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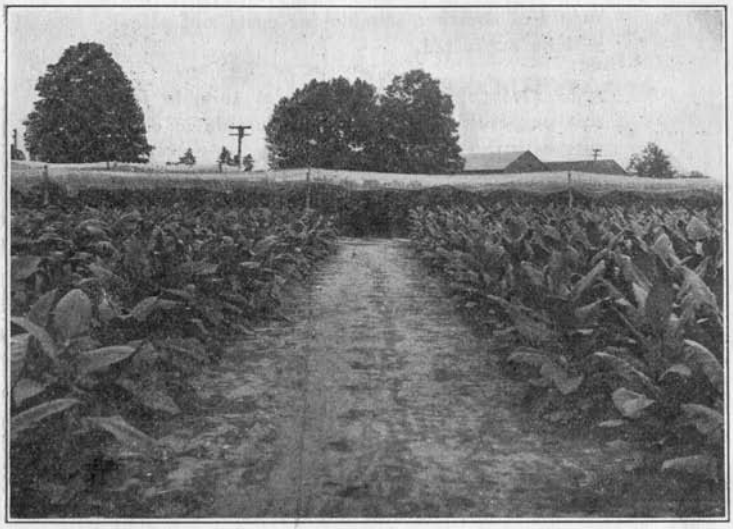

PROLONGING THE LIFE OF TOBACCO SHADE TENT POLES

SUMMARY.

1. Within a comparatively few years the supply of chestnut suitable for posts and poles will be exhausted.

2. Most of our native species suitable for this purpose are naturally non-durable in contact with the soil.

3. The durability of poles can be greatly increased by the use of preservatives to keep out organisms causing decay.

4. Coal tar creosote, or some product derived from it, is the best material to use.

5. Treating can be done satisfactorily in simple, inexpensive outfits constructed and operated on the farm.

6. Immersing the butt of a pole in a hot bath (220° F.) and then in a cool bath (100° F.) will result in the absorption of about one-half gallon of oil and in a penetration of one-half inch to one inch.

7. The above process is called the Open Tank Method and poles treated in this way may be expected to have a useful life of ten years or more.

8. Preservative treatment is not new. Railroad, Pole Line and Mining Companies have saved millions of dollars by using it.

PROLONGING THE LIFE OF TOBACCO SHADE TENT POLES.

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Three hundred and fifty thousand chestnut poles are used to support the tobacco shade tents of the Connecticut Valley. Every year some of these must be replaced because they have rotted off at the ground. The increasing acreage of shade tobacco is swelling the demand for new poles, and to meet this demand there is a steadily diminishing supply of chestnut. The present supply of poles is coming from blight killed timber and within a comparatively few years this supply will be exhausted. Poles from dead timber are often partially rotten when cut, and consequently have a shorter life than formerly when chestnut was cut green, peeled and properly seasoned. This necessitates more frequent replacement. Poles are being brought from greater distances, which increases the cost for transportation. All these factors mean an increased cost to the shade tobacco grower.

Up to the present, other species of trees have not been used for tent poles, either because they were too expensive or because they were not durable in contact with the soil. The shade tobacco grower is now confronted with two problems:

1. That of prolonging the life of such chestnut poles as he may be able to secure.
2. That of providing satisfactory substitutes for chestnut when the supply of this species is exhausted.

The most feasible way of accomplishing both these ends is to use some sort of preservative treatment. The present bulletin is distributed with the object of furnishing what we believe to be the best information available as to the use of wood preservatives for this purpose.

While this paper deals specifically with the application of preservatives to tobacco shade tent poles, the methods described are applicable wherever it is desirable to prolong the life of wood by preventing decay.

Preservative Material.

The main requirements of a good preservative are that it render wood unfit for the development and growth of the organisms (fungi) causing decay, that it be reasonably permanent, and that it be inexpensive. Without discussing the merits of the va-

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rious preservatives that might be used it may be stated that *coal tar creosote,* or some product derived from it, is the best material to use. Coal tar creosote itself is difficult to obtain in small quantities, but there are on the market many derivatives of it which may be purchased in lots of a gallon or more under various trade names. Such products will cost more than creosote, but the fact that they are the only materials easily obtainable in small quantity will render their use compulsory on small jobs. In purchasing preservative the best plan is to secure materials made by a reliable concern which will furnish specifications regarding the characteristics of its product.

