompanied by very warm weather, rather than a matter of soils and situation. This disease is known as "walloon" in the southern states.

#### RAPID GROWTH DESIRABLE.

Rapid growth during the last two weeks the tobacco remains in the field is highly desirable, and the quality of the leaf is always superior when such is the case. The growth which tobacco will make under favorable circumstances is wonderful, leaves 42 by 30 inches and 47 by 27½ inches in size having been grown in sixty days from the time they were set out. Connecticut Seed-Leaf planted in Lancaster county has, under favorable circumstances, produced leaves 26 by 14 inches in twenty-one days.

#### TIMBER LAND OF THE COUNTY.

Probably only 12 or 15 per cent. of the area of Lancaster county is now in timber, and during recent years the cultivation of tobacco has contributed much to reduce the timber area. Newly-cleared lands are the best for tobacco culture. A virgin soil seems to contain all the elements required by this voracious feeder, and no old lands are comparable with them.

#### BY WHOM TOBACCO IS CULTIVATED.

When only a few acres of tobacco are planted by a farmer he and the hired help on the farm attend to it, in addition to the other farm crops; but when a larger area is planted, say from 10 to 30 acres, it is generally given out to croppers on shares, the farmer furnishing the land and the barn and the cropper providing all the labor. The labor being light, much of it is performed by the women and children of the family; so that there is really little or no expenditure in cash on the part of the cropper. Land is seldom rented outright for tobacco-growing, but a few cases of this kind do occur. The rental of land for this purpose is about \$60 per acre, and when the season is a good one even this large sum leaves a handsome profit to the renter. In many cases laboring men who have given their attention to tobacco-growing have bought a few acres, for which a single successful season has enabled them to pay.

#### SECOND TOBACCO CROP.

A second crop is rarely grown. Although this might be done in favorable seasons, when the main crop is cut very early, farmers are content with housing the first growth in good condition. Fields are frequently seen late in the fall, upon which the second growth has been left to take care of itself, that look almost as if no tobacco had been cut from them. This second crop is turned under by good farmers, for the double purpose of enriching the soil and to destroy the numerous insects that feed upon the plant at that time.

#### SOWING TOBACCO SEED IN THE FALL.

It is the general practice to sow tobacco seed in the spring; but some farmers have tried late fall sowing with excellent results, the plants being stronger and better than spring-grown plants set in the same field. In 1879 a grower neglected to gather all his seed, and that from several plants was scattered by the winter winds. In the spring they came up well, and produced better plants than any he grew in the regular way.

#### INSURANCE OF TOBACCO-BARNs AND CROPS.

Insurance is as readily effected on tobacco-barns, warehouses, and buildings in which tobacco is handled as on property of a like kind used for other purposes. A company was organized in 1879 to insure tobacco in the field, and a considerable amount was thus insured, the association taking a risk of \$150 per acre.

## WIDE OR CLOSE PLANTING.

The merits of wide and close planting have been much debated, but very few have taken the trouble to determine the question by experiments carefully conducted and continued for a series of years. So far as is known, Mr. John F. Charles, living near Washington borough, on the banks of the Susquehanna, is the only tobacco planter who has persevered in experiments in this direction. His first experiment was made in 1876. He set out 16,000 plants in rows  $3\frac{1}{2}$  feet apart and 33 inches apart in the row. The result was 7,505 pounds of cured tobacco, which he sold at 22 cents per pound through.

The second experiment was with the crop of 1877. The rows were  $3\frac{1}{2}$  feet apart, but the plants were set somewhat closer, 18,000 being put upon the same piece of land. The result was 6,580 pounds of marketable tobacco, which sold at 5 cents for fillers, 8 cents for seconds, and 20 cents for wrappers.

The third experiment was made in 1878. As in 1876, the rows were marked out  $3\frac{1}{2}$  feet apart, and the plants set out in them at intervals of 33 inches, 16,000 being again planted. The season was far from favorable, and the result gave 5,620 pounds. The price for which it was sold is unknown.

