Bulletin No. 75 - Life and Preservation of Pitch Pine Fence Posts

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UNIVERSITY OF WYOMING.
Agricultural College Department.

WYOMING EXPERIMENT STATION,
LARAMIE, WYOMING.

BULLETIN NO. 75
JULY, 1907

The Life and Preservation of Pitch Pine Fence Posts.

By B. C. BUFFUM.

Bulletins will be sent free upon request. Address: Director Experiment Station, Laramie, Wyo.
Wyoming
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Clerk and Stenographer
The writer was the first man employed by the Board of Trustees to begin experimental investigations under the provisions of the Hatch Act, in Wyoming. One of the first experiments started was the simple one here reported, to determine the life of our ordinary pitch pine fence posts, and to see if some cheap method of treating could be practiced which would prolong their usefulness. At that time some experiments were being conducted by the railroads in methods of treatment to preserve ties. Attempts had been made in Europe and America to preserve piles driven in the sea, and paving blocks for streets, but so far as we know this is the first fence post preserving experiment inaugurated. Any apparent crudeness in the plan may be excused on this score. The investigation has been brought to a successful conclusion after more than sixteen years of waiting, and it is hoped the results here reported may be of value to some of our readers. The trial was made on the fence extending east and west across the north side of the Experiment Farm.

Since this experiment was begun the Bureau of Forestry of the United States Department of Agriculture has carried out some experiments in cheap methods of treating fence posts. Several pamphlets have been issued and a brief account is given in the year book of the Department for 1903, which contains some information of value. This report makes the general statement that all tar oil products should be applied hot, and that wood which is dry will absorb considerable quantities of such preservatives as tar oil, sperittine, carbolineum, etc. Some instructions are given for treatment of posts by
dipping in a solution of corrosive sublimate. The solution should have a strength of one part corrosive sublimate to 150 parts of water. This salt is difficult to dissolve and should first be placed in a small quantity of hot water and then diluted to the required amount. It is very poisonous and must be used with caution. As the salt will decompose by the mercury amalgamating with metal, the solution must be used in wooden, cement, or crockery vessels, and even here it loses its strength with use, or if light reaches it for any length of time, so it must be often renewed and kept covered. The cost of treatment is said to be about four and one-half cents per cubic foot of wood, which makes it a cheap method, and it is claimed to be quite successful, especially where but little water comes in contact with the wood to dissolve the salt. The timbers are soaked long enough to allow the solution to penetrate them effectively.

Other treatments recommended by the Department are soaking in tar oil or in creosote. A cheap process, more generally used than the others, is treating with zinc chloride. This has much practical value, but it is said the salt leaches out rapidly when the wood becomes wet.

In parts of Wyoming crude petroleum is cheap and our experiments here reported indicate that if properly used it is quite effective as a post preservative against dry rot.

**PLAN OF THE EXPERIMENT.**

From the lot of pitch pine posts bought to fence the forty acres, eighty average posts were selected. I believe that these posts cost fifteen cents each, delivered at the farm. North of the fence and running parallel with it at a distance of four or five feet was a small lateral from the canal, used by the neighbors as an irrigation ditch. South of the line of fence twelve feet of ground was set aside for a road. This was used as an approach to the farm buildings for ten years. South of the road and at a distance of twelve or thirteen feet
Preservation of Fence Posts.
from the fence was another small irrigation lateral, along which willow cuttings were planted.

These eighty posts were divided into sixteen lots of five each. They were treated and set in the ground at a depth of two feet, one rod apart. The numbering was commenced at the northeast corner of the forty acres, at the first post west of the corner post, and extended from this post toward the west. The corner post was a gate post and was not included in the experiment. The different lots were as follows:

No. 1. Five posts well coated with tar to a distance of two and one-half feet from the bottom of the post.

No. 2. Five good, clean posts, not treated, as a check.

No. 3. Five posts treated with crude oil, or petroleum, two and one-half feet of the bottom of the post.

No. 4. Five posts with a tar band one foot wide, eighteen to thirty inches from the base, to protect the wood near ground surface.

