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TOBACCO PLANT,

ALEX. J. BONDURANT

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TOBACCO.

The scientific facts pertaining to agriculture, so far as they have been discovered, are scattered through many books and agricultural publications; few of these publications are accessible to the ordinary farmer.

Some service may be done to the farmers generally and especially in the cotton States by collecting some important facts that are accurately and certainly known and the experience of intelligent farmers and scientific men on the subject of "Tobacco Culture" and presenting these to the public in compact form. The investigation of this subject was commenced last year and methods of cultivation and management of this crop was given in Bulletin No 37, March, 92.

I. OBJECT OF EXPERIMENT.

Experiments to a limited extent were undertaken the past year in tobacco, with seed from several varieties that are raised in Virginia, North Carolina, Florida, Connecticut and Cuba to ascertain, if possible, the kinds that are best adapted to this climate, and to find out if the culture of tobacco, as a staple crop, could be made profitable in Alabama.

Experimentation was conducted only in a general way, more with reference to the growth of the different varieties planted and their qualities, than to the particulars of fertilizers suitable to the crop and methods of curing.

Raising Plants.—These experiments were commenced the middle of February; at that time preparation was made for raising the plants in the open air beds burnt in the woods. The first seeding was made 13th of February; from this bed very few of the plants came up. The 7th day of March two open air beds were made which were left without any

covering. At the same time a hot bed was made, the seed sown and the bed covered with cheese cloth. From these beds the seed soon germinated, and in ten days from the time of sowing some of the plants could be seen. The cold spell of weather, which commenced March 19th, when ice to the thickness of a quarter of an inch was formed, destroyed most of the plants in the open air beds during germination, those which were protected under the covering of cheese cloth in the hot bed fared much better, and while large numbers were killed by the freeze, the proportion was much less than in the open beds, and it was from the hot beds that plants were raised for planting the experimental grounds.

April 7th, other seed were sown for late plants for replanting; these were principally of the Cuban varieties obtained from the Florida station; no plants of any consequence were raised from these seed. It was demonstrated from the experiments made in the raising of tobacco plants, that the young plants were easily affected by cold and quickly killed by freezing weather in this climate, in fact, seemed to be affected sooner in this respect than in many localities in the old tobacco raising States. To avoid this difficulty, it is advisable, when practicable, to raise the plants under covered beds, in preference to open air beds.

Another important discovery was made in raising plants on the Station, viz: That the flea beetle, commonly called tobacco fly in the old tobacco States, seems to be abundant in this section, attacking the plants soon after they come up, and in uncovered beds, destroying the plants unless insecticides were promptly applied. It was further ascertained that the plants under canvass made a more rapid growth and presented a healthier appearance, and were ready for transplanting much earlier than those in the open air or uncovered beds.

Transplanting the Plants.—The transplanting of the plants from the plant-bed to the experimental grounds was commenced May 18th, and continued as the season was favorable for transplanting up to the middle of June. A few of the first plants which escaped being killed by the March freeze were left to grow in the open air bed, these made a rapid growth and were topped the 6th of June, and were cut and ready for curing the 1st of August.

Of the different varieties planted the Cuban varieties were the first to get their growth and were ripe and ready for cutting early in August. These were much blistered and made leaf of poor quality, owing to their rapid growth and early maturing during the month of July, which was a wet month, making unfavorable conditions for the growth of tobacco of good quality. Another important fact was observed in connection with Cuban varieties, that is, that the leaves were coarse and thick, not so well adapted for either wrappers or fillers for cigars, too strong for any smoking purposes.

The varieties from Virginia, North Carolina and Connecticut did not make as rapid growth as the Cuban varieties, and did not ripen until September, and continued to ripen until October. Some plants of good size and quality were obtained from these varieties which would make a good quality of chewing tobacco and cigars. The curing was imperfectly done, as it had to be cured by the air process in the gin house; and while a small quantity of bright leaf was secured by this method, the proportion of bright tobacco was thereby greatly reduced.

Making Cigars.—With the view of testing the quality of the tobacco raised on the Station for cigar purposes, and as instruction to the agricultural students, an experienced cigar maker was employed to make up a small quantity of the tobacco into cigars.

This experiment of cigar making demonstrated that some of the tobacco was suitable for this purpose. During the process of making, when the cigars were in a damp condition, they were weighed. It took from 120 to 125 of the smaller size to weigh a pound, and from sixty to eighty of the larger size to weigh a pound.

From the above the conclusion can readily be drawn as to the profits arising from tobacco when manufactured into cigars, and this experiment should encourage the growers of tobacco in this State to strive to raise a good grade of cigar leaf.

Tobacco growing is one of the most profitable branches of tropical and semi-tropical agriculture; the subject has been much neglected by writers of agricultural literature. The importance of the subject to the farmer may be estimated when it is considered that next to the cereals used as staple articles of food there is probably no plant so widely and generally grown as tobacco, and certainly none that is used by a greater number of the human race. It is proposed in this bulletin to give a brief history of the plant; to notice some of the leading varieties, some instructions for its successful cultivation and management with a view to encourage the cultivation of a plant that can be generally grown in this State, the climate and soil of which, it is believed, suits it admirably, in sufficient quantity not alone to satisfy all local demands, but to open up a large and profitable export trade.

II. BOTANICAL CHARACTERISTICS OF TOBACCO.

The tobacco plant is known to botanists by the generic name of *Nicotiana*. The genus *Nicotiana* belong to the Nightshade family to which order belong the Potato, Tomato, Capsicum, Henbane and deadly Nightshade

Of some fifty known varieties of the genus *Nicotiana*, it is claimed that all are natives of America, except two,

namely: *Nicotiana Suaveolens*, which is a native of Australia, and is known as "Native Tobacco," and *Nicotiana Fragrans*, a native of New Caledonia.

The best known species are as follows:

(1.) *Nicotiana Tabacum*, of which there are two varieties, viz: *Macrophylla* (Maryland tobacco) and *Angustifolia* (Virginia tobacco). Each of these two varieties is divided into several sub-varieties.

The *Macrophylla* is the variety which affords the famous Cuban and Manilla tobaccos; it has a fine leaf which is soft and thin, and is much valued in the trade for the fine qualities of the leaf for binders and wrappers in making cigars.

Angustifolia is the most commonly cultivated variety in the United States.

(2.) *Nicotiana Rustica*, best known as Hungarian tobacco, is largely grown in Europe and Asia. There are also two varieties, a large leaved and a small leaved kind, both of which yield tobacco of good quality.

(3.) *Nicotiana Persica*, a type produced by climatic influences, but long thought to be a distinct type.

(4.) *Nicotiana Crispa*. This species is much grown in Syria and on the Mediterranean coast.

(5.) *Nicotiana Repanda*, a Mexican variety. It has small leaves, used for imparting the peculiar aroma to Mexican cigars and cigarettes.

The remaining species, notably *Nicotiana glauca*, *glutinosa*, *longiflora*, *nana* and *sanguinea*, are of no commercial importance, being of interest only to the botanist and horticulturist.

III. CLIMATIC CONDITIONS.

Of the many conditions which affect the quality of tobacco, the most important is climate; other conditions may be, in a measure, modified, but very little can be done with regard to climate. The most rational mode of overcoming

this difficulty would be in the selection of seed of the varieties which have been grown with success under similar climatic conditions as prevail in the district proposed to be cultivated.

