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Agricultural Experiment Station

—OF THE—

AGRICULTURAL AND MECHANICAL COLLEGE,

AUBURN, : : ALABAMA.

TOBACCO.

ALEX J. BONDURANT, AGRICULTURIST.

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TOBACCO EXPERIMENT.

I.

OBJECT OF EXPERIMENT.

Experiments in Tobacco, which were commenced on the Station in 1892, and were reported in Bulletin No. 44, were continued the past year with seed from several varieties raised in Virginia, purchased from R. L. Ragland & Co. Hyco, Va., who are raisers of tobacco seed, to supply the agricultural department at Washington, D. C. Seed were also used of the Connecticut Seed Leaf and Havana, furnished by the agricultural department at Washington. Seed furnished by the Florida Agricultural Experiment Station, and seeds procured from Meguiar, Harris & Co., Louisville, Ky., of the Burley tobacco.

These experiments were undertaken to ascertain the kinds of tobacco that seemed best adapted to this climate and soil.

Experiment Station work, conducted in a general way, was more with reference to the growth of the different varieties planted, their qualities, and methods of curing, than to the particulars of fertilizers suitable to the crop in this climate and on this soil.

Methods of raising the plants. These Experiments were commenced on the twenty-sixth of January, and at that time preparation was begun for raising the plants in the Phytopathological, or plant laboratory, in open air beds burnt in the woods and in a hot bed covered with cheese cloth. A brief account of the method followed in each case will be given.

[a] *Phytopathological laboratory.* Rich wood mould, free

from grass seed, was well fertilized with equal parts of nitrate of soda, acid phosphate and kainit. This was placed in boxes to the depth of six inches, the seed were carefully planted in rows a few inches apart, labeled and the soil kept moist by sprinkling late in the evenings when necessary. Very few plants came up from this process. Those that did reach the surface soon died. There are two rational causes for accounting for the failure of these seeds to germinate and grow. The first is, owing to the extreme heat in the Phytopathological, or plant laboratory, which was covered with glass and not protected with awning at that time, thereby destroying the vitality of the seeds. The second cause is, that the boxes containing the mixture of soil and fertilizer were so small that the proportion of fertilizer may have been too large for the quantity of soil used, and hence in this concentrated or caustic form the germinating power of the small seeds was destroyed.

There were two other sowings of the seed in this laboratory, viz: February 28th, and March 29th, with the same results as with the first sowing.

[b] *The woods bed.* This bed was prepared on January 27th, after the plan practiced in the old tobacco States, by burning the ground and then getting the bed in a fine pulverized condition with hoes and rakes. The bed was fertilized after the same method as before mentioned, and the seeds were sown and covered with a light covering of pine straw. These did well, and by the first warm days of March there was an abundance of young plants in sight; yet notwithstanding the covering of pine straw, some were killed by freezing weather, but enough left for use.

About the twentieth of March it was discovered that the flea beetle, which seems as abundant in Alabama as in the old tobacco States, had commenced to attack the young plants, and then by liberal manuring the plants began to grow rapidly, and soon became sufficiently strong to resist the ravages of this pernicious insect, and although they were later than those raised under canvass, yet many good

plants were gotten from this bed for replanting the experimental grounds.

From experiments made in raising plants in open beds, we find that they are liable to be destroyed by the flea beetle and other insects; and as a remedy, I would advise spraying the bed with one ounce of Paris Green, mixed with fifteen or twenty gallons of weak soap suds. This same application can also be used after the plants reach the surface. Pyrethum, commonly called insect powder, can be used in the place of Paris Green, either dry or mixed with water, but it is not considered so effective as Paris Green, and besides it is costlier, and more difficult to procure unadulterated.

(c) *Covered Bed.* This bed was prepared on the 4th of February, by making a frame 8 by 16 feet, cased-in with inch plank one and a half feet high on the north side, and one foot high on the south side. The method of fertilizing was the same as that followed with the two before-mentioned beds, seeds being sown in drills a few inches apart. The bed was then covered with cheese cloth sewn together to make a close covering to keep in as much heat as possible and then fastened to the planks with tacks. The bed being near a hydrant, was kept watered with a spraying hose. The plants came up well and grew rapidly, and from this bed most of the plants were gotten for the experiments.