In 1879 the fourth experiment was made, with rows  $3\frac{1}{2}$  feet apart and the plants also  $3\frac{1}{2}$  feet apart in the rows, planting 16,000 plants. The product was 7,690 pounds.

These results seem to show that wide planting, even when carried to the extreme, as was done in 1879, gives the most favorable results.

The methods practiced in tobacco culture in Lancaster county, with slight variations, are equally applicable to all the counties in the state producing this staple. A brief notice of the soils and the varieties of tobacco planted elsewhere in the state will therefore suffice.

## BERKS COUNTY.

This county is greatly diversified in its topographical features, and it has many wide and fertile valleys bounded by rough ridges and mountains. The new red sandstone passes through it, while the soils are very similar to those of Lancaster county. About one-third of the area of the county is underlaid with limestone, but in the southern portion red shales predominate. For the production of tobacco a clayey loam is selected, in preference to a sandy one. The surface soil is brownish in color, with a subsoil of yellow clay, and is warm and dry. Every part of the county, except steep hills, is adapted to the growth of tobacco, and the crop is managed as in Lancaster county, though less skillfully. Reading is the principal tobacco market, and has three or four packing-houses. Good tobacco lands are worth \$150 per acre, and such lands will yield 1,500 pounds to the acre. Hands for working in tobacco are rarely employed by the year, but they are paid 80 cents a day, without board, and strippers get 1 cent per pound.

## BRADFORD COUNTY.

This is one of the northern counties in the tobacco belt of the state. The surface of the county is uneven, being broken by numerous ridges of high hills. The Susquehanna has numerous feeders within this county, and near the mouths of these are many flats, which are rich and productive. On the highlands the soils are heavier, having a larger content of argillaceous material. The mean summer temperature is much less than in Lancaster and other counties south, being 63° F., and the mean winter temperature approaches 23° F. The average rainfall is 40 inches. A large portion of the county is underlaid with the Chemung and Catskill groups of rocks, consisting of red and blue shales and sandstones, with some limestones. In the river bottoms the soil is a dark chocolate-colored, sandy loam, and on the first bench of the uplands it is of a light brown color generally, often gravelly, varying in color from a light gray to a dark brown. It has a gravelly subsoil of porous yellow clay, which is light and warm. The latter soils are preferred for tobacco. On the river bottoms the leaf grows thick and heavy, and is altogether inferior. Nor does tobacco do well on the heavy soils of the highlands, there being a difference of a week or ten days in the growth and ripening of tobacco on the warm, light soils and on the heavy soils of the highlands. In harvesting the crop the plants are fastened to poles with twine, thirty-six plants being placed on a 12-foot pole. A few growers drive a wire hook in the butt of each plant and hang six plants on a stick four feet long. Tobacco is not scaffolded before housing. The best tobacco soils are worth from \$150 to \$200 the acre, and with good manuring will yield 2,000 pounds per acre. Wages are \$8 to \$14 per month, with board, for boys and men; by the day, 50 cents to \$1. Cases for packing cost \$1 each. The estimated cost of production on best soils is \$100 per acre, and the value of the product is \$200, or a profit of \$100. Profit on thinner tobacco soils, \$60 per acre.

## BUCKS COUNTY.

This county began to grow tobacco in 1856, since which time there has been an annual increase in acreage. The general surface of the county is undulating, but the ridges of South mountain and the Lehigh hills, in the northern part, encroach upon the Delaware. In the southwestern part of the county the rocks are gneiss, mica-schists, and hornblende, producing a soil of moderate fertility generally, but near the Delaware river it is very