No. 5. Five posts with crude oil band one foot wide, from eighteen to thirty inches from the base.

No. 6. Five posts with crude oil covering two and one-half feet of the bottom of the post, and the oil burned off.

No. 7. Five posts with coating of tar two and one-half feet of the bottom, and the tar burned off.

No. 8. Five posts with band of crude oil one foot wide, from eighteen to thirty inches from the base, and burned off.

No. 9. Five good posts, untreated, as a check.

No. 10. Five posts with tar band one foot wide, eighteen to thirty inches from base, and burned off.

No. 11. Five posts with one foot of bottom dipped in tar.

No. 12. Five posts with one foot of bottom dipped in tar and tar burned off.
Preservation of Fence Posts.

Plate II. (See description on page 17.)

Prescription of Fence Posts.
No. 13. Five of the poorer posts, containing little pitch, untreated.

No. 14. Five good, well charred posts. Two and one-half feet of the bottom of these posts was simply burned to produce a protecting char.

No. 15. Five posts with one foot of bottom dipped in crude oil.

No. 16. Five posts with one foot of bottom dipped in crude oil, and oil burned off.

There was the usual brace at the corners of the fence, and one double brace at the center post. The fence consisted of four ordinary strands of barbed wire with barbs four or five inches apart. The posts were treated and all set on April 15, 1891, and were allowed to stand without disturbing until June 27, 1907, a period of sixteen years, two months and twelve days. During that time accidents happened to only two posts. These were in lot 15. Between them the wire fence was opened near the house, and within the past year two of the posts were broken off by being struck by a wagon as it passed through the gate. One of these was in fairly good condition, being broken off by the force of the blow. The other was partly rotted off with dry rot near the surface of the ground, as indicated in the notes.

RESULTS OF THE EXPERIMENT.

The posts were all dug up in one day, June 27th, and careful notes taken of their condition, and the photographs taken which are here reproduced. The accompanying table gives in condensed form the data of the condition of each set of five posts:
Preservation of Fence Posts.