II.

PREPARING FOR PLANTING.

The land upon which these experiments were conducted was bottom branch land, and poor sandy upland. The bottom land, which was in cotton the year before, was the first that was prepared, by breaking it well with a turning plow on April the third, and equal parts of cotton seed meal, kainit and acid phosphate were applied broadcast, at the rate of one thousand pounds per acre, and plowed in with a scooter.

Each plot of two rows each contained one-forty-second of an acre. The rows were laid off with a shovel plow, three pounds of nitrate of soda, six pounds of kainit, and six of acid phosphate mixed, were applied in the shovel furrow, then bedded with Dixie plow and the beds harrowed. Rows were then run cross, three and one-half feet wide, and plants set in checks. April the twentieth the planting commenced, using plants from the canvas bed. April twenty-fifth and May second, all missing hills were replanted, and no more replanting was done on this ground after that time.

The land on which this experiment was made, was sandy and of moderate fertility. A succession of crops, principally cotton, had been grown on it for many years.

The following table shows the results of yield from land known as branch bottom sandy soil. The plants were set in checks $3\frac{1}{2}$ feet each way:

Plot No.	Names of Varieties.	Pounds yield per acre green Tobacco.	Pounds yield per acre cured Tobacco.	Type.
1	Comstock Spanish.....	6888.0	1029 0	Cigar.
2	Connecticut Seed Leaf.....	9681.0	1268 4	"
4	Havana Seed Leaf.....	5607.0	852.6	"
8	Vuelta de Abajo.....	7014.0	1436 4	"
13	Pure Havana	4179.0	814 8	"

Plot No.	Names of Varieties.	Pounds yield per acre green Tobacco.	Pounds yield per acre cured Tobacco.	Type.
3	Conqueror	5901.0	1163.4	Plug
5	Hester	8366.4	1192.8	"
6	Hyco	8484.0	1247.4	"
7	Long Leaf Gooch	6699.0	1159.2	"
9	Yellow Orinoco	6913.2	1310.4	"
10	White Stem Orinoco	7719.6	1104.6	"
11	Burley	5985.0	1176.0	"
12	Gold Finder	3746.4	688.8	"
14	Yellow Pryor	3234.0	575.4	"

The soil on which the second experiment was made, is upland and known as white sandy soil, very poor without the aid of fertilizers. On this the plants were set, three feet apart on rows three feet wide.

The first application of manure was in shovel furrows laid off three feet apart, stable manure at the rate of five thousand pounds per acre was applied in the drill, then, in the same furrow, at the rate of five hundred pounds per acre, the following fertilizers in this proportion: sixty-six pounds sulphate of ammonia, sixty-six pounds nitrate of soda and two hundred pounds acid phosphate. A scooter furrow was then run in this fertilized furrow, mixing the fertilizer and soil, it was then bedded with the Dixie plow.

The table on next page shows the yield from light sandy soil upland. Rows were three feet apart and plants were set three feet apart:

Plot No.	Names of Varieties.	Pounds yield yer acre green Tobacco.	Pounds yield per acre cured Tobacco.	Type.
1	Comstock Spanish	5382.0	1242.8	Cigar.
2	Connecticut Seed Leaf	5304.0	1505.4	"
4	Havana Seed Leaf	3796.0	881.4	"
8	Vuelta de Abajo	1495.0	439.4	"
13	Pure Havana	*	452.4	"

Plot No.	Names of Varieties.	Pounds yield per acre green Tobacco.	Pounds yield per acre cured Tobacco.	Type.
3	Conqueror	8114.6	1645.8	Plug
5	Hester	7124.0	998.4	"
6	Hyco	8073.0	1591.2	"
7	Long Leaf Gooch	6877.0	1294.8	"
9	Yellow Orinoco	6848.4	1744.6	"
10	White Stem Orinoco	7228.0	1271.4	"
11	Burley	8769.8	1235.0	"
12	Gold Finder	4308.2	720.2	"
14	Yellow Pryor	4630.6	860.6	"

*Green weights of this variety were misplaced and consequently can not be given.