In choosing between several preservatives, select the cheapest one that will answer the requirements of the job. Below is the American Wood Preservers' Association standard for Grade I creosote oil which may be used for comparison in purchasing trade products. Some deviation from these requirements is, of course, allowable but the least that any buyer should do is to assure himself that the preservative is a distillate of coal-gas tar or coke-oven tar and that it has a boiling point of over 200 degrees centigrade.

AMERICAN WOOD PRESERVERS' ASSOCIATION STANDARD SPECIFICATION.

Grade I.

1. The oil shall be a distillate of coal-gas tar or coke-oven tar. It shall comply with the following requirements:
2. It shall not contain more than 3 per cent of water.
3. It shall not contain more than 0.5 per cent of matter insoluble in benzol.
4. The specific gravity of the oil at 38° C. compared with water at 15.5° C. shall not be less than 1.03.
5. The distillate, based on water-free oil, shall be within the following limits: Up to 210° C., not more than 5 per cent; up to 235° C., not more than 25 per cent.
6. The residue above 355° C., if it exceeds 5 per cent, shall have a float test of not more than 50 seconds at 70° C.
7. The oil shall yield not more than 2 per cent coke residue.
8. The foregoing tests shall be made in accordance with the standard methods of the American Wood Preservers' Association.

Preparation of Poles for Treatment.

Only sound wood should be selected for treating because, if decay has already started, treatment may not kill the fungi responsible for it and the organisms will continue to work inside the treated area. If a pole shows signs of decay it should be rejected or the decayed portion should be shaved off. *This is particularly important with dead chestnut, which is often punky on the outside.*

Poles should be peeled for their entire length, taking especial care to remove *all* the fibrous inner bark from the area to be treated. After peeling they should be piled in open cribs to permit a thorough circulation of air around each pole and allowed to season. The length of time needed for seasoning will vary with the time of year and the species. A test to determine the degree of seasoning may be made by weighing periodically. If an average sized pole loses a pound or less a week in good drying weather it is dry enough to treat. Seasoned timber which has been exposed to rain should not be treated until it has dried out again. Species like oak, which check badly, should be cut and peeled in the fall and winter since seasoning proceeds less rapidly at this time of the year. Some species "case harden" by forming an impervious shell on the outside when seasoning. This shell should be broken by rasping or scraping before treatment.

It should be remembered that, in general, sapwood is more easily treated than heartwood, although there are exceptions to this rule. Wood which is to be treated by brushing, spraying or dipping may be round, sawn or split since the treatment is superficial and there is little penetration of the wood cells by preservative. But if treatment is to be by the open tank method, it is better to use round material because the band of easily penetrated sapwood on a round stick insures an even penetration of preservative to a considerable depth. The smallest round pole which is strong enough to meet the requirements of the job is preferable to a larger one because it has a larger percentage of sapwood than the latter. Should chestnut be treated by the open tank method, care should be taken to retain as much sound sapwood as possible because the heartwood is very difficult to penetrate with preservative.

Application of Preservatives.

There are a number of ways of applying preservatives, each of which has its merits. The user must decide for himself as to which best fits his conditions.

Brush Treatment. This is the easiest, cheapest and least effective means of application. It consists in flowing on the preservative with a stiff brush or swab, or spraying it on with a pressure gun. The preservative may be applied cold but better penetration will be obtained if it is heated to about 200° F. Two or more coats should be applied, allowing a twenty-four hour interval between coats. Care should be taken to fill all checks and depressions. The advantages of the method are that it requires almost no equipment and the preservative can be applied where it is most needed. The area treated should extend one foot above and two feet below the ground line. The chief drawback

to the method is that there is little penetration and the durability is consequently not increased as much as with some of the other processes. A two coat application requires about ten gallons of preservatives per thousand square feet of surface and may be expected to prolong the life of timber from three to five years. The main use of this method is for increasing the life of wood that is in itself naturally durable. It is particularly recommended for use on dead chestnut poles.

