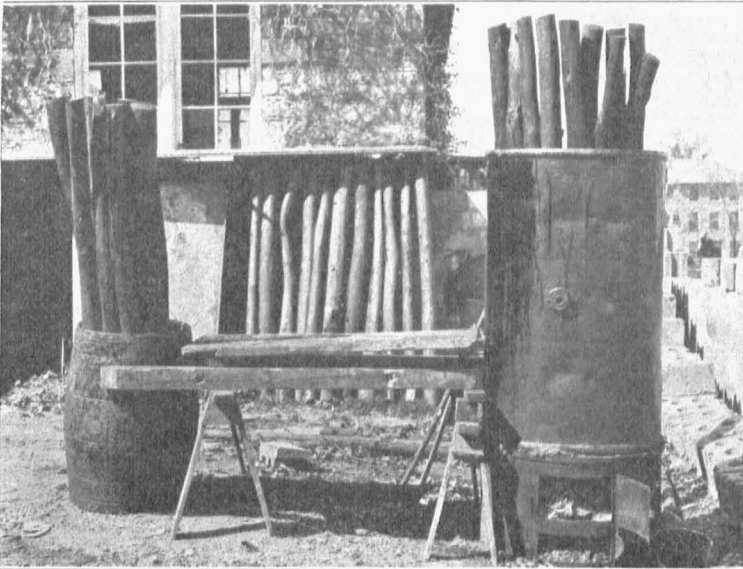


UNIVERSITY OF MISSOURI COLLEGE OF AGRICULTURE
AGRICULTURAL EXPERIMENT STATION

F. B. Mumford, *Director*

Effect of Treatment on Fence Posts

J. C. WOOLEY



Post treating plant for using creosote treatment.

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Effect of Treatment on Fence Posts

J. C. WOOLEY

On the average livestock farm in Missouri $12\frac{1}{2}$ posts are required per acre of land. With an allowance of $1\frac{1}{4}$ cents per post per year the cost per acre for fence posts is 22 cents per year. On the 160-acre farm the annual cost amounts to \$35.20. The purpose of this experiment is to find the varieties and the treatments that will reduce the post year cost to a minimum.

THE PLAN OF THE EXPERIMENT

In the fall of 1913 the preliminary treatments had been completed and the posts were set in the plots as shown on pages 6 and 7.

Varieties.—Twenty-seven more or less common varieties were used in the test. A number of these varieties are not recognized as good post timber, but they were used with the thought that some of these might be favorably affected by some of the different treatments so as to make them useful for fence posts. Twenty-one posts of each variety were secured. These were selected for uniformity of size, peeled and cured before treatments were applied.

Series A.—Three posts of each variety were set without treatment to serve as a check and to secure data on the life of varieties without treatment.

Series B.—The posts in this series were set in screened gravel. The holes were dug as for series A and the screened gravel was used to make the fill around the post.

Series C.—The posts in this series were charred for a distance of 4 feet up from the base.

Series D.—After the posts for this series had been peeled and cured they were given two paint coats of carbolineum, applied hot. Cost per post—peeling 3.1 cents; preservative 0.9 cent; total 4 cents.*

Series E.—This treatment was similar to D except for the preservative. Creosote was used in the same manner as the carbolineum. Cost—peeling 3.1 cents; preservative 1.37 cents; total 4.47 cents.*

Series F.—In this series the posts were submerged in a tank of boiling creosote to a depth of 4 feet. They were kept in this heated creosote for one hour and then submerged in cold creosote to a similar depth for one hour. Cost—peeling 3.1 cents; preservative 6.5 cents; depreciation on plant 1.12 cents; fuel 0.6 cent; labor 1.5 cents; total 12.82 cents.*

Series G.—This treatment was similar to series F except for the time. The posts were kept in the heated creosote for two and one-half

*Labor is figured at 15 cents per hour.

hours and in the cold for a similar length of time. Cost—peeling 3.1 cents; preservative 13 cents; depreciation on plant 1.88 cents; fuel 1 cent; labor 3 cents; total 21.98 cents.*