In this State, with its range of climate from semi-tropical to temperate, a wide margin is permitted to the grower, and seed can be procured suitable to all parts of the State. In tobacco, as in all other crops, the aim of the grower should be to produce the kind which will command the highest price. The most valuable tobaccos are the Cuban and Manilla, and they owe their fame mostly to the favorable conditions under which they are grown. These places possess a tropical heat, but at the same time are tempered with the sea breeze, and there are, no doubt, parts of the coastal districts of this State which may produce an article that could favorably compare with these tobaccos.

Tobacco thrives best in a good rich soil, rich in vegetable mould, but light soil containing a good amount of organic matter and well drained will produce an excellent smoking tobacco, and on such soil the finest leaves are grown. The more clay in the soil the thicker the leaves become, and the aroma becomes less, and is consequently less suited for the finer qualities of smoking tobacco, although the weight of yield may be heavier.

Black prairie land will probably yield more to the acre than any other kind of land in this State, but the tobacco will not possess so fine a quality—on such soil it grows larger, has coarser stems and a heavier leaf, and is not so good for wrappers, or fine cut or cigarettes and cigars as the upland tobacco on sandy soils. Though tobacco is a hardy plant and will grow under varied conditions, yet to become a profitable crop, it must not be grown in a situation very different from that to which it is suited by nature. It must be remembered that the plant is a native of

a warm climate, and thrives best in a moist atmosphere; therefore, in such a climate, by employing ordinary means, tobacco may be made to yield a profit not attainable in less favored situations. A warm, moist climate will permit of the selection of the varieties that sell at the highest price in the market, and in a suitable soil the profit will be such as is not often or easily realized from any other crop.

From a table at hand, which gives the essential features of the crops of cotton for the year 1888, in the United States, it appears that the yield per acre for cotton was one hundred and eighty pounds—price per pound, eight and a half cents. Value per acre, fifteen dollars and thirty cents.

With tobacco, the average annual production during the past decade has been about one-sixth that of cotton. The average yield per acre has been about seven hundred and twenty-five pounds, with an average of eight and one-half cents per pound, making the value of tobacco per acre sixty-one dollars and sixty-two and a half cents.

As the Havana tobaccos command the highest price, growers everywhere attempt to introduce and cultivate them. The difficulty in growing these varieties is, they speedily degenerate if the conditions are not favorable. Virginia tobacco is the most favored in temperate climates, as it does not require such a high temperature, but on account of its botanical characteristics it is not much liked by cigar or cut tobacco manufacturers. A high price is generally commanded, no matter of what variety, which possesses either a light mahogany, cinnamon, or golden color, and fine aroma, with thin ribs far apart and even. The wider the leaf and the less they are worm eaten, or torn, the greater the number of wrappers which can be cut from a pound for making cigars, consequently manufacturers will pay more for grades possessing these qualities than for others. There are among growers as many

varieties of tobacco as there are varieties of cabbage, each section favoring a particular kind.

It may, however, be said of the varieties most generally grown in America, that the Kentucky, Virginia and Maryland are employed for chewing, pipe and cigarette smoking, while the Connecticut seed leaf and Havana are most in use for fillers and wrappers in the manufacture of cigars.

Tobacco is now cultivated through a wider range of temperature than any other tropical plant, and whether grown amid the plains of South America, or in the rich valleys of South side Virginia, or as far north as Connecticut, develop its finest form and perfection of leaf.

During the last half century the plant has been developed to a greater extent than during the three hundred years succeeding its discovery. Its cultivation and management have been reduced to an approach to an exact science, and the quality of the leaf is, in a great measure, within the control of the growers of the plant; until quite recently it was supposed that the varieties that grew in the tropics could not be cultivated with success in the temperate regions, but recent experiments have demonstrated the fact that the tobacco of Cuba can be grown with success in many parts of the United States. The tobacco raised in the tropics is the finest in flavor, while the more temperate regions produce the finest and best colored leaf.

The tobacco of the tropics, as to the uses to which it is put, is limited, while the tobacco of the more temperate regions can be used for all the purposes for which the plant is needed.

Formerly but little attention was paid to the color and texture of the leaf, the principal object being the production of a leaf of large size, rather than one of good color and of silky texture. Now, these are most important conditions, and give value to the tobacco in proportion to the perfection of these qualities.

IV. RAISING THE PLANTS.

The first operation necessary in starting tobacco growing is the making of a seed-bed for raising the plants. A warm sheltered position should be selected for this. It is a common plan to burn a pile of brush-wood on the land selected for raising the plants to supply potash, and at the same time destroying the seeds of weeds, or the eggs of insects.

A more recent plan of raising the plants is under a covering of cheese cloth in a hot bed. Plate No. 1 is an

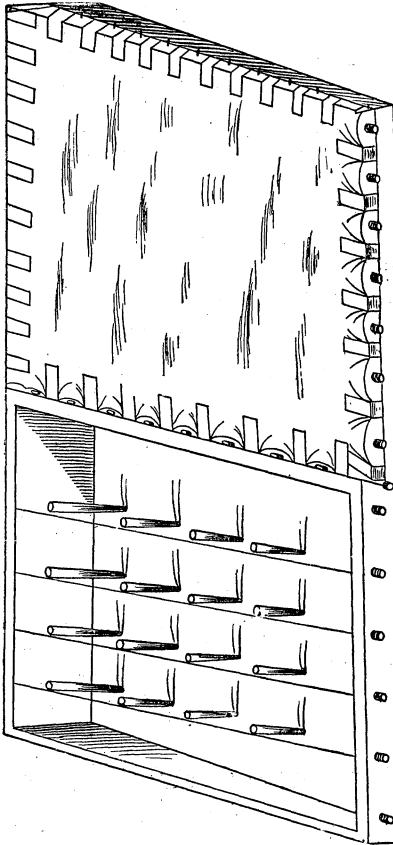


illustration of the modern method of covering the plants during their growth both in the open air and hot beds. The area of the seed bed will of course depend upon the extent of the proposed cultivation and as usually about one square inch in space is allowed to each young plant in the seed-bed, it will require a seed-bed of thirty-six square feet, say nine by four feet, to supply plants for an acre planted at equal distances of three feet apart. An ounce contains enough seed to plant from six to seven acres, but as it has not a high percentage of vitality it is usual to sow at the rate of half an

ounce for an acre. The bed ought to be covered with a covering of cheese cloth, or fine brush, or short leaf pine straw. This not only protects the plants from the cold, sudden freezes, which are common in the early spring in this latitude about the time germination commences, but checks too rapid evaporation from the earth, keeping the surface moist. When the young plants first appear above the surface they are very tender; they require frequent watering of weak liquid manure and top dressing with fertilizers. All weeds must be carefully removed and the flea beetles which often destroy all the young plants in a few days must be watched for and insect remedies applied. In from five to six weeks the plants will be ready for transplanting.

V. FIELD CULTURE.

Land on which it is intended to grow tobacco should be well ploughed; on compact soils the ploughing should be deep. An intelligent rotation of crops carried out with an intelligent knowledge of the needs of the tobacco crop will be the aim of the practical farmer. Before transplanting the young plants from the seed-bed the land should be ridged, the distance between the ridges depending on the kind of tobacco to be planted—the larger kinds requiring more room than the smaller-leaved and tall sorts; but they should be far enough apart to allow a free passage between the rows of plants without injuring the plants. Generally from three to three and a half feet apart between the rows, and the same between the plants will be sufficient. Where the surface is level the plough may be run lightly over the field at right angles, thus forming small hills on which the plants are planted.

Choice of Soil.—The growers of the plant in Virginia are very particular in the selection of soil for the plant. The lands which they find best adapted are the light red or

chocolate colored lands and the richest low grounds. The selection of soil will depend upon the color of leaf in demand, as the soil as well as the fertilizers determine to some extent the color and texture of the leaf.