Cultivation. The cultivation was shallow throughout, being done with Terrell heel scrape; on the bottom land the plowing was done both ways, which reduced the expense, as the hoe was not much used.

Harvesting and Curing. The gathering of the crop commenced July the seventeenth, and was continued for every

eight or ten days thereafter until the entire crop was gathered, as it required that length of time to make a curing, to bring the tobacco in order, to take it down out of the house and bulk it. The curing was done in a modern tobacco barn, with heating apparatus, as was shown by illustrations in bulletin No. 44, May 1893.

The following is the method of curing that was followed :

CURING TOBACCO.

—FOR YELLOWING OR SWEATING—

Temperature of Barn before firing Stoves, 86 degrees.

July 19, 10 o. c., a. m. Fire started and thermometer kept on average of 90 degrees until 12 o. c. that night. From 12 o. c. at night (July 19th) to

July 20, 9 o. c. An average heat of 95 degrees. All openings, ventilators, &c. closed, temperature not rising much over the average, Twenty-three hours now since fire begun; tobacco yellowed, which is earlier than the rule, thirty hours being usually required to yellow.

SETTING THE COLOR.

July 20, 9 o. c., a. m. Opened ventilators over the Stoves, made two openings in conduits next to door on either side, and half of ventilator on top of Barn. Temperature raised to 100 degrees.

July 20,	10	a. m.	"	"	105	"
"	"	11	"	"	110	"
"	"	3	p. m.	"	115	"
"	"	6	"	lowered	110	"
"	21	3	a. m.	raised	115	"
"	"	6	"	"	120	"
"	"	9	"	"	125	"
"	"	3	p. m.	"	130	"
"	"	9	"	"	135	"

CURING TOBACCO, JULY 31, 1893.

Monday, July 31st. Gathered 4 varieties of tobacco and put in Barn and started fire about 3 o. c., p. m. Thermometer raised to 90 degrees and kept at this heat until

Wednesday, Aug. 2nd, 3 o. c., p. m., when temperature was raised to 95 and 100 degrees, using about 4 barrels water in sprinkling floor to prevent drying too rapidly.

Thursday, Aug. 3rd, temperature raised to 130 to 140 degrees; tobacco drying as fast as possible.

Saturday, Aug. 5th, finished drying and wet basement.

Monday, Aug. 7th, took down tobacco and packed away in barn.

Bulking. The tobacco was taken down out of the curing barn as soon as it was cured, and bulked down in the new Agricultural Laboratory, so as to have use of the curing house for more tobacco. In curing tobacco by artificial heat, this barn is an economical method. By commencing to take off the leaves, say the middle of July that are ripe, and continuing to gather the leaves as they ripen until all of the crop is gathered, in this climate with frost delayed until November, as much as eight or ten thousand pounds of tobacco can be cured in a tobacco barn sixteen by twenty feet, from the middle of July to the first of November. Another important advantage in curing by this process is, that a larger per cent. of bright tobacco can be obtained than by curing with open fires.

The tobacco, as it was taken down from the curing house, was in as dry condition as it could be handled without breaking. Unless the stems were thoroughly cured, it would be unsafe to place tobacco in bulk from the curing house as early as was done in this experiment. As all of the tobacco that was cured by this process was thoroughly cured before it was taken from the curing house for bulking in the Agricultural Laboratory, it went through a moderate sweating

process, and was found to be all sound and sweet when the bulks were opened about the first of December for assorting and binding into hands.

Assorting. The tobacco was assorted and classified according to the color and quality.

In assorting, three grades were made ; *first quality*, which consisted of the largest and best quality of leaf ; *second quality*, leaves of smaller size than the first, and *third quality*, or lugs, which were composed of the lowest grade, usually the leaves grown nearest the ground.

After the different qualities were assorted, they were tied in bundles or hands, a thin pliant leaf being used to make the tie. From seven to ten leaves of the best quality were sufficient to make a bundle of a convenient size for handling, from eight to twelve leaves of the second quality were placed in a bundle, and from ten to fourteen of the third quality.

III.

CLASSIFICATION AND VALUATION.

With the view of ascertaining the quality and value of the tobacco raised on the Station, samples of the different varieties were sent for examination to dealers in New York, Richmond, and Danville, Va., Florence, S. C. and New Orleans, La.