SERVICE FROM DIFFERENT VARIETIES WHEN USED FOR POSTS

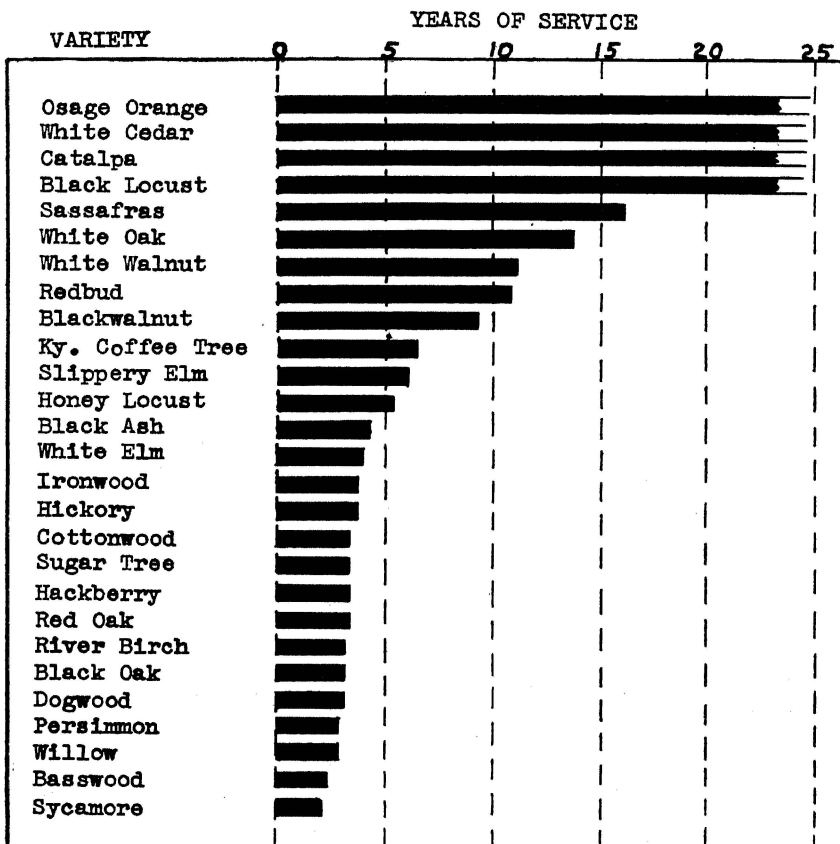


Fig. 2.—An Array of Varieties Based on Their Serviceable Life as Fence Posts When Used Without Treatment.

It is evident that only a few of these varieties would be suitable for fence posts except under special conditions. White oak posts give 13 years of service and if the cost per post year is to be kept below $1\frac{3}{4}$ cents the first cost per post must not be greater than 15 to 18

*Labor is figured at 15 cents per hour.

cents. Where a few posts in a fence line have failed, and where an additional service of 4 or 5 years is expected for the fence, a honey locust, an elm, or other similar variety might be used profitably providing the first cost was less than 9 cents per post.

Series B. Setting in Screened Gravel

Twenty-two varieties have failed in Series A and B so that a comparison can be made to determine the effectiveness of the treatment. Comparing the 66 posts in the check to the 66 having the gravel fill, we find an increase in serviceable life of 10 per cent due to the treatment. Some varieties were more favorably affected than others. Honey locust showed an increase of 100 per cent, red oak 90 per cent, and black locust 59 per cent, while white oak, black walnut and a few other varieties were unfavorably affected by the treatment.