productive. The red shales and sandstones, accompanied by conglomerates and limestones, occupy a large portion of the county, making excellent soils. Trap and gneissoid rocks also abound in the ridgy parts of the county, where there are many fertile limestone valleys. The soil preferred for tobacco is what is known as isinglass soil—a light loam on rolling lands, in which particles of mica are abundant. The texture of the tobacco grown on rolling lands is finer than that grown on level lands. Five townships in the southern part of the county are well adapted to the growth of tobacco. The acreage has increased 25 per cent. since 1876, and the quality is much finer, improving with the experience of the farmers. Duck island, in the Delaware river, is noted for its excellent tobacco. Stable manure yields on sandy loams the best results in the culture of tobacco, and about 16 tons of horse manure, at a cost of from \$2 50 to \$4 per ton, are applied with three or four hundred weight of artificial fertilizers to the acre. Rotation: wheat, grass, corn, tobacco. The quality of the tobacco made is rank. Tobacco plants are set on ridges raised 3 inches above the general level. These ridges are 4 feet apart, and one plant is set at every 30 inches. In 1879 the crop was badly damaged by pole-sweat, at least 50 per cent. having been injured. The tobacco-houses are greatly inferior to those of Lancaster county. There are two packing establishments near Tullytown. The cost of growing one acre, producing 1,500 pounds, is estimated at \$125, including manure, which costs \$40 per acre; value of product in the barns, 12 cents per pound, or \$180 per acre; net profit, \$55. Another report gives the cost of labor alone at \$100; other expenses, including \$65 for manure, at \$81; making a total cost per acre of \$181. The crop is credited with 1,800 pounds of tobacco, at 14 cents through, or \$252, which would give a net profit of \$71 per acre.

#### CHESTER COUNTY.

This county adjoins Lancaster on the east, and partakes largely of its general character in surface and soil features. The Welsh mountains, a sandstone chain, run along its northwestern boundary. South of that lies a wide belt of red shale and sandstone and a considerable area of gneissoid rocks. Chester valley is based on metamorphosed limestone and forms a distinguishing feature in the county. South of the valley lies a belt of Eozoic rocks, consisting of gneiss and mica slates. In this belt serpentine hornblende, trap and feldspar, chrome-iron ore, kaolin, and corundum occur. Tobacco is principally grown in those townships adjoining Lancaster county, and sandy loams are preferred, though limestone and slaty soils are employed in its production. Tobacco culture has increased very rapidly. In 1878 but little more than 100 acres were planted; in 1879 the returns show 487 acres, yielding 633,632 pounds. The crop of 1879 far exceeded any other in quantity as well as in quality, the varieties planted being the same as those grown in Lancaster county. Tobacco-barns are of a poor character, mere temporary make-shifts. The market for tobacco is Lancaster. The cost of producing an acre is variously estimated at from \$50 to \$67, which would indicate light manuring; the yield per acre is 1,301 pounds.

