SHADE-GROWN TOBACCO.

BY WALDON FAWCETT.

One of the most interesting as well as most important of the new activities fostered by the United States Department of Agriculture is found in the growing of Sumatra tobacco under shade in the Connecticut Valley. The experiments in this field were the direct result of the investigation of the physical properties and composition of tobacco soils undertaken soon after the organization in 1891 of the Division of Soils of the Department of Agriculture. The similarity of the tobacco grown upon the light sandy soil bordering on the Connecticut River to that produced in Sumatra was at once noted, but the American leaf was lacking in some respects, notably in uniformity of color, and it was to remedy this as well as to improve the quality of the tobacco in other respects that the government officials undertook the experimental work which has resulted so successfully.

View Inside a Patch Showing Arrangement of Posts, Stringers and Wires for Supporting Cheese-Cloth.

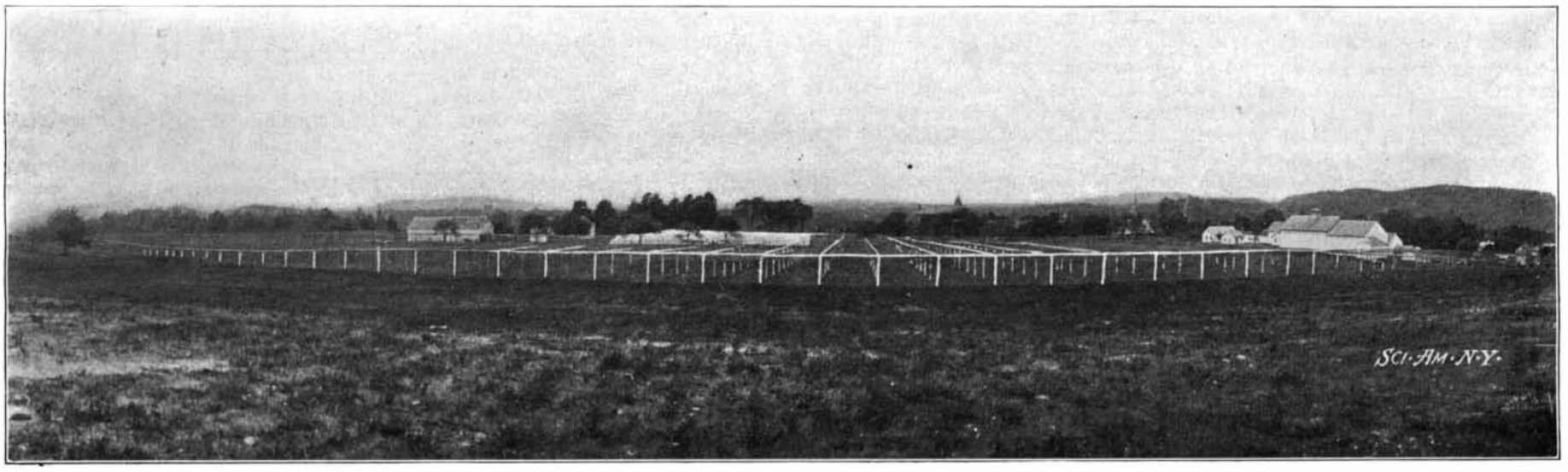
The plan followed has been, in a sense, a co-operative one. The farmers pay the entire cost of the erection of the shade, cultivation of the crop, and the fermentation, grading and sorting of the leaf. The government furnishes the seed and controls in every way the cultivation, preparation and selling of the product, the understanding being that the government derives no financial benefits from the transaction, but simply has the right to offer the crop for sale in order to determine the value placed upon it by the tobacco dealers and manufacturers.

The very light sand or sandy loam of the Connecticut Valley is admirably adapted to the cultivation of the Sumatra tobacco. In this connection it may be noted that with the exception of a small area in Florida and southern Georgia and a narrow area in Pennsylvania there are no other tracts, so far as at present known, where this type of tobacco can be successfully grown unless it be, perhaps, in some of the tobacco districts of New York and Wisconsin, where a thorough investigation has not yet been carried out.