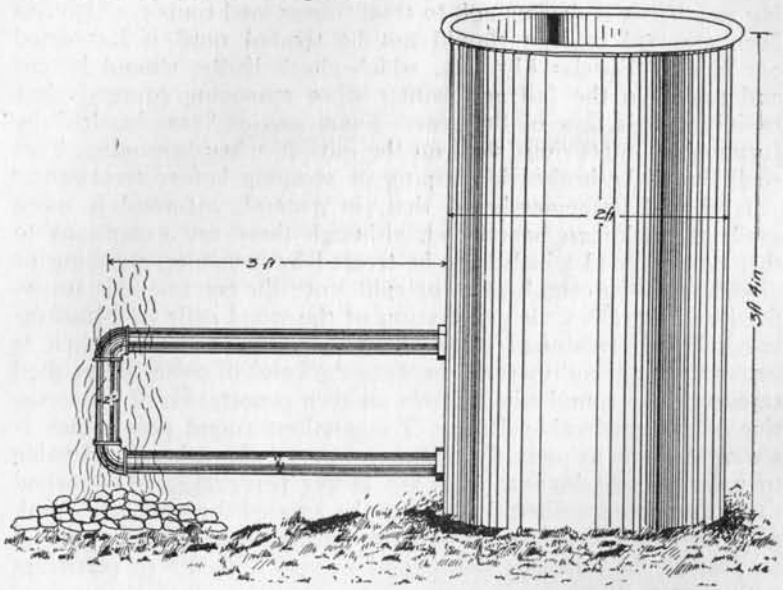

FIG. 1. An easily constructed outfit which can be readily transported from place to place. The tank is of 24 guage galvanized iron with a capacity of 15-20 poles a day which could be doubled by providing a second tank for the cool creosote.

Dipping. By this method the butts of the poles are dipped for five to fifteen minutes or more in preservative which has been heated to 200° F. The increase in durability which may be expected will be about the same as for brushing or spraying. It is considered slightly more effective than the latter because the preservative enters into places not reached by brush or spray. However, it uses more preservative per unit of area treated and its application requires a tank and some method of heating the oil. This method is not especially recommended. If the expense for tanks, etc., is to be incurred it would be better to employ the Open Tank Method described below.

Open Tank Method. This is the most practicable method for treating shade tent poles of non-durable woods. The apparatus

required may be very simple or quite elaborate, according to the number of poles to be treated. In its simplest form it consists of a steel barrel (old gasoline drum with one head removed) and a thermometer. The barrel is set up over a hole in the ground, or on a stone or brick foundation, and a fire started under it to

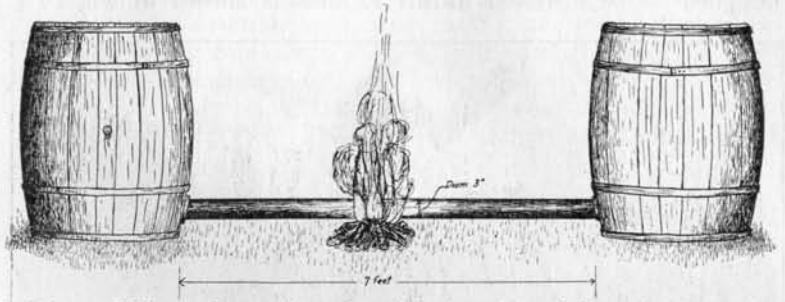

FIG. 2. This outfit consists of 2 tight barrels, 7½ feet of 3 inch pipe, four 3 inch lock nuts and four 3 inch rubber gaskets. Capacity 15-20 poles daily. This may be doubled by providing 2 more barrels for the cool creosote.

heat the oil. If desired, a U-shaped return bend may be inserted in the barrel. If this is done, heating of the oil is accomplished by applying a blow torch flame to the bend or starting a fire under it. (See Figure 1). Another scheme is to connect two barrels by means of a seven-foot length of three-inch pipe. Heating is accomplished by starting a fire under the pipe. (See Figure 2). If either of these two plans is used the barrel may be of wood. The depth of the barrel needed is governed by the length of the butt to be treated. The treated part of a pole should extend for at least six inches, and preferably a foot, above ground line. The barrel should then be a foot deeper than the treated portion of the pole to allow for expansion of the oil. To prevent poles from moving about or floating in the oil, it is a good plan to construct a false bottom out of two-inch plank with heavy screws projecting upward through it for about three-fourths of an inch and to fasten this in the bottom of the barrel. (See Figure 3).

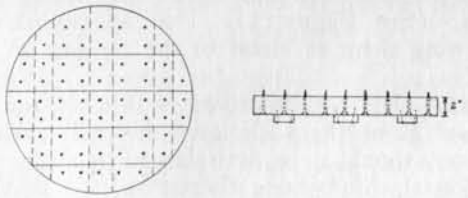

FIG. 3. This device is to be fastened in the bottom of the barrel or tank to keep the poles from floating and can be made of scrap materials. The screws should project for ¾ inch.