#### CLINTON COUNTY.

The west branch of the Susquehanna flows through Clinton county for a distance of 50 miles. As in other counties in central Pennsylvania, the surface is varied by mountains, hills, and valleys, and the timber growth is pine, oak, chestnut, walnut, and hickory. Limestones and sandstones prevail generally throughout the county, but the latter are more common. The soil, both on the uplands and in the valleys, is mostly a sandy loam, this being especially the case along the streams; indeed, there is scarcely an acre in the upper west branch region that is not more or less strewn with broken fragments of sandstone. Yet this soil is generous and kind, and even elevated farms produce crops of all kinds. Limestone is found in nearly every township, but the northwestern portion of the county lies within the limits of the Clearfield coal-basin. The culture of tobacco was begun in this county as early as 1854, some say ten years earlier, but the census of 1850 does not report tobacco among the productions. The crop is now cultivated mainly east of the center of the county. The best tobacco soil is a dark sandy loam, light, warm, and loose, with a red-clay subsoil, and in preparing it it is plowed only once in the fall and again in the spring. Large applications of barn-yard manures are made after plowing and are harrowed in, and the soil is said to increase in productiveness every year, so large is the quantity of manure used. The crop is managed generally as in the southern counties, only that in the preparation of seed-beds the land is frequently burned. In harvesting the plants are speared on laths, and no hooks or twine are used. The tobacco-barns in this county are from 24 to 32 feet wide and of any desired length, and are made as tight as rough boards will make them, and it is estimated that a barn 24 feet wide, 20 feet long, and fourteen tiers high, with a short one under the roof, is sufficient to house one acre of good large tobacco. A barn 24 feet wide and 100 feet long will cost \$500. Scaffolds are used in the fields, but it is believed that the color of the tobacco is improved if carried to the barn as soon as cut. Contrary to the usual rule, in assorting and classifying tobacco only two grades are made, wrappers and fillers. Rarely is the third grade, seconds or binders, separated. The growers sell to local dealers, who pack it in boxes 40 inches long, 28 inches wide, and 30 inches deep. The best lands in the county for growing tobacco are rated at \$200 to \$250 per acre. These lands will grow in a favorable season from 1,800 to 2,000 pounds of tobacco. Inferior tobacco lands, with a capacity for growing 1,000 to 1,200 pounds to the acre, are worth from \$100 to \$150 an acre. When rented, the best lands bring from \$25 to \$30 an acre. For working a tobacco crop labor is hired by the day at from 75 cents

to \$1. The estimated cost of growing an acre in tobacco is \$60; average yield on best lands, 1,600 pounds; average price, 8½ cents; profit per acre, \$73 33. From 2 to 3 acres are generally allotted to the hand. Artificial curing with charcoal, costing 25 cents per bushel, is sometimes practiced in very damp weather.

#### CUMBERLAND COUNTY.

This county lies in the southeastern portion of the state, directly west of the Susquehanna river, which forms its eastern boundary. Its natural boundary on the north is the Blue mountain, and on the south the South mountain. The surface of the county is comparatively level, especially in the limestone sections, but the slate region is uneven and hilly. Along the South mountain there are numerous tracts which are composed principally of hard, white sandstone. There is also a detached bed of limestone in this portion of the county, although further to the north nearly the entire formation is of this stone. The county is unusually well watered, and the wood is principally oak, hickory, and walnut. Tobacco is grown on limestone loam with clay subsoil, and some on black and yellow slate, but the former is the preferred soil. The eastern half of the county only is well adapted to tobacco culture, and the larger portion of the crop is grown in the central portion of the eastern half—a strip about 16 miles long and 10 wide. As long ago as 1862-'63 a few small lots of tobacco were grown in this county, and little attention was afterward given to it until about 1876, since which time the growth in acreage has been rapid. The increase in product is due, for the most part, to the fact that growers are better informed as to the requirements of the crop in the matter of preparing the soil, kinds of soil, manures, planting, cultivation, and general handling. The product has steadily increased in quality as well as in quantity. About 10 per cent. of the crop is grown on newly-cleared lands, and it may be stated that, in round numbers, about 40 per cent. of the timbered area of the county is adapted to the growth of tobacco. Freshly-cleared lands are always preferred, and there is no perceptible difference between the product of level and that of rolling lands, in case both are equally manured. No artificial fertilizers are used, but stable manure is applied at the rate of from 20 to 40 tons to the acre, at a cost of from \$25 to \$50, increasing the yield largely, and at the same time improving the quality; and a neglect to use it in the growing of the crop is at once indicated by a loss of from 25 to 50 per cent. of its quantity and value. Wheat generally follows tobacco in the rotation of crops, after which the fields are left in grass for several years, when they are again plowed. In some cases the manure is plowed under, while in others the application is made to the surface and mixed with the soil by means of thorough surface cultivation. The cultivation of the crop and the varieties planted are the same as in Lancaster county. The schedules report the following prices: 20 cents per pound for wrappers, 10 cents for seconds, and 5 cents for fillers, making an average of about 14 cents per pound. The houses in which the tobacco is cured have been mostly built for this special purpose, and some of them are very large. The tobacco is mostly sold at home to dealers from New York and elsewhere. There are two packing establishments in this county, located at Mechanicsburg. The cost of growing an acre of tobacco is estimated at \$75.