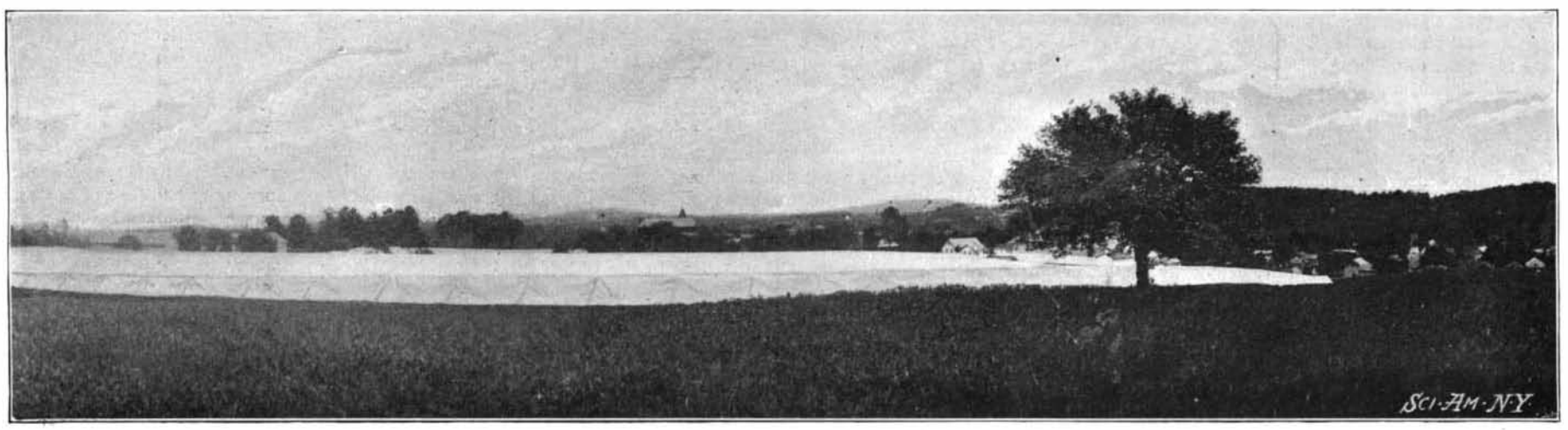
The provision of the cheese-cloth shade constitutes one of the most distinctive features of the industry in the Connecticut Valley. The vast canopies are supported on frames of substantial construction. Chestnut posts, four inches in diameter and twelve feet in length, are set three feet in the ground, leaving nine feet for the height of the frame. The posts are placed sixteen and one-half feet apart and are connected one way by stringers, while across the other are run heavy cable wires stapled to each post and made secure at each end of the field by stakes driven well into the ground. Parallel with and between these cable wires are run wires of lighter weight to support the cloth. The entire structure is covered with a heavy tent cloth which comes to the ground on all sides. A gate is provided, covered with cloth, and in the case of a field of exceptional size a road is left lengthwise through the field.

In July, 1901, the Connecticut Valley was visited by a cyclone of unusual severity preceded by a hailstorm, which did considerable damage to the crops in the open fields, but the cloth entirely prevented damage from the hail to the plants growing within the tents. Such was the force of the wind following this hail that buildings were overturned and trees uprooted, but the crops growing within the tents did not sustain the slightest injury. The cloth was torn in some places, but the total damage in the forty-one acres under shade was repaired at an expense of only $50 for material and labor. Thus far it has been considered advisable to purchase new cloth each season, but the framework will last from five to eight years. The approximate cost of materials and labor for the provision of one acre of shade is $360 for a very excellent grade of material, whereas some of the Connecticut growers have provided satisfactory shade for as low as $260 per acre. Preparation of the seed beds begins in the fall when the ground is well plowed or spaded, and divided into beds six feet wide and of any desired length, surrounded by boards. These beds are highly fertilized and covered with leaves to protect them from frosts during the winter season. About April 1 this top dressing is removed and the bed again spaded, after which there is sown the seed which has sprouted in jars or other receptacles kept in warm rooms, a preliminary treatment made necessary by the fact that the Sumatra seed requires an unusually high temperature for germination. If the soil is at all dry the beds are kept continuously moist, but not wet, until the plants are set out. The plants are set with a planter at a distance of twelve inches apart in rows three feet three inches apart. Inasmuch as the

An 8-Acre Patch After First Picking.
Note that lower leaves are gone.