The operation of one of the forms of equipment described above consists in immersing the butts of the poles in preservative and maintaining the latter at a temperature of 220° F. for three hours. The fire is then drawn and the poles allowed to stand in the oil for twelve hours or more. A single tank outfit designed to be operated in this manner is shown in Figure 4.

FIG. 4. A home-made single tank treating plant in operation. A tank like the one shown is better than a barrel because of its greater depth. Note the drain barrels at the left.

An elaboration of the above method, which will greatly speed up the process, is to provide another tank or barrel containing oil at a temperature of about 100° F. The poles are immersed in the hot bath for three hours as before and are then immediately transferred to the cool bath and allowed to remain in it for one to two hours. (See Figure 5). This accomplishes the same result as allowing them to stand in the cooling oil for a much longer period.

The apparatus thus far described is suitable for butt treatments only and in northern climates this will usually be sufficient. However, should it be desirable to treat the tops as well, this can be done by immersing the entire pole in the cool bath after the butts have been treated to the hot bath as described above. The complete two bath treatment for the entire pole is seldom warranted. Treating the tops of the poles in the cool bath requires a tank long enough so that they may be immersed. (See Figure 6). It is a good plan to provide a number of extra barrels in which the poles may be placed to drain when they are removed from the cool oil.

Further elaborations may be made in the size and shape of the bath tanks, methods of heating, tackle for handling the poles, etc.; but, in any case, the principle involved is the same, i.e., the hot bath drives the air and water out of the wood cells, creating a partial vacuum. When the oil is allowed to cool, or when the wood is immersed in the cold bath, the preservative is forced into the vacuum.

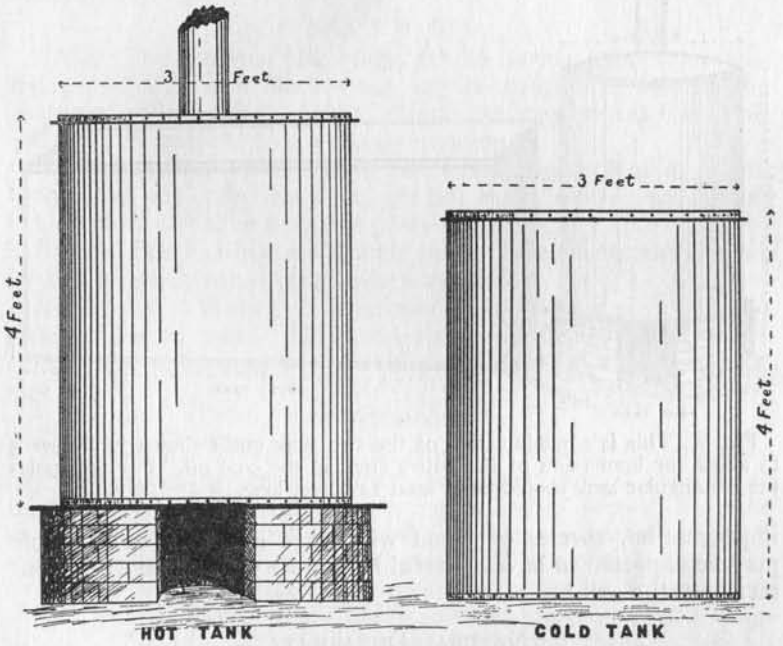

FIG. 5. A two tank outfit. Capacity 50-60 poles daily. The tanks should be of heavy galvanized iron reinforced at the top and bottom with angle iron.

The average butt treated pole will absorb about one-half gallon of creosote in the hot and cold baths. The depth to which penetration takes place is from one-half inch to more than one inch, depending on the species. Immersing the entire pole in the cold bath adds somewhat to the amount of preservative used.

While more costly both as to materials and equipment than the more superficial methods of brushing, spraying and dipping,

this expense is fully justified with species which are non-durable. Tests made at a number of Experiment Stations show that, in northern climates, species which normally have a life of from one to five years when used in the ground will be serviceable for ten years or more when treated by this method.