At the time of writing this bulletin, reports have been received from the following. As these reports may be of interest to the farmers of this State, and the South, who are interested in this new industry, the essential part of the different reports are given :

REPORT OF H. T. DUFFIELD.

The first report received was from Mr. H. T. Duffield, of the Tobacco Leaf Publishing Co., New York, enclosing the classification of Mr. Wallace, an experienced "judge of tobacco." Mr. Duffield wrote, "the samples you sent are very

much like the tobacco grown in the celebrated Owensboro district in Kentucky, this is the opinion of Mr. Wallace ; he is a fine judge and never says anything except what he thinks. Mr. Wallace was formerly a member of the firm of Sawyer, Wallace & Co. I have known that house to make one sale of tobacco which amounted to about one million and a half of dollars. I have taken great pleasure in showing the samples, for I am a native of Mississippi, and was reared in Kentucky, and am always glad to do what I can to assist the brethren down South."

OPINION OF MR. WALLACE.

Yellow Pryor. This perhaps is the most serviceable tobacco of the lot. Sample in good condition, shows a very good leaf indeed. If the leaf were a little longer it would be better.

Hester. Brighter than the preceding ; better color than it, rather short.

Conqueror. A very nice long leaf ; well cured, long enough to be of use to the manufacturers.

Gold Finder. Good brown color ; some good leaf and some too thin and papery.

White Stem Orinoco. Green color, with a few leaves of good color, quality uneven.

Long Leaf Gooch. Would never pay to grow, except for the very lowest grades.

Burley. Too green and slazy. If it cannot be grown of better color and more body, it had better be left alone.

Yellow Orinoco. No comparison with the other light colored samples; not nearly so yellow and more green, lifeless.

First Quality Brown. Much larger leaf than second quality brown ; a little slazy, color comes more from the growth than from curing. Samples rougher than number two ; good body; a good shipping leaf for England ; delicious flavor.

Second Quality Brown. Some remarkably good leaf in the sample ; rather short—too short for stripping purposes.

First Quality Bright. Shows a very good leaf; well cured; nice small stems.

Second Quality Bright. Shows considerable green and too short to do anything with, except for granulating purposes.

The samples of plug manufacturing leaf, clearly show that the soil and climate are well adapted to the growing of this class of tobacco profitably.

The tobacco, as a rule is too short measuring, that is, the longest sample twenty-one to twenty-two inches, when it should be from twenty-two to twenty-five.

The best varieties are Conqueror, Yellow Prior, and First Quality Brown, in the order named. When compared with the rest, Conqueror seems to justify its name.

Your bright tobaccos are worth just what a man fancies. Some fancy bright wrappers bring fifty cents per pound, while the very commonest bright will fetch six cents or so, on the market now.

REPORT OF MR. FRANK M. ROGERS, FLORENCE, S. C.

I feel sure that the development of the culture of bright tobacco in your State will add materially to the prosperity of the farmers when they give it proper and careful attention.

The industry in this section has become quite a prominent feature in our agriculture, and to those of our farmers who are industrious and attentive, tobacco has proven one of the best paying crops introduced.

There is great prejudice in all the markets of North Carolina and Virginia against all new sections.

They tried in every way to discourage and kill-out the business in this State at first, by paying very low prices for our products; the same prejudice still remains. Owing to our soil, climate and length of season, we can far surpass States north of us in quality of leaf, production per acre and cost of production. They fully realize this, and should the industry spread through two or three of our Southern States, they would practically be unable to compete.

The following is the valuation of the samples, as far as made by Mr. Rogers;

Number one is worth from eight to nine cents per pound.

Number two is worth from seven to eight cents per pound.

Number three is worth from five to six cents per pound.

REPORT OF DIBRELL BROTHERS, DANVILLE, VA.