Framework for 8-Acre Plot,



Same Plot Under Canvas.

A NEW INDUSTRY—GROWING TOBACCO UNDER SHADE.

machine waters the plants when they are set, the transplanting can be done at any time irrespective of weather conditions.

When the tobacco plants are not topped they grow to the full height of the shade and the blossoms often push up the cloth cover at the height of nine feet from the ground. The shade-grown tobacco must be primed or the leaves plucked off as they ripen, and this is a matter which requires great judgment on the part of the farmer, owing to the fact that it is more difficult to tell when the shade-grown leaves mature than when grown in the open field. It is advisable to harvest the leaf in the early stage of ripeness, but there is always danger of harvesting too green. Often not more than three or four leaves will be taken off each plant at a priming. As the tobacco is picked off it is transferred in baskets lined with burlap to the curing shed. It is customary to make five or six primings of a crop, which occupies a period of from one month to six weeks. In the curing shed from thirty to forty leaves are threaded on a string, each end of which is fastened to a lath and this is hung in the barn for curing.

The curing is, of course, a very delicate operation, governed by the nature of the tobacco and the conditions of the weather, and consequently varying in almost every case. The object in all cases is to have the tobacco become fairly moist and fairly dried out once every twenty-four hours, and to accomplish this latter it is sometimes found necessary to have fires started in small charcoal heaters distributed throughout the barn. The average time for curing tobacco is from fourteen to eighteen days.

The next step is fermentation, which is carried on in the sweat room where from five thousand to six thousand pounds of tobacco are placed in each bulk. When the tobacco has been thoroughly cured it is sized, assorted and baled. The bales measure thirty inches square and pressed to a thickness of one foot—the exact size of the bales imported from Sumatra. A bale of these dimensions contains from 150 to 160 pounds. The covering used is matting imported from the island of Sumatra, and over this is put another covering of burlap. The total cost of producing shade-grown tobacco in Connecticut averages about $657 per acre. The tobacco has already sold at prices ranging from $1.40 to $2.50 a pound, which is very significant in view of the fact that the Connecticut Havana tobacco, grown in the ordinary manner, but long recognized as the most desirable domestic tobacco for wrapper purposes, brings but eighteen or twenty cents a pound. The Sumatra tobacco imported exclusively for wrapper purposes pays a duty of $1.85 per pound and sells on the market for from $2.50 to $3 per pound.

REMARKABLE BLASTING OPERATIONS IN SLATE QUARRIES.

BY OUR ENGLISH CORRESPONDENT.

One of the most delicate and dangerous operations in connection with the slate quarrying industry of Wales is the removal from time to time of gigantic masses of waste rock by blasting. As a rule these blasts are carried out on a gigantic scale, from 150,000 to 300,000 tons of rock being displaced by a single explosion. The slate extends through the rock in layers, and the waste granite or "dyke rock" as it is technically called, has to be removed in order to facilitate the work of the miners. Blasting is the only means by which the rock can be removed, as the ordinary mining implements make scarcely any marks upon the hard granite.

The largest of these blasts are carried out at the extensive slate quarries, near Bangor, in North Wales, under the supervision of the Hon. W. W. Vivian, the general superintendent of the quarries, and one of the most expert blasting engineers in the country.

In the case of the 150,000-ton blast at these famous quarries, the preparation for the blast occupied no less than three months. It was a dangerous performance, since the quarrying of the slate had undermined the base of the wall which towered 140 feet into air and threatened to overbalance at any unexpected moment.

At the base of this rock three tunnels were cut, and on either side of them were hewn ten large chambers for the accommodation of the blasting charges. Each chamber measured 11 feet by 4 feet. All the preparations were carried out by the aid of the electric light, a special installation for which was laid down.

Fig. 1.—A 125,000-TON PINNACLE, 75 FEET HIGH, IN LORD PENRHYN'S SLATE QUARRY. BEFORE BLASTING.