Full Pressure Treatment. This method, which consists in forcing preservative into the wood under high pressure, is only mentioned because the high cost of equipment will prohibit its use except where a large amount of material can be treated. By the use of pressure it is possible to force from five to fifteen pounds of preservative into each cubic foot of wood. With such heavy

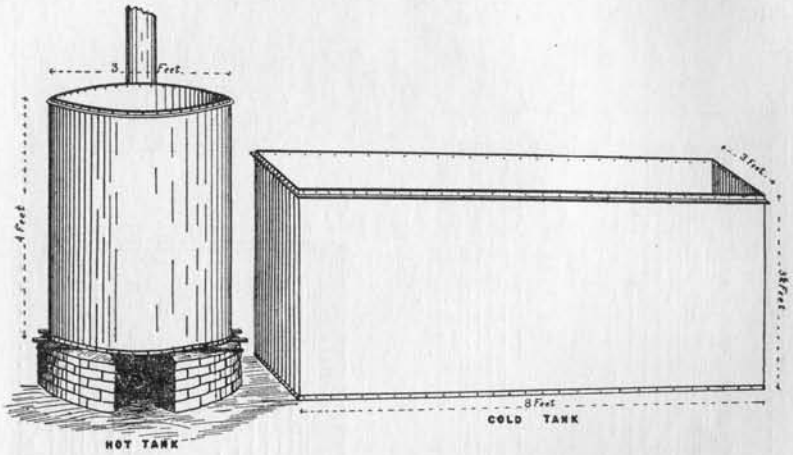

FIG. 6. This is a modification of the two tank outfit shown in Figure 5 to allow for immersion of the entire stick in the cool oil. For tent poles the rectangular tank should be at least 12½ feet long.

impregnation, species of wood which are naturally non-durable may be expected to have a useful life of 20 years or more in contact with the soil.

NATURAL DURABILITY.

There are only four native woods which have good natural durability when used in contact with the soil. They are chestnut, locust, white oak and red cedar heartwood. From a commercial standpoint chestnut may be considered an extinct species. White oak and red cedar heartwood make good poles so far as durability is concerned, but both grow rather slowly and both have values for special purposes which will generally preclude their use for poles. Moreover, white oak is rather heavy for this purpose. Locust is very durable, but it cannot be grown commercially on account of a serious insect pest.

In the future the bulk of the post and pole supply must come from other native woods, preferably those which can be obtained near at hand. These may be generally classed as non-durable. A few of them will last for five to ten years untreated, but most of them rot off in less than five years in contact with the soil. It is for this group of non-durable woods that treatment is especially important.

NON-DURABLE SPECIES WHICH MAY BE USED.

The requirements for a good pole or post wood are that it be reasonably light, straight, strong, easily obtainable and susceptible to treatment.

HEAVY WOODS.

Oaks. The common black oaks (those having pointed leaves—red, pin, scarlet and black) may not be considered suitable for posts and poles because of their weight, but they are easy to obtain and can be creosoted with good penetration.

Hickories, Black and Yellow Birch and Sugar Maple. These species are not only heavy but are not easily treated and should not, in most cases, be used for posts and poles.

Beech. Beech, while moderately heavy, takes preservative readily and is worth considering where available.

White Ash. White ash is similar to beech in weight but is a little harder to treat. However, its straight growth renders it suitable for poles and, where obtainable, could be used to advantage.

LIGHT WOODS.

The Pines and Hemlock. The pines are reasonably light when dry and are easily treated. Pitch or yellow pine is readily obtainable over most of the tobacco region and at present has little or no value. If treated and used for poles, an economic waste would be diverted into useful channels. White pine is also plentiful, and red and Scotch pine could be grown to advantage to supply post material (See the Rainbow Experimental Plantations). Hemlock, while suitable in weight and form, is difficult to treat and should not be used untreated since it is not durable in the soil.

Elm and Sycamore or Buttonball. Elm is a light wood and one most easily treated. In fact, it absorbs preservative almost too readily. Sycamore is also easily treated, although less so than elm.

Red or Soft Maple. This tree is particularly recommended for post and pole material because of its good form and the fact that it is so readily obtainable. It takes treatment well and considered from all angles, it is one of the most likely species that can be suggested.

Gray Birch, Poplar, Willow and Basswood. These are light species. The poplars, willow and basswood take treatment readily and when available should make good poles. Gray birch is one of our least durable woods. There is little information available at present as to the ease with which it may be treated and it can not be recommended at this time. However, its abundance warrants experiments to determine its practicability as treated post material.

Care of Poles After Treatment.

Great care should be taken to prevent the treated portions of poles from being broken. Should the preserved shell be opened up in any way it should be brushed over with one or two coats of hot creosote before the pole is set.

All framing, sharpening, etc., should be done before treating. Should it be necessary to cut into a pole after treatment, the fresh cuts should be brushed over.

If only the butts are treated the poles should be piled in open cribs, otherwise decay may start in the untreated tops. If the entire pole is treated, close piling should be used as there is less chance for the preservative to be lost by volatilization.

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