#### DAUPHIN COUNTY.

Rocks: Limestones and hills of slate; timber: hickory, oak, ash, walnut, and chestnut. Tobacco is cultivated mainly in the lowlands along the eastern side of the Susquehanna, and on the numerous islands with which that wide stream is everywhere dotted. The crop has greatly increased since 1876, that of 1878 being a very fine one, much better than any of the preceding ones. The varieties grown are the Connecticut Seed-Leaf, Glessner, Mud Island, and Pennsylvania Seed-Leaf. The soil preferred for tobacco is a rich loam, known as bottom lands, and it is said that the first and second crops grown on freshly-cleared bottom lands are superior to any grown subsequently. Twenty four-horse loads of barn-yard manure, the value of which is from \$75 to \$100, are often applied per acre, the crop being doubled in quantity and greatly improved in quality by such applications. Lime is freely applied to the soil, as much as 100 bushels being used every five years. It takes from fourteen to twenty-one days for tobacco to ripen after being topped, and the average value of the crop through is 7½ cents, fillers bringing 2 to 3 cents, seconds 4 cents, and wrappers 7 to 10 cents. There are packing-houses at Middletown and Conewago.

#### LEBANON COUNTY.

The best tobacco soils in this county are found along the line where the sandstone and limestone belts join, the preference being given to those on the limestone side, especially in the bottom lands, where water stones or small, round boulders prevail, but all parts of the county, except the northern portion, are adapted to its growth. Plaster and gypsum are occasionally applied to the hill. Five thousand four hundred plants are usually set to the acre. Transplanting may be done as late as July 5, and forty-five days elapse between planting and topping. The plants are topped to from eight to fourteen leaves, and the time between topping and cutting is about twenty-five days. The plants mature earlier on rich soils than on thin ones, and when ripe are cut with a corn-knife, a saw, or with tobacco shears. There are but few houses built expressly for curing tobacco, and the crop of the county is sold loose at Lancaster and at Lebanon. The best tobacco lands are worth \$200 per acre, and will yield in good seasons as high as 2,000 pounds per acre when well manured and properly managed. Inferior lands cost \$60, and yield 600 pounds per acre. Good laborers cost \$1 25 and board per day during summer, and 75 cents per day, with

board, at other seasons of the year, and strippers are paid 1 cent per pound. The cost of growing 100 pounds of tobacco on the best land is \$7 94; on the worst lands, \$19 28. The quantity of land generally planted to the hand is 2 acres. Three per cent. of the tillable land of the county is planted in tobacco. The following is the cost of growing an acre of tobacco on the best lands in this county:

Dr.		
Making seed-bed .....		\$1 00
Plowing one acre twice .....		3 00
Manure .....		52 00
Harrowing and preparing ground .....		3 00
Planting .....		2 00
Harrowing and hoeing three times .....		9 00
Topping, suckering, and worming .....		10 00
Harvesting .....		5 00
Use of barn, wagon, laths, etc. (interest on value of) .....		15 00
Taking down and stripping .....		20 00
Rent of land (interest on value of) .....		10 00
Taking to market .....		5 00
		135 00
Cr.		
1,100 pounds tobacco, at 18 cents .....	\$198 00	
200 pounds tobacco, at 8 cents .....	16 00	
400 pounds tobacco, at 4 cents .....	16 00	
		230 00
Estimated profit .....		95 00