The effect produced by planting tobacco too near the sea is injury to the leaf, which is apt to be thick and unfit for a cigar wrapper. In some countries, however, notably Cuba, the leaf grown near salt water is equal in color and texture to any grown in the interior.

Generally the plant obtains its finest form and quality of leaf on lands bordering the largest rivers. This is true of the tobacco lands of Connecticut, Kentucky, Virginia and North Carolina, as well as of those in the islands of Cuba and San Domingo; but some of the finest tobacco grown in the United States is grown in countries some distance from large rivers.

When possible, select the kind of soil for tobacco that will produce the color and texture desired. For Connecticut seed leaf a light moist loam is the best soil. For the bright tobaccos, such as are raised in Virginia, North Carolina and Maryland, the soil should be light and friable, or what is commonly called a sandy loam, not too flat, but of a rolling, undulating surface not liable to overflow in excessive rains. New cleared in these last named States is considered better than long cultivated soils. In Cuba the planters select the red soil as the best for fine tobacco. Some planters, however, prefer a soil mixed of one-fourth sand and one-half to three-fourths of decayed vegetable matter.

Both the Cuban and American planters concur in asserting that a large quantity of silicious matter in soils is essential for the growth of good cigar tobacco. The rich clay loams on the banks of the James River in Virginia do not grow the highest price tobacco, while the less fertile silicious soils of other sections will produce tobacco of su-

perior quality for chewing and smoking. Tobacco of high grade will not grow in the calcareous regions. A better soil is one that rests upon the primary foundation.

VI. TRANSPLANTING.

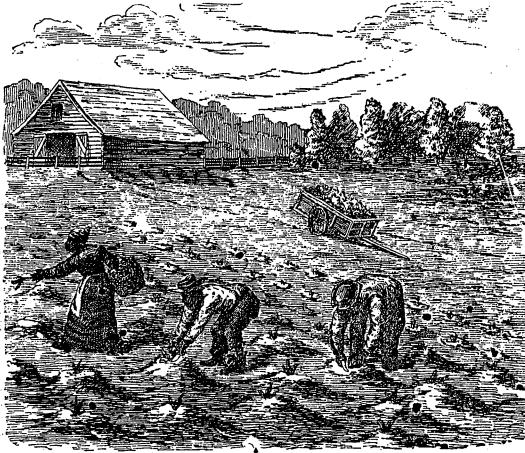


FIGURE 2.

— Figure 2 shows the plan of placing and setting the plants.

Transplanting should be done in the evening or on a cloudy day. Before transplanting, the seed-bed should receive

a good watering so that the plants can be drawn without injury to the roots.

The planting is similar to the planting of cabbage and is no more difficult. A good plan is, for a boy to walk between the ridges, placing the plants alternately to right and left, being followed by the planters, who place the plants in the hills or ridges, taking the precaution to leave the bud well above the surface.

In a few days any missing hills which occur should be replanted, and during the early growth a close watch must be kept for the cut worm, bore worm, and other injurious insects. When the plants have taken root they grow very quickly and subsequent cultivation is simple, though requiring care.

When the plants are from six to nine inches high they require to be hilled, by mounding the earth around the

plants, to protect them from falling when the soil is wet or from being blown down by heavy winds. One or two hoeings are necessary during the growing period to keep down the weeds, as everything that detracts from the growth of the plant is detrimental to the quality of the leaf.

VII. CHEMICAL PROPERTIES.

An analysis of the ashes of tobacco by Professor Johnson shows the following constituents in their several proportions (per cent.):

Potash.....	12.14
Soda.....	0.07
Lime.....	45.90
Magnesia.....	13.09
Chloride of Sodium.....	3.49
Chloride of Potassium.....	3.98
Phosphate of Iron.....	5.48
Phosphate of Lime.....	1.49
Sulphate of Lime.....	6.35
Silica.....	8.01
	100.00

From this analysis it will be observed that of the mineral matters contained in tobacco, the following predominate: silica, potash, lime and magnesia, with a large proportion of the phosphate of iron and sulphate of lime.

There is in tobacco a volatile alkali which may be known by its smoke changing the color of flowers—turning red to purple and purple to green. Different kinds of tobacco are distinguished by the peculiar odor emitted. This variation is in part due to the different modes of curing the leaf.

Recent Investigations.—Many new investigations have been made as regards the tobacco crop, referred to under the following heads.*

*Dr. J. Nessler, of Karlsruhe (Landw. vers. Stat. 40, pp. 395-438) Experiment Station Record, October, 1892.

- (1) Demands of the trade especially with reference to burning qualities.
- (2) What amount of chlorine is allowable and what amount of potash essential to the desired burning quality.
- (3) Effect of soil on the burning quality.
- (4) Amounts of chlorine and potash removed from the soil by different crops and effect of previous cropping on the burning quality of tobacco.
- (5) Amounts of potash and chlorine furnished the soil in different manures.
- (6) Effect of manuring on burning quality.
- (7) Effect of previous cropping and manuring on the properties of tobacco other than that of burning.
- (8) Injurious and beneficial methods of cropping and manuring tobacco.

The various properties of the tobacco leaf, burning qualities, size, weight, color and fermentive properties, are all more or less affected by the variety of tobacco, the soil, time, and manner of manuring, climate and the time of ripening.

The properties of tobacco may also be affected by the manner of curing and the weather during the curing. The fact that so many factors play an important part in determining the quality of tobacco makes this part of the subject a difficult and tedious one to study and understand. To secure the desired burning quality, the amount of chlorine must not rise above a maximum, nor the amount of potash sink below a minimum. From studies made of forty-six samples of tobacco, grown in Baden, Germany, on different soils and with different manures, the conclusion was, that tobacco continued to glow longer, *i. e.*, burned better, the more potash and less chlorine (sodium chlorine) it contained.

In general, tobacco will be of inferior burning quality, which contains more than 0.4 per cent. of chlorine, and less than 3.5 per cent. potash.

Effect of Soil on Burning Quality of Tobacco.—As a result of the studies referred to above, it was found that while tobacco from sandy soils contained on an average only 0.29 per cent. of chlorine, that from heavy soils contained 0.92 per cent. of chlorine, and that tobacco from light soils averaged 2.8 per cent. potash, while that from heavy soils averaged 2.4 per cent. From these indications, to secure the best burning quality, tobacco should be grown on light soils, and not on heavy clay soils.

Effect of Fertilizers on Burning Qualities of Tobacco.—As previously stated, that to be of good burning quality, tobacco should not contain more than 0.4 per cent. chlorine to 2.5 per cent. potash (that is, six times as much potash as chlorine), consequently, fertilizers for tobacco should contain at least six parts of potash for every part of chlorine that is at the disposal of the plant. The closer the relation between potash and chlorine in a fertilizer the less it is adapted for tobacco. A number of experiments have been made, with potassium nitrate, potassium sulphate, potassium muriate, gypsum and common salt as fertilizers for tobacco.

The chlorine compounds always injured the burning qualities, and the potassium sulphate and potassium nitrate often improved this quality, though not always—the failure being due, it is believed, to the potash not being sufficiently distributed through the soil, or where heavy applications were made to the formation of too concentrated solutions.

The tobacco plant gets its growth and maturity rapidly, and requires a constant supply of plant food from the soil, but on the other hand it is exceedingly sensitive to concentrated solutions. It is important that the fertilizer, especially the potash, be thoroughly mixed with the soil to a depth to which the roots extend. This may be accomplished in a measure by applying the fertilizer sometime in advance of planting.