Series C. Charring the Butts of the Posts

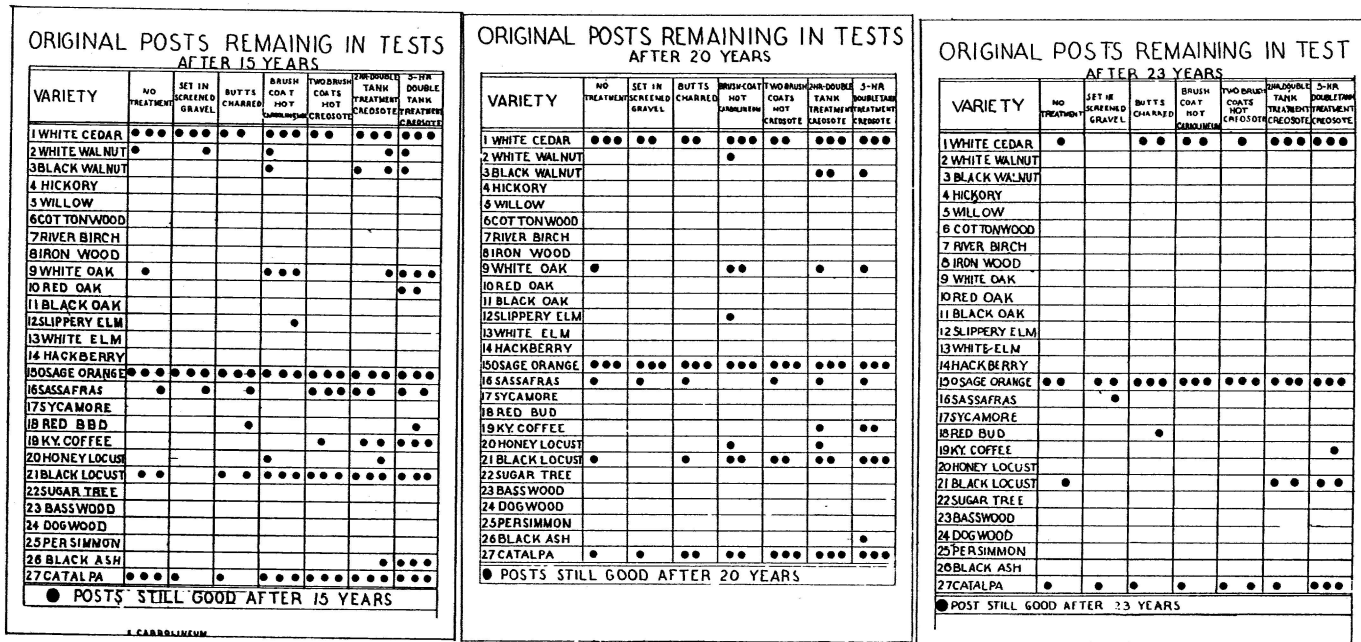
Twenty-four varieties had failed in both the A and C series. The comparison shows that there was a 4.4 per cent increase in the C series. Black locust showed an increase of 90 per cent in the series and the oaks and walnuts seemed to be unfavorably affected by charring. On the whole the practice did not show sufficient gains to make it worth while.

Series D. Painting the Butts of the Posts with Carbolineum

Twenty-three varieties had failed in this series and in the check. A comparison shows an average of 55.4 per cent increase in service due to the treatment. The varieties showing the greatest gain from the treatment are as follows: Honey locust 218 per cent, red oak 166 per cent, hackberry 160 per cent, ironwood 160 per cent, black oak 131 per cent and black locust 89 per cent. This treatment does not require much of an investment in equipment and when figured on the basis of cost per post year it will be found to be profitable on many varieties. The critical areas on fence posts are, first the space included between one foot above and one foot below the surface of the ground and second, the top of the post and perhaps four inches down on the sides from the top. A thorough application of carbolineum to these critical areas could be made for 4 cents per post and would bring good returns.

Series E. Painting the Butts of Posts with Creosote

Twenty-one varieties have failed in this series and the comparison with the check shows a gain for only a few varieties. Honey locust shows a gain of 59 per cent, white oak 15 per cent and other common varieties showed practically no gain from the treatment. This is probably due