Plate III. (See description on page 17.)
<table>
<thead>
<tr>
<th>No. of set</th>
<th>TREATMENT</th>
<th>Number whole</th>
<th>Number broken</th>
<th>Condition at bottom, per cent</th>
<th>Condition at ground surface, per cent</th>
<th>Condition of top, per cent</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Coal tar 2½ ft. bottom</td>
<td>4</td>
<td>1</td>
<td>100</td>
<td>65</td>
<td>85</td>
<td>One gone at 15 yrs.; 4 would last 20 or 25 yrs.</td>
</tr>
<tr>
<td>2</td>
<td>No treatment</td>
<td>2</td>
<td>3</td>
<td>80</td>
<td>30</td>
<td>12</td>
<td>Three gone at about 12 yrs.; 1 would last 17 yrs.; 1, 18 yrs.</td>
</tr>
<tr>
<td>3</td>
<td>Crude oil 2½ ft. base</td>
<td>5</td>
<td>0</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>Two would last 20 yrs.; 3 perhaps 30 yrs.</td>
</tr>
<tr>
<td>4</td>
<td>Tar band 1 ft. wide</td>
<td>3</td>
<td>2</td>
<td>75</td>
<td>75</td>
<td>0</td>
<td>Two good as new; 1, 20 yrs.; 2, about 12 yrs.</td>
</tr>
<tr>
<td>5</td>
<td>Crude oil band</td>
<td>5</td>
<td>0</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>Four good as new; 1 good for 25 yrs.</td>
</tr>
<tr>
<td>6</td>
<td>Crude oil and burned</td>
<td>5</td>
<td>0</td>
<td>100</td>
<td>98</td>
<td>95</td>
<td>Four good as new; 4 would probably last 20 yrs. or more.</td>
</tr>
<tr>
<td>7</td>
<td>Tar 2½ ft. and burned</td>
<td>5</td>
<td>0</td>
<td>60</td>
<td>50</td>
<td>95</td>
<td>One good as new; 4 gone this year.</td>
</tr>
<tr>
<td>8</td>
<td>Crude oil band and burned</td>
<td>2</td>
<td>3</td>
<td>60</td>
<td>15</td>
<td>90</td>
<td>One good for 18 yrs.; 3 have been broken 3 or 4 yrs; 1 gone this year.</td>
</tr>
<tr>
<td>9</td>
<td>No treatment</td>
<td>4</td>
<td>1</td>
<td>40</td>
<td>35</td>
<td>90</td>
<td>One good for 20 or 25 yrs.; 2 gone now; 1, 17 yrs.; 1 off several yrs.</td>
</tr>
<tr>
<td>10</td>
<td>Tar band and burned</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>40</td>
<td>85</td>
<td>Two good for more than 20 yrs.; 2, 14 yrs.; 1, 16 yrs.</td>
</tr>
<tr>
<td>11</td>
<td>Tar 12 in. base</td>
<td>5</td>
<td>0</td>
<td>75</td>
<td>75</td>
<td>95</td>
<td>Two would last 20 yrs.; 2, 18 yrs.; 1 broken a yr. or more.</td>
</tr>
<tr>
<td>12</td>
<td>Tar 12 in. and burned</td>
<td>1</td>
<td>1</td>
<td>50</td>
<td>50</td>
<td>80</td>
<td>One might stand 17 yrs.; 2, 16 yrs.; 2, 14 yrs.</td>
</tr>
<tr>
<td>13</td>
<td>No treatment</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>7</td>
<td>80</td>
<td>Two, 25 yrs.; 1 broken would have stood 17 yrs.; 2, 20 yrs. or more.</td>
</tr>
<tr>
<td>14</td>
<td>Well charred</td>
<td>4</td>
<td>1</td>
<td>70</td>
<td>65</td>
<td>90</td>
<td>Two good for 30 yrs.; 1, 16 yrs.; 1, 15 yrs.; 1, 14 yrs.</td>
</tr>
<tr>
<td>15</td>
<td>Crude oil 12 in. base</td>
<td>2</td>
<td>3</td>
<td>40</td>
<td>40</td>
<td>90</td>
<td>Two may last to 20 yrs.; 2 gone this year; 1 gone 2 yrs. ago.</td>
</tr>
<tr>
<td>16</td>
<td>Crude oil 12 in. and burned</td>
<td>2</td>
<td>3</td>
<td>30</td>
<td>30</td>
<td>90</td>
<td>Two may last to 20 yrs.; 2 gone this year; 1 gone 2 yrs. ago.</td>
</tr>
</tbody>
</table>
Column 1 is the number of the set; column 2 states briefly the treatment; column 3 gives the number of posts which are whole, that is, have not been broken off through action of dry rot; column 4 gives the number which have been broken off; and from the appearance some estimation was made of the length of time these posts have been standing in the fence with the bottoms rotted off. The last three columns of the table give the condition of the posts at the bottom, at the ground surface, and weathering at the top, giving it in percentage. If the post was in perfect condition the mark will be 100 per cent; if entirely rotted off, so it would stand no longer in the fence, the percentage will be 0; if the estimation showed 50 per cent gone with dry rot, the condition would be 50 per cent, and so on. These figures give a comparative idea of the effects of different methods of treatment and of the life of the posts not treated. In the notes following each set of data in the tables an attempt is made to estimate the life of each post. In the cases where they have probably been rotted off for one or more years, the notes indicate that the life of the post was that much less than the length of time since the experiment was begun. On the other hand, if in the opinion of the observer the post would last a longer time, the total life of the post is indicated. For example, in the fourth set of posts it is estimated that one would last four years longer, and the notes state “one 20 years,” indicating that the total life of the post would be 20 years. Two of these posts had been rotted off for four or five years, and the notes state that their life was about twelve years. In addition to the tabulated data, the following notes on each post are given to indicate the general condition:

NOTES.

First 5. Two and one-half feet of bottom dipped in tar. Post No. 1 rotted off near surface of the ground, about two feet two inches from the bottom. Bottom in good condition, showing no rot. Posts Nos. 2, 3, 4, and 5, all in fairly good
Plate V. (See description on page 18.)
condition; each one is just beginning to show the effects of dry rot in a ring from twenty-two to twenty-seven inches from the bottom, which is the location of the surface of the ground.