Previous Culture of Land for Tobacco.—The quality of the soil and the manuring are largely responsible for the early and late ripening and the regular and irregular ripening of tobacco.

Tobacco plants ripen later on soils rich in organic matter, except in the case of sandy soils, where the organic matter decomposes rapidly. Heavy applications of nitrogenous manures retard ripening. Tobacco richly manured with liquid manure, night soil, barnyard manure, or nitrate of soda, ripens late.

If the plants are set late on fields so manured, or those rich in organic matter, the leaves may not have time to ripen, and a greenish leaf will result, which, in burning, gives an unpleasant odor and bitter taste, and bitter taste in chewing also.

Formulas for Fertilizers for Tobacco.—The following formulas for fertilizing tobacco have been recommended :

Formula No. 1.—From 900 to 1250 pounds of wood ashes, or 350 pounds of potassium sulphate per acre, the applications being made to deep soils late in the fall, or to shallow soils before the first plowing. In the spring before setting the plants 135 to 180 pounds of nitrate of soda may be applied when the land is not heavily manured. In rainy seasons, when the plants lose their dark green color, and fail to grow well, 90 to 135 of nitrate of soda per acre may be applied while the plants are small.

Formula No. 2.—Two hundred and seventy-five (275) pounds of low grade sulphate of potash, 250 pounds of acid phosphate (12 per cent.) and 100 pounds of sulphate of ammonia (a by-product of gas liquor) or 280 pounds of cotton seed meal. Sulphate of ammonia, it is stated, is one of the most concentrated forms in which ammonia can be applied to the soil, and is, at the same time, one of the most active and readily available forms, being deci-

dedly quicker in its action than any form of organo-nitrogenous matter.

Magnesium carbonate, a new product of the Stassfurt industry, of Prussia, Germany, containing 18.5 per cent. of potash, is said to possess good properties in improving the quality of tobacco. In the Connecticut valley, where fine cigar leaf is raised, nearly all kinds of domestic, commercial, and special fertilizers are used. Of domestic fertilizers, horse manure is considered the best, as it produces the finest and lightest colored leaf of any known fertilizer. Cotton seed meal, when used with domestic manure, is an excellent and strong manure.

Mapes formula is a favorite with many growers of fine cigar leaf in Connecticut.

VIII. THE STALK.



FIGURE 3.

Figure 3 represents a full grown tobacco stalk, with the leaves taken off.

The tobacco stalk varies with the varieties of the plant.

All of the species cultivated in the United States have stalks of a large size, much larger than many varieties grown in the tropics.

The American varieties have erect, round, hairy, viscid stalks and large fibrous roots, while the foreign varieties

are harder and much smaller. The size of the stalk corresponds with that of the leaves; the two larger stalks in the figure show the American, and the smaller stalk the foreign. The size of the stalk corresponds with that of the leaves, and with such varieties as are planted in Virginia, North Carolina, Kentucky, and other old tobacco States, will be found to be larger than the Spanish

and Syrian tobacco, which have a much smaller, but harder stalk. The stalk must be hard and strong to support the long, palm-like leaf, which, in some varieties, grows to a length of two and half to three feet.

The Leaves.—The plant bears from eight to twenty leaves, according to the species of the plant.

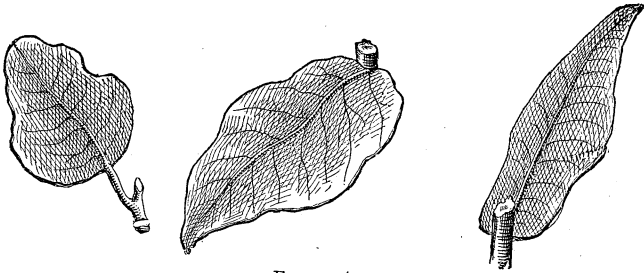


FIGURE 4.

They have, as represented in figure 4, various forms; ovate, lanceolate, and pointed. Leaves of a lanceolate form are the largest, and the shape found on most varieties of the American plant.

The color of the leaves when growing, as well as after curing and sweating, varies, and is frequently caused by the condition of the soil. The color, while growing, may be either a light or dark green, which usually changes to a yellowish cast as the plant ripens. The ground leaves generally ripen first, turning yellow and during wet weather will rot and drop from the stalk if not gathered. The color of the leaf, after curing, may be determined by the color of the leaf while growing; if dark green while maturing in the field, the color will be dark after curing and sweating, and the reverse if of a lighter shade of green. If the soil be dark, the color of the leaf will be darker than if grown upon light soil. The kind of fertilizers applied to the soil, as well as the soil itself, has much to do with the texture of the leaf, and should be duly considered by all growers of the plant.

The Flower.—The flowers of the tobacco plant grow, as is shown in figure 5, in a bunch on the summit of the plant, and are of a pink, yellow, purple or white color, according to the variety of the plant.

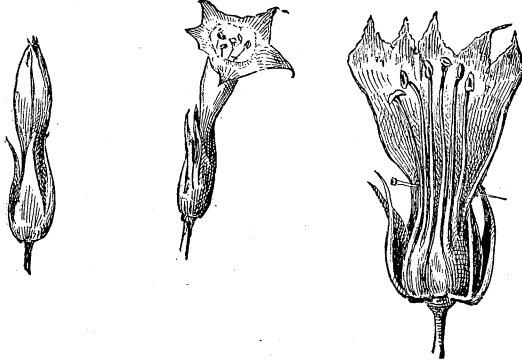


FIGURE 5.

After the buds appear they blossom in a few days and remain in full bloom two or three weeks, when they perish.

The Capsule.—When the flowers drop from the fruit bud, the capsules grow very rapidly and soon attain full size, as shown in figure 6.



FIGURE 6.

This occurs only in those plants which have been left for seed and remain untopped. In form, the fruit bud resembles an acorn, though more pointed at the top; in some species, of a dark brown, in others of a light brown color, containing two cells filled with seed, similar in shape to the fruit bud. Some writers state that each cell contains about one thousand seed. The fruit buds of Virginia tobacco, as

well as of most varieties grown within the limits of the United States, are much larger than those of Havana, Syrian and numerous other species of the plant, while the color of these last named varieties is a lighter shade of brown.

The color of the seed also varies according to the varieties of the plant. The seeds of some species are of a dark brown, while others are of a lighter shade.

The seed are so small that the variety to which they belong can not be determined except by planting or sowing them. The plants selected for seed should be left growing late in the season. Strong, healthy plants generally produce large, well-filled capsules, and these should be selected by the grower for seed. The largest and finest capsules on the plant mature first, while the smaller ones grow much slower and are frequently several weeks changing from their green to brown color. Many of the capsules contain imperfect seed and some do not contain any seed at all.

The Sucker.—The sucker makes its appearance at the junction of the leaves and stalk, as indicated in figure 7.

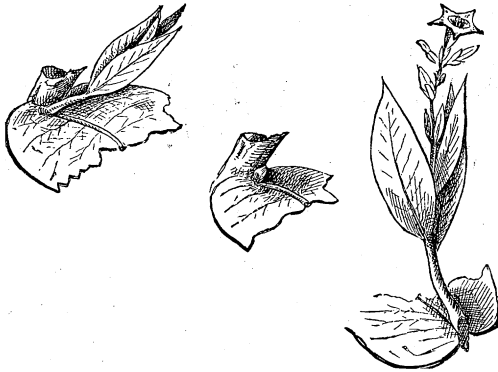


FIGURE 7.

Usually these are not seen until after the plant has been topped, when they come forward rapidly and if not plucked off in a short time develop into strong, vigorous shoots.