ORIGINAL POSTS REMAINING IN TESTS
AFTER 20 YEARS

VARIETY	NO TREATMENT	SET IN SCREENED GRAVEL	BUTTS CHARR'D	FRESH COAT HOT JARULINUM	TWO BRUSH COATS HOT CREOSOTE	2-HR. DOUBLE TANK TREATMENT CREOSOTE	5-HR. DOUBLE TANK TREATMENT CREOSOTE
1 WHITE CEDAR	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●
2 WHITE WALNUT				●			●●●●
3 BLACK WALNUT							●●●●
4 HICKORY							●●●●
5 WILLOW							
6 COTTONWOOD							
7 RIVER BIRCH							
8 IRON WOOD							
9 WHITE OAK	●			●●		●	●
10 RED OAK							
11 BLACK OAK							
12 SLIPPERY ELM				●			
13 WHITE ELM							
14 HACKBERRY							
15 OSAGE ORANGE	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●
16 SASSAFRAS	●	●	●	●	●	●	●
17 SYCAMORE					●	●	●
18 RED BUD							
19 KY. COFFEE							●●
20 HONEY LOCUST				●	●	●	●
21 BLACK LOCUST			●	●●	●●	●●	●●●●
22 SUGAR TREE							
23 BASSWOOD							
24 DOGWOOD							
25 PER SIMMON							
26 BLACK ASH	●	●	●●	●●	●●●●	●●●●	●●●●
27 CATALPA	●	●	●●	●●	●●●●	●●●●	●●●●

● POSTS STILL GOOD AFTER 20 YEARS

ORIGINAL POSTS REMAINING IN TEST
AFTER 23 YEARS

VARIETY	NO TREATMENT	SET IN SCREENED GRAVEL	BUTTS CHARR'D	BRUSH COAT HOT CARBOLINUM	TWO BRUSH COATS HOT CREOSOTE	2-HR. DOUBLE TANK TREATMENT CREOSOTE	5-HR. DOUBLE TANK TREATMENT CREOSOTE
1 WHITE CEDAR	●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●
2 WHITE WALNUT							
3 BLACK WALNUT							
4 HICKORY							
5 WILLOW							
6 COTTONWOOD							
7 RIVER BIRCH							
8 IRON WOOD							
9 WHITE OAK							
10 RED OAK							
11 BLACK OAK							
12 SLIPPERY ELM							
13 WHITE ELM							
14 HACKBERRY							
15 OSAGE ORANGE	●●	●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●
16 SASSAFRAS		●					
17 SYCAMORE							
18 RED BUD				●			
19 KY. COFFEE							●
20 HONEY LOCUST							
21 BLACK LOCUST	●					●●●●	●●●●
22 SUGAR TREE							
23 BASSWOOD							
24 DOGWOOD							
25 PER SIMMON							
26 BLACK ASH							
27 CATALPA	●	●	●	●	●	●●●●	●●●●

● POST STILL GOOD AFTER 23 YEARS

Fig. 4.—Twenty-three years of use leaves only Osage orange, white cedar, catalpa, and black locust, named in the order of their durability.

to the fact that very little penetration was secured with the creosote applied with the brush.

**Series F. Butts of Posts Submerged One Hour in Hot,
and One Hour in Cold Creosote**

Twenty-one varieties have failed in Series F and in the check Series A. The average gain from the treatment on these 21 varieties was 10.7 per cent. The gain on the varieties most favorably affected with the percentage gain over the check was as follows: Willow 300 per cent, black ash 238 per cent, red oak 230 per cent, ironwood 227 per cent, honey locust 176 per cent, river birch 166 per cent, hickory 155 per cent, cottonwood 150 per cent, black walnut 112 per cent and white oak 21 per cent. The real test, however, is not the percentage gain in service but the cost per post year, and many of these varieties show too high a post year cost to be economical.

**Series G. Butts of Posts Submerged Two and One-Half Hours
in Hot, and an Equal Length of Time in Cold Creosote**

Nineteen varieties can be compared in this series and the average gain from the treatment for all was 131.3 per cent. The varieties most favorably affected with the percentage gain over the check were as follows: Red oak 300 per cent, willow 312 per cent, ironwood 300 per cent, black ash 293 per cent, hackberry 230 per cent, hickory 228 per cent, river birch 222 per cent, cottonwood 140 per cent, honey locust 135 per cent, black walnut 89 per cent, and white oak 30 per cent.

TABLE I.—YEARS OF SERVICE FROM DIFFERENT VARIETIES UNDER THE DIFFERENT TREATMENTS.