Second 5. No treatment. Posts Nos. 1, 2, and 3 rotted off near the surface of the ground. No. 4 effected with dry rot from within six inches of the bottom to the ground surface, and would probably not last more than one year longer. Post No. 5 badly dry rotted from the bottom to the ground surface. Only No. 5, in this set, still holding the fence.

Third 5. Two and one-half feet of base dipped in crude oil. Post No. 1 showing a little dry rot from bottom to surface, increasing till about 10 per cent of the body of the post is affected at the ground surface. Posts Nos. 2 and 3 sound at bottom, but about 10 per cent of the body of post rotted off with dry rot in a ring eight to ten inches wide near the ground surface. Posts 4 and 5 practically in a perfect condition.

Fourth 5. Treated with tar band eighteen to thirty inches from base. Posts No. 1 and No. 5 in perfect condition. Posts Nos. 2 and 4 rotted squarely off near the ground surface. Post No. 3 dry rotted from bottom of post to above ground surface, about two-thirds gone.

Fifth 5. Band of petroleum eighteen to thirty inches from base. Post No. 1 almost in perfect condition, enough rot started to be noticed. Post No. 2 beginning to dry rot near surface of the ground; would probably last seven to ten years longer. Posts Nos. 3, 4, and 5 almost as good as new.

Sixth 5. Crude oil two and one-half feet of base, burned off. Posts almost as good as new. No. 1 shows slight beginning of rot underneath the char, but the others are in perfect condition. If properly done, this treatment seemingly would make good posts last indefinitely.

Seventh 5. Tarred two and one-half feet of base, and tar burned off. Post No. 1, one-half body of post rotted off near
ground surface. Post No. 2, good as new. Post No. 3 about one-third rotted off near ground surface. Post No. 4 shows general dry rot from bottom to the surface of the ground. Post No. 5, general dry rot from bottom to the surface of the ground.

Eighth 5. Crude oil band eighteen to thirty inches from bottom, burned off. Posts Nos. 1, 4, and 5 rotted through and broken squarely off an inch or two below the surface of the ground. Nos. 2 and 3, dry rotted from bottom to the surface, and near ground surface one-third to three-fourths gone.

Ninth 5. No treatment. Posts Nos. 1 and 3 show a little dry rot from the bottom to the ground surface. Posts Nos. 2 and 4, rotted three-fourths off. Post No. 5, rotted and broken squarely off at ground surface; apparently has been in this condition for several years.

Tenth 5. Tar band eighteen to thirty inches from bottom and burned off. Posts Nos. 1 and 3 rotted squarely off near surface. Post No. 4, four-fifths gone. Posts Nos. 1 and 5, dry rotted at the bottom, No. 5 being in fair condition near the surface of the ground.

Eleventh 5. Tar twelve inches of base. All five posts show very uniform condition, each being rotted about the same amount from the bottom of the post to the ground surface. This rotting is not large in amount, the maximum being about one-fourth of substance of post.

Twelfth 5. Tar twelve inches of the base and burned off. Post No. 1 in good condition, showing a little dry rot. Post No. 2, all of the part under ground effected with dry rot, being one-half to two-thirds gone. Posts Nos. 3 and 4, from one-fifth to two-thirds rotted away. Post No. 5, rotted and broken squarely off near the ground surface.

Thirteenth 5. No treatment. Post No. 1 rotted and broken off ten inches below the surface. Post No. 2, one-fourth rotted off. Posts Nos. 3 and 4, rotted and broken squarely off
Preservation of Fence Posts.

Plate VII.
(See description on page 18.)
six inches below the surface. Post No. 5, rotted almost through from the surface to the bottom of the post; might last one year longer.

Fourteenth 5. Well charred. Posts Nos. 1 and 2 in fairly good condition, merely showing beginning of rot near the surface. Post No. 3 in good condition. Post No. 4 rotted and broken off one foot below the surface. Post No. 5 shows dry rot from the surface of the ground to the bottom of the post.