The growth of the suckers is injurious to the leaf, retarding their size and maturity, and affect the quality as well as the maturity of the plant. When the plants are fully ripe and ready to harvest, the suckers will be found to be growing around the root of the plant.

This is one of the most reliable evidences of its maturity, as it denotes the ripening of the entire plant.

Breaking off the suckers hastens the ripening of the leaves and gives a lighter shade of color, no matter on what soil the plants are grown.

Topping.—Topping is simply breaking off the bud at the top of the stalk, as represented by figure 8,—



FIGURE 8.

to prevent the plant running up to flower and seed.

By this means the best growth of the leaves is secured, and they at once develop to the largest possible size; will ripen sooner, while the quality is much better.

There are various methods of topping, as well as different periods. Some planters top as soon as the capsules appear, while others wait until the plants are in full blossom. If topped before the plants have come into blossom, it

should be done as soon as possible, as a longer time will be required for the leaves to grow and ripen than when topping is delayed until the plants are in bloom. Top the plants at a regular height, leaving from nine to twelve leaves, so that the field will look even and also make the number of leaves to a plant uniform. The above method of topping refers more especially to cigar rather than cutting leaf. Those varieties of tobacco suited for cutting leaf should be topped as soon as the flower bud appears; top low, thereby throwing the strength of the stalk into a few leaves, making them large and heavy. Let it grow from five to six weeks after it is topped, so as to have it thoroughly ripe, thereby giving it the bright, rich, golden color, entirely different from cigar leaf, but desirable for chewing leaf. The custom in the old tobacco States is to top for English shipping from eight to ten leaves; for coal curing, from ten to twelve. In some sections of the United States the plants are not topped at all; the leaves are left upon the stalk until they are fully ripe, when they are taken off.

IX. INSECT PESTS.

The two most destructive pests that prey upon the tobacco plant after being transplanted to the field are the "cut worm" and the "horn worm", as shown by figure 9.

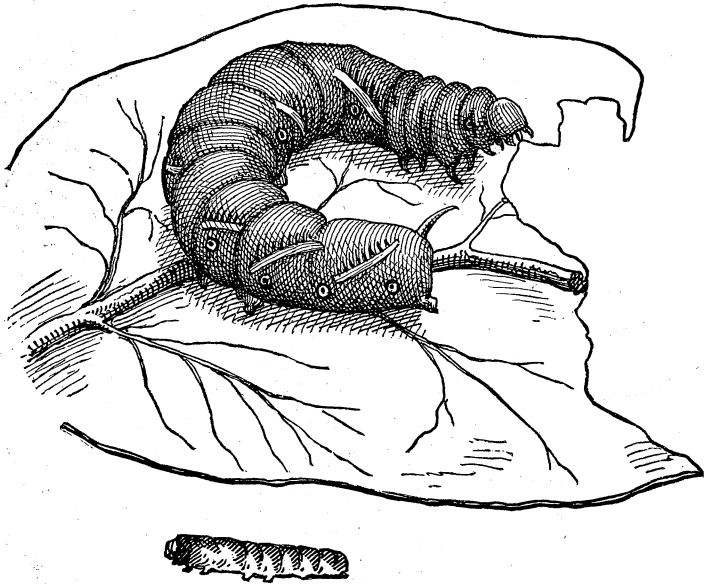


FIGURE 9

The cut worm commences its work of destruction in a few hours after transplanting in the field.

During the night this worm begins by eating off the small or central leaves, and often so effectually as to destroy the plant. The best time to find and destroy these pests is early in the morning, when they can be found nearer the surface; with the heat of the sun they burrow deeper in the soil.

Soon after they disappear, the fight with the horn worm commences.

Figure 10 shows the Sphinx, or moth, the parent of the horn worm, the larvae and the horn worm.

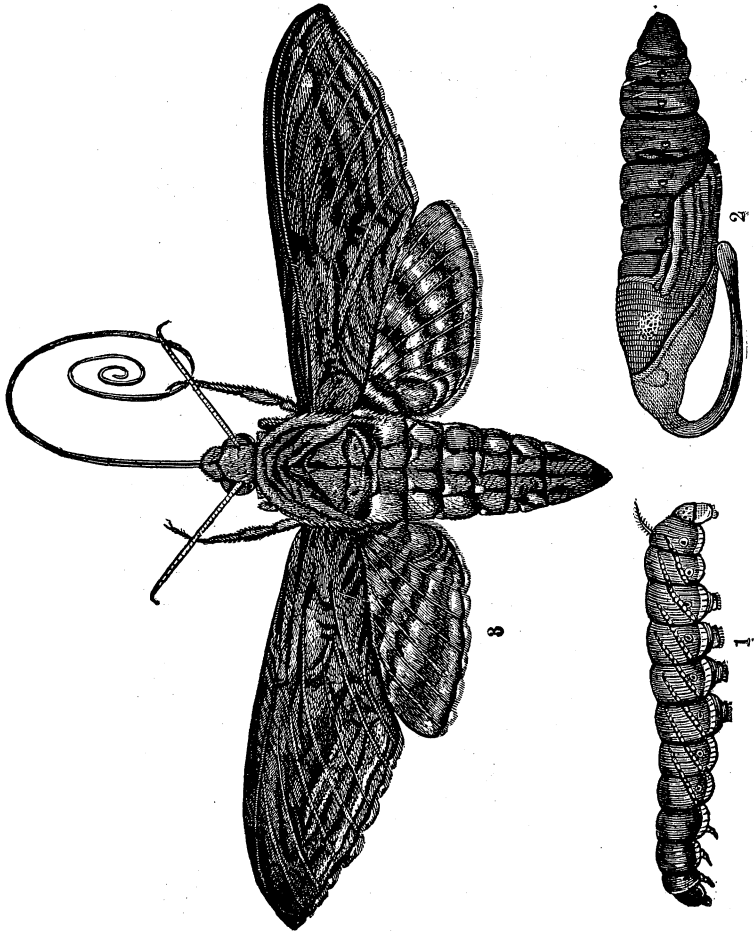


FIGURE 10.

The horn worm feeds upon the finest and largest leaves; eats the leaves in the finest parts of them. They leave large holes which render the leaf worthless for a cigar or chewing wrapper, leaving it fit only for fillers. As the Sphinx, that lays the eggs usually deposits two crops of

eggs on the tobacco plant during its growth, it will require much time and labor to destroy the eggs and worms. If this is neglected, the crop will be much injured and will not be sought after by good judges of tobacco.

X. VARIETIES OF TOBACCO AND HARVESTING.

Figure 11 represents the Connecticut seed leaf as it appears ready for harvesting.



FIGURE 11.

Tradition indicates that this variety was introduced originally into the New England States by B. P. Barber, and it is thought to belong to the Cuban variety. The varieties cultivated in the United States and known as "seed leaf" tobaccos, are grown in Connecticut, Massachusetts, Vermont, and eastern and western States.

All of the seed-leaf of the United States is used exclusively in the manufacture of cigars, and is celebrated for cigar wrappers from the superiority of its color and texture, and the good burning quality of the leaf.

The plant grows to the height of about five feet, with leaves from two and one-half to three feet in length, and from fifteen to twenty inches broad. The color of this tobacco after curing is either dark or light cinnamon.

There are two principal varieties of Connecticut seed-leaf, broad and narrow leaf—of these two, the broad leaf is considered the finest, cutting up to better advantage in cigar making, and ripening and curing fully as well.