We have examined the samples carefully, and have put the following valuations on them:

First Quality Brown,	we	value	at	.....	4	cents.
Second " "	"	"	"	.....	$4\frac{1}{2}$	"
First Quality Bright,	"	"	"	.....	10	"
Second " "	"	"	"	.....	8	"
White Stem Orinoco,	"	"	"	.....	4	"
Burley,	"	"	"	.....	$6\frac{1}{3}$	"
Gold Finder,	"	"	"	.....	$4\frac{1}{2}$	"
Hester,	"	"	"	.....	$6\frac{1}{2}$	"
Hyco,	"	"	"	.....	8	"
Yellow Orinoco,	"	"	"	.....	$4\frac{1}{2}$	"
Yellow Pryor,	"	"	"	.....	7	"
Conqueror,	"	"	"	.....	9	"
Long Leaf Gooch,	"	"	"	.....	5	"

We think the Hyco and Conqueror are of better quality and more decided character than any of the others.

REPORT OF S. P. CARR, RICHMOND, VA.

I have carefully examined the samples of tobacco you sent. You have a fine field for the dark tobaccos and a fighting chance with our North Carolina bright varieties, owing to your soil being of similar quality to the North Carolina best tobacco soils.

I think you have at least thirty per cent. advantage in culture—certainly ten per cent. in length of seasons and sunshine, and twenty per cent. in the advantage of a curing season, for unless you are forced to cut through an abnormally wet season, there is no reason why you cannot always

have a select time for cutting and curing, which rarely happens in our latitude. In short, we have six weeks margin to cut and cure our tobacco, and you have ten weeks certain.

There was a time in our tobacco industry, dating only a few years back, that no part of our country could raise tobacco worth anything, but North Carolina and Virginia, the home of its first commercial culture; but it has been fully demonstrated that this is a mistake. It is in your power to make the very best type of cigar filler, binder and wrapper, and in these grades you will have a world-wide outlet.

Below find description and comments on your types.

Gold Finder. Coarse leaf, worth eleven to twelve cents per pound.

Conqueror. Very good quality, worth twelve to fourteen cents per pound.

Comstock Spanish. A fair cigar filler, not large enough for wrappers; some of it large enough for binders.

Havana Seed Leaf. Very good binder and common filler, but the laterals or veins too coarse for perfect combustion.

Connecticut Seed Leaf. Too heavy for wrapper, will make fair filler and possibly a binder.

Vuelta de Abajo. A very good filler, but a fraction too rich in body for a mild smoke.

Pure Havana. The best of all the cigar types, only needs a little to make it perfect for wrapper, binder and filler. This is the kind to direct your energies to; you can supplant the genuine Havana in this country, if you will direct your attention to this kind.

Hester. Leaf and texture all right.

Yellow Pryor. Good body, and texture all right.

White Stem Orinoco. Very fair goods.

Long Leaf Gooch. Fair stemmer for the English market.

Yellow Orinoco. A good stemmer for English export, but rather coarse.

Burley. Fair quality, worth from eight to ten cents per pound.

IV.

FACTS FROM STATISTICS OF THE U. S. DEPARTMENT OF AGRICULTURE.

From the report of the U. S. Department of Agriculture on the crops for the year 1893, the estimate placed on the crop of tobacco raised in sixteen States, all that are reported as having raised tobacco, is 483,023,963 pounds from 702.952 acres, and valued at $39,155.442. This will give an average of $55.70.1 per acre for the sixteen States that cultivated tobacco in 1893. The last estimate made by the Department of Agriculture of the acreage, production and valuation of tobacco, prior to those given above, appeared in the annual report of the Department for 1889, being the estimate of the crop for 1888. The acreage as estimated for 1888 was 747,326, producing 565,795,000 pounds of tobacco, at a total value of $13,666.665. The crop the following year, 1889, was returned by the U. S. Census at 488,255,896 pounds, the product of 692,990 acres, with a total valuation of $34,844.449.

From a comparison of the estimates of 1888 with the Census figures of 1889, it would seem that the former were considerably too high. These discrepancies have been eliminated in the Department Report for the year 1893. The figures of acreage for the whole, vary little from year to year, there being an increase of about 10,000 acres over the Census figures. The yield, on the contrary, varies greatly; and for 1893 was below the average. This is shown by the total production being 5,000,000 pounds less than for the Census year, despite the increased acreage. The average yield of tobacco for the year 1893 in the sixteen tobacco States amounted to 687 pounds per acre.