Variety	Check	Set in Gravel	Butts Charred	Carbo- lineum	Creosote Painted	Creosote 1 Hr. Tank	Creosote 2 ½ Hr. Tank
	A	B	C	D	E	F	G
White Cedar.....	23.3	21.3	x	x			
White Walnut.....	11.0	11.6	8.6	3.3	x	x	x
Black Walnut.....	9.3	7.6	7.3	12.3	10.3	13.0	14.6
Hickory.....	3.6	o	3.6	9.6	10.0	20.0	17.6
Willow.....	2.3	2.6	2.3	4.0	4.6	9.3	12.0
Cottonwood.....	3.3	3.3	2.6	4.0	2.6	8.3	13.0
River Birch.....	3.0	4.6	3.3	o	3.3	8.3	8.0
Ironwood.....	3.6	3.6	3.0	9.6	o	8.0	9.6
White Oak.....	13.6	---	7.0	20.6	3.2	12.0	13.6
Red Oak.....	3.6	6.3	7.0	9.3	8.0	16.6	20.0
Black Oak.....	3.0	4.3	3.3	7.0	4.0	11.0	15.3
White Elm.....	4.0	3.6	3.3	9.6	8.6	13.0	12.0
Hackberry.....	3.3	o	2.0	4.6	4.0	1.0	8.0
Osage Orange.....	x	x	x	x	3.0	6.6	11.0
Sassafras.....	16.0	16.3	13.0	6.6	x	x	x
Sycamore.....	2.0	2.0	6.3	4.0	17.3	17.0	17.6
Redbud.....	10.3	7.3	11.6	9.3	2.0	9.3	8.0
Kentucky Coffee Tree.....	6.3	8.6	8.6	11.0	7.3	14.3	14.3
Honey ocust.....	5.3	11.3	6.0	14.6	14.0	18.0	21.3
Black Locust.....	21.5	11.0	18.0	21.3	9.0	15.6	13.3
Sugar Tree.....	3.3	3.0	3.3	3.6	x	x	x
Basswood.....	2.3	2.0	2.3	2.6	3.6	5.0	7.0
Dogwood.....	3.0	3.3	3.3	6.3	2.0	4.6	8.3
Persimmon.....	2.6	3.0	2.3	3.3	3.6	9.3	12.6
Black Ash.....	4.3	4.6	4.6	6.0	3.3	8.6	8.0
Catalpa.....	x	x	x	x	4.0	14.0	18.6

x—Posts have not failed to date.

o—Posts removed or records not usable.

TABLE 2.—THE COST PER YEAR* OF DIFFERENT VARIETIES WITH DIFFERENT TREATMENTS.

Variety	First Cost	Check	Set in Gravel	Butts Charred	Carbo-lineum	Creosote Painted	Creosote 1 Hr. Tank	Creosote 2½ Hr. Tank
		A	B	C	D	E	F	G
	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents
White Cedar.....	30	1.45	1.61	x	x	x	x	x
White Walnut.....	15	1.73	1.65	2.60	1.61	2.28	2.13	2.54
Black Walnut.....	15	2.20	2.52	3.06	1.87	2.35	1.39	2.10
Hickory.....	10	3.89	---	---	1.46	4.00	2.46	2.67
Willow.....	5	3.90	3.64	5.35	3.25	5.20	1.92	2.08
Cottonwood.....	5	4.22	4.22	4.74	3.25	4.10	2.12	3.38
River Birch.....	8	4.00	2.65	4.63	---	---	2.60	3.12
Ironwood.....	12	4.45	4.50	6.42	2.08	6.40	2.06	2.50
White Oak.....	15	1.40	---	3.19	1.12	2.94	1.67	1.85
Red Oak.....	12	4.45	2.57	2.76	2.15	5.12	2.26	2.22
Black Oak.....	12	5.33	3.76	6.85	2.86	2.38	1.91	2.83
White Elm.....	8	3.00	3.40	4.64	1.67	4.12	1.89	3.76
Hackberry.....	10	4.25	---	8.64	3.90	6.15	3.46	2.90
Osage Orange.....	30	x	x	x	x	x	x	x
Sassafras.....	16	1.25	1.26	1.79	3.62	1.42	1.67	2.16
Sycamore.....	8	6.00	6.00	2.43	4.00	8.25	2.24	3.75
Redbud.....	12	1.55	2.22	1.67	2.15	2.80	1.73	2.37
Kentucky Coffee Tree.....	15	3.02	2.24	2.60	2.10	1.68	1.54	1.74
Honey Locust.....	12	3.02	1.44	3.21	1.37	2.28	1.59	2.78
Black Locust.....	20	1.12	2.20	1.52	1.33	x	x	x
Sugar Tree.....	5	4.22	3.06	3.73	3.61	.375	3.56	3.86
Basswood.....	5	3.90	4.60	5.35	5.00	6.75	3.88	3.25
Dogwood.....	8	4.00	3.70	4.64	4.38	4.60	2.24	2.38
Persimmon.....	8	4.62	4.06	6. 5	4.85	5.00	2.42	3.75
Black Ash.....	12	3.72	3.51	4.20	3.33	5.13	1.77	1.83
Catalpa.....	22	x	x	x	x	x	x	x