This tobacco has not that fine flavor of Cuban tobacco, but in texture is considered equal to it. It burns freely, leaving a white or pearl colored ash, which is one of the best evidences of a good cigar tobacco.

The leaf is firm and strong, and sufficiently elastic to bear considerable manipulating in manufacture. Thorough cultivation by the growers has made this quality of tobacco one of the most profitable of any cigar tobacco grown in the United States.



FIGURE 12.

This figure represents a plant of Virginia tobacco maturing seed. Virginia tobacco has acquired a reputation which has gradually increased for more than two hundred and fifty years.

The plant grows to the height of from three to five feet; the leaves are long and broad, and when cured are of various colors, from a rich brown mahogany, cinnamon, to a fine golden yellow.

The finest quality of Virginia tobacco comes from the southside counties, but the amount is small compared to the quantities of dark raised on the lowlands of the Dan and James rivers and their tributaries. The tobacco grown in the southside and southwestern counties of Virginia is much lighter in color, and of much softer and finer texture than the ordinary Virginia tobacco.

Havana Tobacco.—This famous variety of tobacco, as is shown in figure 13, is considered the finest flavored for cigars that is now cultivated.



FIGURE 13.

This variety, it is stated, grows to a height of from six to nine feet, with oblong, spear-shaped leaves. The leaves when young are of a dark green color, and have rather a smooth appearance, changing at maturity into yellowish green. This variety grows quickly, and by careful pruning a fine colored leaf is obtained, varying from a straw color to a dark brown or black.

The finest is grown in Vuelta de Abajo, which for nearly a century has been celebrated as a fine tobacco producing district. The Havana tobacco ripens in from eight to ten weeks after being transplanted.

The stalk and leaves are not as large as the Connecticut seed-leaf, but it is better in flavor.

Cutting the Plant.—Figure 14 represents harvesting the plant.

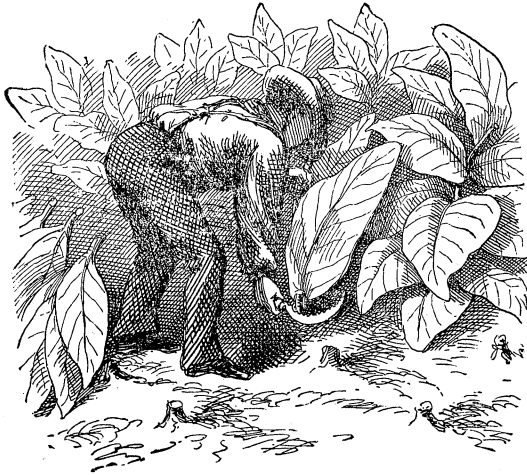


FIGURE 14.

There are two methods of harvesting, cutting down the whole plant or gathering the leaves singly. The former is the one that has been practiced for a long time by tobacco planters; the latter, which is of recent origin, is regarded by many as the most scientific method.

Both these plans of gathering have their advantages. The first is the easiest and permits of quicker handling, but the leaves have to be assorted afterwards, while the latter permits the sorting of the leaves in the first operation, and the development of a greater number of mature leaves.

For cutting, a heavy knife is used, and the method is similar to cutting sugar cane, the plant being held with the left hand and cut close to the ground.

The plants should be removed to a shady place to prevent their becoming sunburnt.

Putting on the Stick.—This is shown by figure 15.

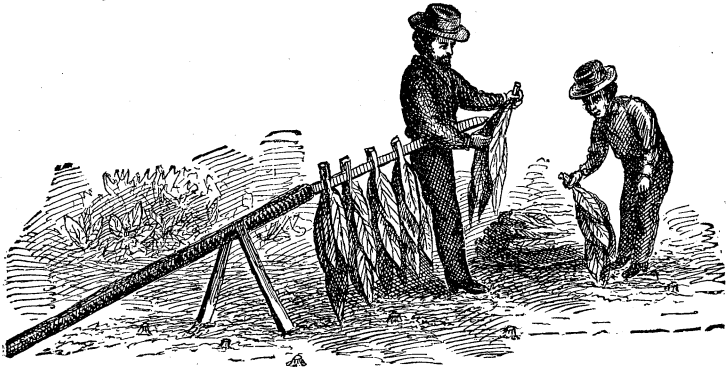


FIGURE 15.

After the plant is wilted and becomes pliant and in good condition to handle without breaking, it should be placed on the stick.

Some tobacco growers hold the opinion that the plants should be harvested without wilting at all, stringing on the stick as soon as cut, and carrying them immediately to the tobacco barn. The reason for this is, that often at the time of cutting the plant the ground is hot, and the plant becomes very warm and quickly sunburned. When hung on the stick, which is four and a half feet in length, six to eight large plants are the usual number.

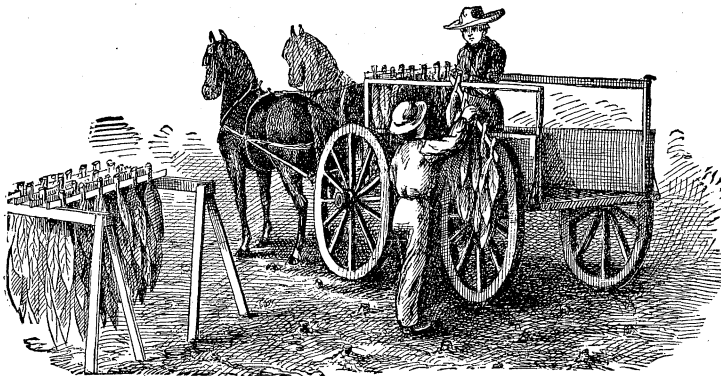


FIGURE 16.

Carrying to the Barn.—This figure shows how the sticks

are placed on a frame in the field and loaded on the wagon for taking to the tobacco barn.

XI. MODERN VIRGINIA TOBACCO BARN.

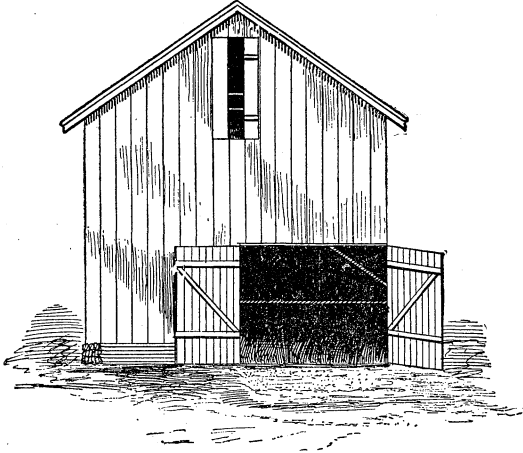


FIGURE 17.

The process of curing now commences, and on the success of this operation depends in a great measure the ultimate value of the crop. No matter how fine the plants may be, or how large the production, an error in curing is sufficient to destroy, in a great degree, the work of the season. The tobacco barn should be built with windows and doors sufficient to insure a free current of air. The barn should be high enough to permit three rows of plants being hung one above the other, say 16 to 18 feet from floor to roof.

There are several methods of curing, viz: Air curing, sun curing, firing with open fires, and curing by flues.

Air curing is the process of curing the plant in shade or barn, as seen in figure 18.