The final estimates of the average farm price of tobacco, December 1st, 1893, for the sixteen States that produced tobacco, are as follows:

Massachusetts,	16.0	cents	per	pound,
Connecticut,	14.0	"	"	"
New York,	15.2	"	"	"
Pennsylvania,	13.5	"	"	"
Maryland,	7.6	"	"	"
Virginia,	6.2	"	"	"
North Carolina,	8.0	"	"	"
Arkansas,	10.0	"	"	"
Tennessee,	8.8	"	"	"
West Virginia,	10.2	"	"	"
Kentucky,	7.6	"	"	"
Ohio,	6.5	"	"	"
Indiana,	7.3	"	"	"
Illinois,	7.0	"	"	"
Wisconsin,	6.3	"	"	"
Missouri,	7.6	"	"	"

This report makes no allusion to tobacco raised in the Southern States. It is well known that Florida and Southern Georgia produce good cigar tobacco, and South Carolina good plug and smoking, and all of these States have tobacco manufactories for cigars, plug and smoking tobacco.

The report of the government for cotton for the year 1893 for acreage and yield is not at hand, only the prices of the staple from eleven States that cultivated cotton are given. From the report of 1888, which gave the essential features of the cotton crop for that year, it appears that the average yield per acre for cotton that year, for all the cotton States, was one hundred and eighty pounds, and the average price at that time was eight and one half cents per pound, which would amount to fifteen dollars and thirty cents per acre. Since that time the average production may not have decreased, but it is certain that the price of the staple has declined, and it is reasonable to conclude from the following table that the farmers in the cotton States did not average gross, over $12.61 per acre for their cotton, for the year 1893.

The average farm price for cotton for 1893, in the eleven States that raised cotton, is as follows:

Virginia,	7.1	cents	per	pound.
North Carolina,	7.2	"	"	"
South Carolina,	7.1	"	"	"
Georgia,	7.3	"	"	"
Florida,	7.3	"	"	"
Alabama,	7.0	"	"	"
Mississippi,	7.0	"	"	"
Louisiana,	7.0	"	"	"
Texas,	6.9	"	"	"
Arkansas,	6.8	"	"	"
Tennessee,	6.5	"	"	"

As far as Experiments have progressed on the Station, the indications are that tobacco, of good quality, particularly for manufacturing plug, for pipe smoking and cigarettes, and possibly for cigars, can be raised in this part of Alabama at a profit. From samples sent to the Station for examination, from different parts of the State, it is fair to conclude that in that portion of the State bordering on the Gulf coast, that tobacco of good quality, fine flavor for wrappers, binders and fillers for cigars, can be produced. Some of this kind was received this season from Dr. John Gordon, Healing Springs, Washington county, which apparently possessed all the requisite qualities for making cigars of excellent quality, after being put through the proper process. Samples of tobacco were also received from Mr. Z. T. Stroud, Aberfoil, Bullock county. These samples were in a badly damaged condition, owing to the fact that they were very wet. After the samples were dried-out, they were examined and found to be a leaf of good size and color—good flavor in smoking, free from pungency, a decided cigar flavor, burning well and leaving a pearl ash.

Some good samples were received from Mr. R. D. Martin, Florence, Ala., suitable for making plug and smoking. The variety which Mr. Martin calls the Brazil Gold Leaf, has been grown by him for several years, and he writes that he has sold all he has for sale at thirty cents per pound. He reports that he has gotten three crops a year from this variety on the same ground, by planting early.

One of the most important things to be done to make the tobacco industry a success in this State, is the establishment of home manufactories. The freight charges on tobacco from Auburn to Florence, S. C., or Danville, Va., are $1.05 per 100 pounds, which reduces the profit too much in this age of sharp competition.

The cotton crop of this State brings annually $30,000,000 to $35,000,000, and from the best information that has been gotten, as much as one-fourth or one-fifth of the amount that the cotton crop sells for is spent in tobacco raised in other States. If our own people raised and manufactured enough tobacco for their own consumption, a large amount of money that is now sent out of our State annually for an article that we could produce at home, would be kept in our own State.

The Station saved seed from last years crop of all of the varieties planted, and will distribute a limited quantity to the farmers of the State on application.