Fifteenth 5. Twelve inches of the base dipped in crude oil. Post No. 1, broken off and exchanged last year, was partly destroyed with rot. Post No. 2, broken off this year by accident, was in good condition. Post No. 3 rotted off at surface and changed last year. Post No. 4 in good condition. Post No. 5 rotted off five or six inches below the surface of the ground.

Sixteenth 5. Twelve inches of the base dipped in crude oil, and oil burned. Posts Nos. 1 and 2, dry rot beginning to show near the surface; in fair condition. Posts Nos. 3 and 4, on each side of canal, rotted off about one foot below the surface, or just above where the oil was burned off. Post No. 5, rotted off at surface.

**SUMMARY OF RESULTS.**

The best treatment, and one which was eminently successful in preserving the posts, was dipping the lower ends in crude petroleum and burning off the oil a sufficient distance to come above the ground when set. This seems to drive hot oil into the post, which with the protecting char cover keeps it from decay. The sixteen years had made but slight inroads on the posts thus treated, and they apparently would last indefinitely. This dipping can be done very cheaply, and will undoubtedly pay.
Preservation of Fence Posts.

Simply dipping two and one-half feet of the bottom of the posts in crude oil or in tar did fairly well. The oil seemed a better protection to the posts than did the coal tar. Posts that were well charred by burning came in about third place.

Under our conditions good pitch pine posts, without treatment, will last from twelve to twenty-five years after being set in the ground.

There is little advantage to be gained by simply oiling or tarring a band to protect the post from dry rot where it comes through the ground, and less from any treatment of only a portion below the ground. Such oil band helped preserve the post, but the time taken to apply the oil in this manner would make it more expensive than dipping the entire lower end of the post.

EXPLANATION OF PLATES.

All made from photographs taken June 27, 1907. The posts were set in the ground April 15, 1891, having been treated two or three days before.

PLATE I. Showing the north line of fence looking west from the northeast corner. The men are preparing to pull up post No. 1, which was broken off a few inches below the ground surface. In the second set of five posts, which was the first check untreated, it will be noticed that the first two posts are broken off and lying on the ground.

PLATE II. This shows appearance of the first and second sets of five posts. Each individual post is numbered from one to five in each set and this number corresponds to the same number in the notes. First set, tar coat two and one-half feet of base, one post rotted off. Second set, not treated, three posts rotted off.

PLATE III. Set three, two and one-half feet of the base dipped in crude oil. None broken. Fourth set, tar band eighteen to thirty inches from base. Posts 2 and 4 rotted off.
Fifth set, petroleum band eighteen to thirty inches from base, all in fairly good condition.

Plate IV. Sixth set, treated with crude oil two and one-half feet from base and oil burned off. All in good condition, and would last indefinitely. Seventh set, tar two and one-half feet of base and tar burned off. None broken, but posts 1, 3, 4, and 5, affected with dry rot, have seen their best days.

Plate V. Eighth set (to the right), crude oil band eighteen to thirty inches from base, and oil burned off. This treatment did no good, as three posts were rotted off, and the other two nearly gone. Ninth set (to the left), no treatment. Post No. 5 rotted off. Nos. 2 and 4 practically gone, and the others beginning to decay.

Plate VI. Tenth set (to the right), tar band eighteen to thirty inches from base and tar burned off. Treatment no value, as only one post, No. 5, is in even fair condition. Nos. 1 and 3 broken off and 2 nearly gone. Eleventh set, tar twelve inches of base. All of the posts beginning to dry rot. None broken.

Plate VII. Twelfth set (to the right), tar twelve inches of base and tar burned off. No. 1 in good condition, others all decayed; from one-half to two-thirds gone. Thirteenth set (to left), no treatment. Three posts rotted off, other two almost gone with decay. Fourteenth set (standing in center), treated by burning two and one-half feet of the base until well charred. Posts 1 and 2 just beginning to show decay. No. 3 in good condition. No. 4 rotted off one foot below the surface of the ground. No. 5 shows some decay.