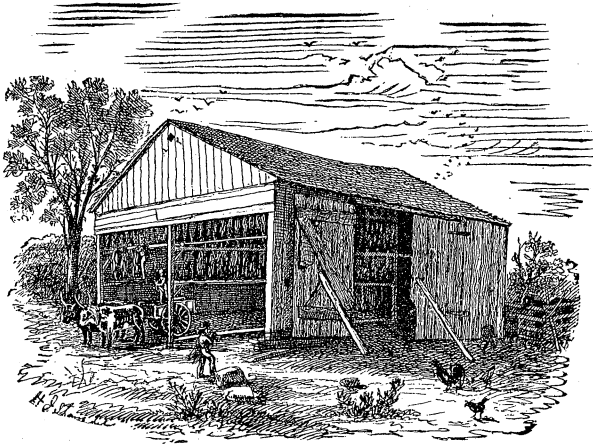


FIGURE 18.

Sun curing is the method of curing in the open air, while firing is the process of curing as above stated, either by open fires or flues in the tobacco barn. The latter method is the one generally practiced in the tobacco sections in Virginia, North Carolina, and to some extent in the west, and is considered the best way of curing cutting leaf.

Method of Curing.—There are two common methods practiced of handling tobacco for curing,—the older and long favored method of cutting and hanging the whole stalk with the leaves attached, and the method of detaching the leaves from the stalk before hanging,—a method which is comparatively new in this country, but is employed to considerable extent in Germany and France.

These methods are too long to be discussed fully in this bulletin for the purpose of passing on the merits of either.

A recent experiment conducted at the North Carolina Experiment Station, with a view to settling the matter, indicates that a comparison between the weight of one-half a crop of tobacco cured on the stalk and the other half cured separate from the stalk shows a difference of

weight of 128 pounds per half acre in favor of the latter. Major R. L. Ragland, a large and successful grower of tobacco in Virginia, states that he has for years employed both methods with success, and there is no doubt that in parts of Virginia and North Carolina the method of stripping the leaves has recently come into decided favor.

A contrary view is held by Prof. Wagner, of Darmstadt, Germany, a most reliable authority, and one in whom the Germans have great faith. He says: If the leaf is picked before it is ripe, it needs a process of subsequent ripening to give it a good quality. This is impossible if the leaf is separated from the stalk. With this view another German writer, W. Tscherbatscheff, also agrees.† An experiment conducted by Nessler shows that the dried constituents of tobacco cured on the stalk, and separate from it, show no appreciable difference in weight.*

These opinions are conflicting and irreconcilable at present, and further investigation will have to be made to settle the question.

XII. SNOW'S MODERN TOBACCO BARN.

This new process of harvesting and curing tobacco was introduced by W. H. Snow, of Highpoint, North Carolina. Figure 19 shows the view of this modern barn.

† *Tscherbatscheff W. Der Tabak und Seine Kultur in den Nordamerikanischen Staaten, Landwirthschaftliche Jahrbucher*, 1875, p. 102.

*Wagner, I. C., p. 38.

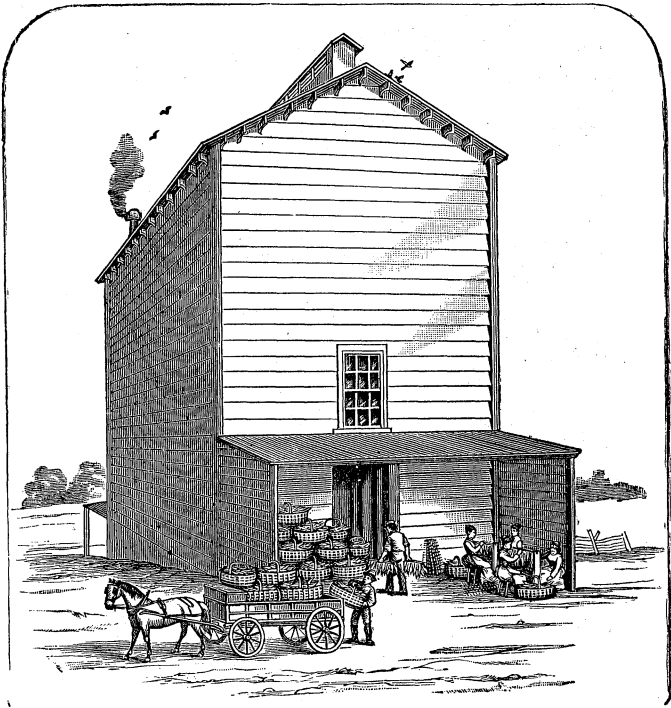


FIGURE 19.

It is not necessary at present to give details for the construction of this barn and apparatus. It is claimed that this system of curing tobacco in the Snow Modern Barn has important advantages. The leaves are stripped from the stalks in the field and brought to the barn in baskets, and strung about the width of a finger apart on pointed wires which project at right angles from a wooden stick. As the sticks are filled they are placed in movable racks in the barn, and as fast as a rack is filled it is raised by a simple device to the top of the building. This is continued until the barn is filled, leaving only as much space between racks as is required for the hanging leaves.

Plan of Housing.—The plan of housing in this barn is illustrated by Figure 20.

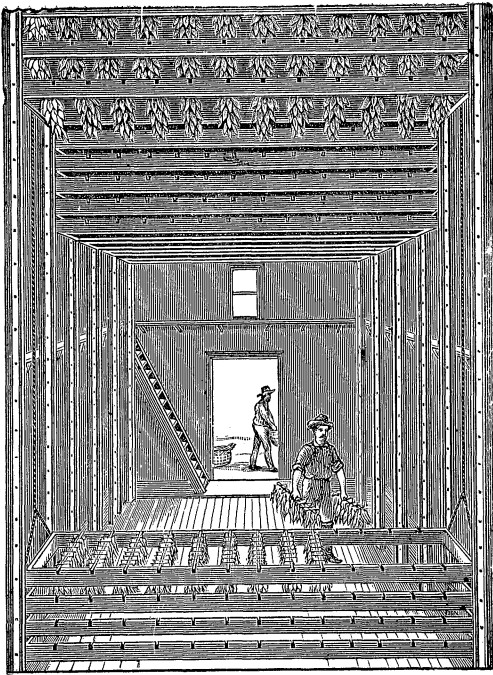


FIGURE 20.

Advantages of the Method.—The following are some of the important advantages claimed for the Snow process over the old:—

I. The planter can begin to house his crop from two to four weeks earlier, as the bottom leaves which ripen first can be taken off and cured as soon as they are ripe.

II. As the lower leaves are pulled off those left on the stalk ripen up more rapidly, which enables the planter to get in his crop earlier in the season.

III. The tobacco can be stored in a much smaller space and with no risk of losing color or molding when bulked down.

IV. Tobacco can be cured with a more uniform color.

V. Less fuel will be required, and the risk of setting fire to the barn will be greatly lessened.

Many other advantages are claimed for this new system over the old, which I will not now enumerate.

Flues and Flue Curing.—The cut 21 represents the furnace and pipe which is extensively used in flue curing.

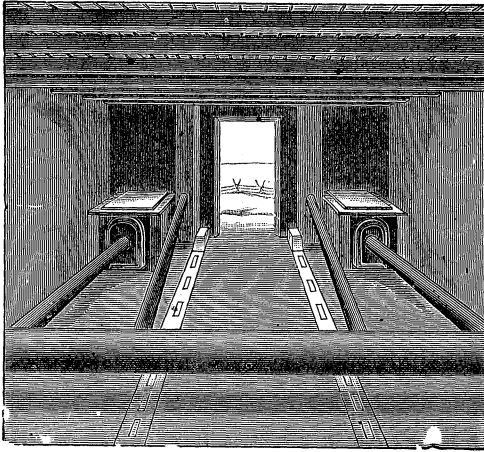


FIGURE 21.