#### TIOGA COUNTY.

This county adjoins on the north the state of New York, and lies within a belt where there is more than the average rainfall for the state. The surface is rolling, often hilly, and much of the land is rough and mountainous, the ridges being separated from one another by broad valleys, underlaid by the Devonian rocks of the Chemung and Catskill series. Agricultural industry is confined to the valleys, while the steep mountain sides are covered with hemlock, birch, pine, and maple. Angular blocks of conglomerate often cover the mountain slopes, the coal measures a considerable portion of the county, and there are numerous patches of red slate. The siliceous soils predominate. There are large bodies of alluvial, sandy soil, but clayey loams are met with, and the color varies from a dark brown to a yellow. The subsoil is chiefly a red and yellow clay resting on a gravelly bed slightly cemented in places. Stable manure is largely used in the production of the tobacco crop, and cold frames, with glass, are sometimes used in growing plants. The plants are set in ridges, made 3½ feet apart. About 7,000 are considered sufficient for one acre. The crop is suckered generally but once, and that just before harvesting. The plants at harvesting are cut with a hatchet or with a flat piece of thin steel, with a handle and two edges, the instrument being about 6 inches wide and 7 inches long. Sticks with wire hooks are used to some extent in hanging tobacco, but generally the plants are tied to poles with twine. The tobacco-houses are of ordinary character, framed and battened, from 28 to 30 feet wide and from 60 to 250 feet long. The crop throughout is cultivated, handled, and marketed more after the methods pursued in New York than after those usually practiced in Pennsylvania. Wages for good farm hands vary from \$120 to \$170 a year and board. The erection of tobacco-sheds costs from \$2 to \$2 50 per lineal foot of barn 4 feet wide. Tobacco culture is a new industry in this county. It was first cultivated near the junction of the Tioga and Cowanesque rivers, and its culture has increased with great rapidity. No tobacco was reported for this county in the census of 1870; but it now reports 292,198 pounds, grown on 234 acres, showing an average yield of 1,249 pounds per acre. The nearest packing establishments are at Elmira, New York.

#### WESTMORELAND COUNTY.

In this county, lying in the western part of the state, tobacco was first grown in 1878, and the reported production for 1879 was 62,096 pounds, grown upon 54 acres. Limestone soils are preferred for its growth, but the sandy loams of the river bottoms and black-walnut clearings are considered excellent. Fully 75 per cent. of the wooded lands of the county are adapted to the growth of tobacco, and it is said that the quality grown on newly-cleared lands is much superior to that grown on old lands. No fertilizers are used, yet about 1,150 pounds per acre is the reported yield, which would indicate an unusual adaptation of the soil for tobacco. The crop of 1879 sold for 14 cents per pound, a high average. The market for the crop is at Latrobe.

#### YORK COUNTY.

York is separated from Lancaster county by the Susquehanna river, and in physical characteristics, soils, and geological formations resembles it very much. The conveniences for handling and taking care of the crop are not so extensive as in Lancaster, and as a consequence the prices received are lower by several cents per

pound. The lack of experience by those who have recently entered upon the cultivation of tobacco is another reason assigned for the difference in price of the product of the two counties. Improvement in these respects, however, is made every year, and there are already twelve packing-houses established in the county. Tobacco is marketed somewhat later than the crop of Lancaster county, and is generally bought by the same packers. The average price of the crop of 1879 was 10 cents, but the range of prices was from 5 to 15 cents, depending on the skill exercised in curing and handling. This crop has increased from 10 to 25 per cent. annually for four years. The varieties planted are the Connecticut Narrow Leaf, the Connecticut Broad Leaf, Hoover Leaf, Brooklyn Leaf, Valley Green, Kill Island, Glessner, and Pennsylvania Seed-Leaf. The sandy soils require more fertilization, but produce a finer type of tobacco. The tobacco grown on limestone lands is inclined to be rank.