*Post year cost is found by dividing the first cost plus the cost of treatment plus setting by the years of service.

x—Indicates posts that have not failed to date.

TABLE 3.—THE MAXIMUM VALUE OF DIFFERENT VARIETIES FOR POST TIMBER
BASED ON WHITE OAK AT 15 CENTS.

Variety	To Be Used Without Treat- ment	To Be Painted with Carbolineum	To be Given One Hour Double Tank Creosote Treatment
	Cents	Cents	Cents
White Cedar.....	32.6	x	x
White Walnut.....	15.4	16.0	5.2
Black Walnut.....	12.9	13.2	11.6
Hickory.....	5.1	9.4	3.8
Willow.....	3.2	1.6	5.2
Cottonwood.....	4.6	1.6	0.0
River Birch.....	4.2	x	0.0
Ironwood.....	5.0	9.4	6.0
White Oak.....	15.0	28.0	15.0
Red Oak.....	5.0	9.0	8.2
Black Oak.....	4.2	5.8	3.8
White Elm.....	5.6	9.4	0.0
Hackberry.....	4.6	2.4	2.4
Osage Orange.....	40.0*	x	x
Sassafras.....	22.4	5.2	11.6
Sycamore.....	2.8	1.6	0.0
Redbud.....	14.4	9.0	0.0
Kentucky Coffee Tree.....	8.7	11.4	3.0
Honey Locust.....	7.2	16.2	5.6
Black Locust.....	30.0	22.0	x
Sugar Tree.....	4.6	1.0	0.0
Basswood.....	3.2	0.0	0.0
Dogwood.....	4.2	4.8	4.6
Persimmon.....	3.6	0.6	0.0
Black Ash.....	6.0	4.4	13.0
Catalpa.....	33.0*	x	x

*Estimated after inspection of posts.

SUMMARY

If we establish 1¾ cents as the maximum post year cost allowable, then only a limited number of varieties and treatments are feasible.

Osage Orange.—This variety is economical without treatment.

Since no posts have failed to date it is not possible to calculate what the value of treatments will be. This variety is not well adapted to use with board fences on account of the difficulty of nailing.

Catalpa.—There have been no complete failures in any series and the value of treatments on this variety cannot be determined. If the proper variety "Catalpa Catalpa" is secured the post is economical without treatment.

White Cedar.—Economical without treatment. Posts have not failed to date so no measure of value of treatments is given.

Black Locust.—Cost slightly less per year without treatment. Cost about the same for post year when treated with carbolineum treatment. Creosote treatments have not failed to date.

White Oak.—Satisfactory without treatment. Most economical with the carbolineum treatment.

Sassafras.—Satisfactory without treatment but shows some increase in economy with the carbolineum treatment.

White Walnut.—Should be given the carbolineum treatment to give sufficient life to be economical.

White Elm.—Economical only when given the carbolineum treatment.

Honey Locust.—Economical only when treated with carbolineum or creosote.

Other Varieties Not Included in the Above Tests

Red Cedar.—"Durable without treatment even under conditions favorable to decay." Probably improved by treatment.*

Yellow Pine.—Satisfactory when properly treated.

*Wood Handbook, U. S. Department of Agriculture.