Flues have almost entirely superseded open fires for curing yellow tobacco as being cheaper and better every way. The heat is more readily controlled by the use of flues, and the tobacco cured by this process is cleaner, brighter and sweeter. The flue is regarded as the best mode for applying heat in the curing process for any type of tobacco requiring the application of artificial heat, and is fast superseding the open wood fire.

The Stove.—The stove as represented in figure 22 is

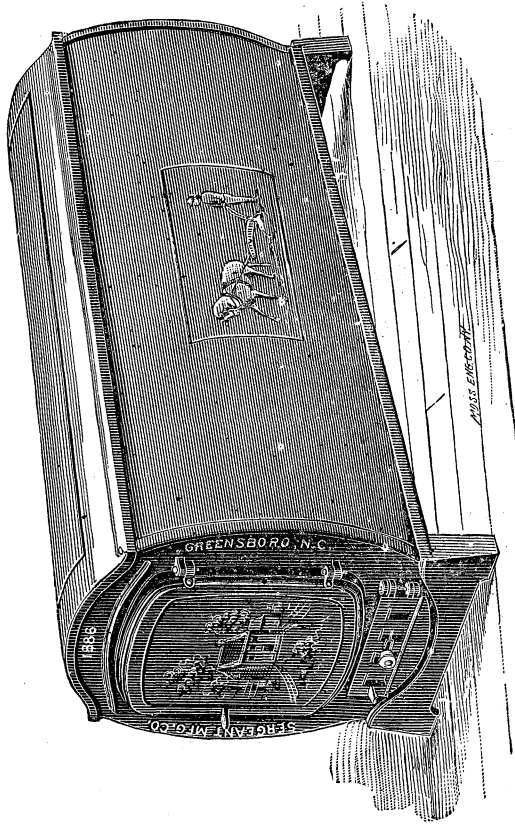


FIGURE 22.

the kind usually used. This is placed in the basement of the barn. The doors of the stoves open from the outside. The stoves are covered with brick or stone arches extending two feet beyond the rear ends of the stoves.

XIII. STRIPPING.

This process is represented by Figure 23.



FIGURE 23.

After the tobacco is thoroughly cured it has to be stripped. The leaves become soft and pliant in damp weather and can be readily taken down out of the barn for stripping. After taking down, the plants should be packed, in order to be kept moist until stripping.

This operation consists in taking the leaves from the stalk and tying them in bundles after assorting the various qualities and keeping them separate. Each hand or bundle of the best grades should contain at least twelve leaves. In the old tobacco States the plant is usually made into three grades—long, short, and lugs, or worm eaten leaves.

In Cuba the leaves are divided into four classes; first, the leaves at the top of the plant, which constitute the best quality, from the fact that they get more equally the benefit of the sun's rays by day and the dew at night; second, the leaves which are next to the above; third, the inferior or small leaves; fourth, the lug leaves, or those nearest the ground.

The assorting of the plant previous to putting in hands or bundles is an operation that requires judgment and a

practiced eye. This mode of assorting colors in stripping is similar to that of shading cigars, in which the utmost care is taken to keep the various colors and shades by themselves. Assorting the plant does not imply that it is carried to its fullest extent in point of color, as in shading cigars, but simply keeping those general colors by themselves, like light and dark brown leaves. Figure 24 shows the bundle after it has been stripped, assorted and tied.

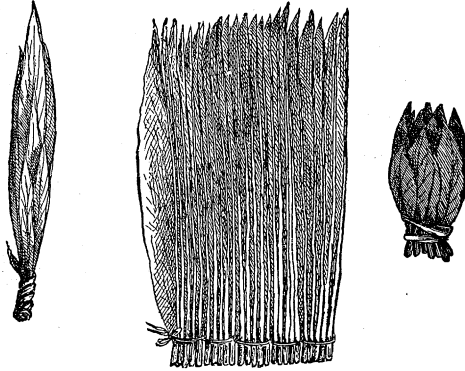


FIGURE 24.

Packing.—This is shown by figure 25.



FIGURE 25.

according as the hands are moist and dry:

After the process of stripping is completed the hands should be packed to keep them moist or as near possible in the same condition as when stripped. Select a cool, dry place in the center of the floor of the tobacco barn. It should be packed loosely or compact

Hand the tobacco to the packer, who presses the hands firmly with his knees and hands, laying the tobacco in two rows—keeping the pile about the same height, filling in occasionally with a middle row until all is packed. The different qualities should be packed separately. They can be packed any height or length desired, but usually from three to five feet high will be found convenient height, while the length may be proportioned to the height or not. After the tobacco is packed, it should be covered with boards and gently weighted with stone or pieces of timber. If the tobacco is packed down in a good case, or keeping condition, which requires experience to determine, it can remain packed until ready for prizing.

Prizing, Casing and Baling.—This is shown by figure 26.

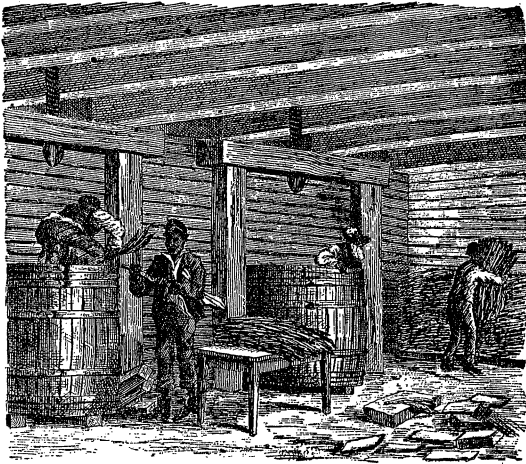


FIGURE 26.

The term prizing originated in Virginia. In the sense in which it is to be taken here is a local word, which the Virginians claim the credit of creating. It is the act of pressing or squeezing the article which is to be packed into any package by means of certain levers, screws, or

other mechanical force,—this requires the combination of judgment and experience, “otherwise the tobacco may become bruised.

All leaf used for cutting purposes and export in America is prized in hogsheads; cigar leaf is usually cased or baled. In some tobacco sections about 800 pounds net is packed in one parcel, while in others from 1000 to 1800 pounds. Tobacco in good condition to prize must be damp enough to bear the pressure without breaking and crumbling, while it must not be too moist or it will rot in the case.

The hands or bundles are packed in the hogshead, or the case in two tiers—when nearly filled, it is subjected to a strong pressure as is shown in figure 27.

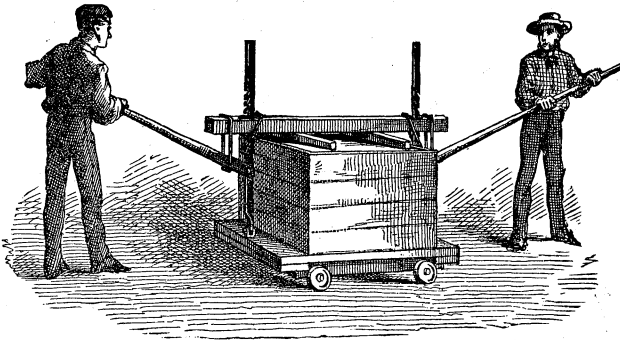


FIGURE 27.

The tobacco should be cased hard so that the mass will rise but little when the pressure is removed. When tobacco is prized or cased in the spring, it will commence to “warm up” as the summer comes, and will go through a sweat. After “going through a sweat” the leaves take on a darker color, and lose the rank flavor which they had before.

* After much correspondence and delay, the plates for this Bulletin were procured from The American Publishing Company, Hartford, Connecticut, Historical Publishing Company, Philadelphia, Penn., and Orange Judd Company, New York—and the issuing of the Bulletin has been delayed from this cause.