Gelatine-dynamite was the explosive used, as it is considerably more powerful for this work than blasting gunpowder. In all 2½ tons were buried in the ten chambers, and the mouths of the tunnels were filled up with stone and rubble, securely cemented, so as to prevent the charges simply blowing out instead of exploding. The charges in the various chambers were connected with instantaneous fuses, which terminated at one point, where a twenty minutes' time fuse was attached, to enable the engineer, after firing the charge, to escape to a safe distance.

The explosion was peculiar in character. There was a dull thud as the charges detonated, and the earth for about a mile round quivered as if visited by an earthquake. Then sheets of smoke spouted from the crevices of the dyke, and huge bowlders at the summit of the wall were detached as if by their own volition and fell with deafening crashes to the bottom. The wall then split open in all directions and subsided quietly in a huge disintegrated heap, covered by a thick cloud of smoke, the after damp. Not a single bowlder was blown any distance.

In the case of the huge blast whereby 300,000 tons of rock were demolished—the largest on record—more elaborate preparations had to be made. This blast was necessitated by reason of the vast quantities of worthless rock which separated the veins of slate. As the latter was of a very rich quality, and too much time would be occupied in cutting it out by the ordinary process, the engineer resolved to raze the whole solid mass to the ground.

The rock was of enormous dimensions measuring 216 feet in height and ranging from 84 feet to 150 feet in thickness. Thirty-five men were requisitioned to bore the main tunnels into the base of the rock, for a distance of 174 feet, and ranging from 5 feet 3 inches to 3 feet 2 inches in width. From this tunnel six shafts were driven at right angles, 39 feet apart, in which the gelatine dynamite was placed, which, by the way, is specially prepared for this work. The charges were laid in bags, 512 containing 12½ pounds, and 72 bags containing 6¼ pounds, of the explosive each. In all 6,840 pounds of gelatine-dynamite were used, which is equivalent to 67,200 pounds of blasting gunpowder. In addition six dynamite primers, each of 25 pounds were used.

The charges in each chamber were connected with twelve instantaneous fuses, each 200 feet in length—the longest instantaneous fuses ever used for blasting work—and were attached to a twenty minutes' time fuse. The work of laying the charges in position, and connecting the fuses involved incessant work for three days and nights. The chambers and tunnels were sealed up with 350 tons of clay and rubble, to ensure perfect detonation.

The blast was a perfect success. The huge mass of rock broke up like a cake. Not a single stone was hurled into the air. Some of the bowlders which were disintegrated were over 2,000 tons in weight.

A huge blast was carried out at Lord Penrhyn's slate quarry, when a huge pinnacle of rock called the Talcaen Mawr, 75 feet in height and weighing 125,000 tons, standing in the center of the quarry was demolished. Our illustrations show the pinnacle before and after the explosion.

A tunnel was bored into the base of the pinnacle for a distance of 60 feet, and measuring 7 feet in height and width respectively. About the center of the tunnel, on either side, a chamber was cut out of the rock at right angles for a distance of 21 feet. At the end of each of these two smaller tunnels, a shaft was sunk to a depth of about 10 feet, and filled with the explosive which in this instance consisted of black blasting gunpowder. In all 280 casks of explosive, each containing 56 pounds, representing a total quantity of 15,680 pounds of powder were used. A wooden trough placed at an angle of 50 degrees passed through each chamber to the charge in the shaft, one of which contained a charge of 6,720 pounds and the other 8,960 pounds of powder. In this wooden trough the instantaneous fuse was firmly embedded in a mixture of sand and sawdust, a process called "tamping." The ends of the two instantaneous fuses were connected to a patent igniter, which in turn was attached to a 48-foot length of slow-burning twenty minutes' fuse, which extended for 20 feet outside the entrance to the tunnel. In this instance firing the charges was delayed owing to heavy rain having damped them. After igniting the fuse the engineers jumped on a small locomotive standing ready near by and were rapidly conveyed to the top of the quarry. The charges detonated eighteen minutes after the ignition of the fuse, and the huge pinnacle was shivered to pieces. Examples of smaller blasts could also be given; but those mentioned are perhaps the most important and interesting.

Fig. 2.—THE QUARRY AFTER THE PINNACLE WAS BLASTED AWAY.