The following table shows the production, acreage, yield per acre, and value in primary markets or farmers' hands of the tobacco crop of Pennsylvania from 1876 to 1879, both inclusive, only the figures for 1879 being from the census returns :

Year.	Production.	Acreage.	Yield per acre.	Value in primary markets.	Value per pound.	Value per acre.
	<i>Pounds.</i>		<i>Pounds.</i>		<i>Cents.</i>	
1876.....	13, 634, 744	9, 880	1, 380	\$1, 227, 126	9. 00	\$124 20
1877.....	21, 630, 000	15, 450	1, 400	1, 946, 700	9. 00	120 00
1878.....	23, 550, 922	19, 025	1, 200	2, 355, 092	10. 00	120 00
1879.....	36, 040, 272	27, 506	1, 340	4, 036, 380	12. 55	108 10

## CHAPTER XV.

## CULTURE AND CURING OF TOBACCO IN TENNESSEE.

The cultivation of tobacco in Tennessee began with the settlement of the state. The early pioneers, those who settled in the fertile valleys of the Watanga, Nolachucky, the Holston, and the French Broad rivers, raised it for their own consumption, and those who planted colonies on the Cumberland river during the last two decades of the eighteenth century brought the seed from the tobacco-growing districts of Virginia and North Carolina. Though grown for many years in a small way, it was not until about the year 1810 that tobacco began to form one of the great staples of the state, the comparatively easy access to the seaboard by the Cumberland, the Ohio, and the Mississippi rivers, and the dependence of the population on New Orleans as a market for their surplus productions, soon awakening a general interest all along the Cumberland river in the production of a crop which occupied less room in their small flatboats and keelboats, in proportion to its value, than any other which could be produced. Montgomery and Smith counties, with portions of Sumner, entered vigorously into its cultivation, and by 1820 several thousand hogsheads were annually carried out in flatboats to New Orleans and exchanged for coffee, sugar, salt, and other commodities. The extinguishment of the Indian titles in western Tennessee, and the throwing of a wide domain into market in 1819, added immensely to the available area for the cultivation of the crop. Experience had demonstrated also that the tobacco grown in the state possessed those qualities most sought after in the European markets. Prices were generally low, but the cost of production was scarcely appreciable, as the acreage in other crops was not decreased in consequence of the tobacco crop, requiring, as it did, the largest amount of attention at a time when the other crops required the least, and the rich, fertile soils, freshly cleared, could in no other way be so well prepared for the growth of corn, oats, and wheat as by planting them for a year or two in tobacco. Probably during the decade between 1820 and 1830 the actual cost of growing tobacco did not exceed \$1 per 100 pounds. Most farmers owned their labor, and, even when hired, \$50 and board was considered a fair average price for good men during the cropping season, which lasted from March 1 to November 1. From 1830 to 1840 the culture of the crop was widely extended. Henry county, in western Tennessee, headed the list, and in 1840 reported a yield of 9,479,065 pounds, 1,212,604 pounds more than any county grows at the present time. Smith county came next, reporting 3,017,012 pounds; and then in regular order came Sumner, 2,615,100 pounds; Montgomery, 2,549,984 pounds; Wilson, 2,313,000 pounds; Robertson, 1,168,833 pounds; Williamson, 1,126,982 pounds; and Rutherford, 1,089,000 pounds. Stewart, Jackson, and Davidson produced, respectively, 993,495, 859,336, and 334,394 pounds.

The prices which prevailed in 1837 were very low, and many planters who shipped their crops to New Orleans during that year were brought in debt for freight and charges. An account of sales of four hogsheads of tobacco in New Orleans in 1837 makes return of the net proceeds as \$22 01, or about \$5 50 for a hogshead weighing, net, 1,550 pounds, and another account shows that two hogsheads of tobacco netted \$7 04, or \$3 52 each, scarcely enough to pay for the casks in which the tobacco was pressed. The two years succeeding, however, show a marked increase in price, and from 4 to 10 cents were frequently paid for ordinary crops. The year 1839 is noted for the high prices paid, but in the succeeding year prices again fell very low, good crops bringing from 2 to 5 cents per