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FOREIGN WOODS

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ATHEL TAMARISK  
Tamarix aphylla (L.) Karst.  
(= T. articulata Vahl.)  
Family: Tamaricaceae

By

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The name Tamarix was derived from Tamaris (now Tambro), the name of a river in Spain on the border of the Pyrenees, in the vicinity of which species of Tamarix abounded. About 75 species of shrubs and trees of this genus are native to western and southern Europe, northeastern Africa, western Asia, and Japan (4, 5, 7, 11)<sup>2</sup> and some of the species have been widely distributed (1, 3, 10, 12, 13).

Tamarix aphylla was introduced at the Arizona Agricultural Experiment Station, Tucson, in the early 1900's; later numerous plantings were made in southern Arizona, Texas, and California where the climate was hot and dry, with strong sunlight. Tamarisk may be killed or damaged by temperatures below 16° to 20° F. (6, 15).

<sup>1</sup>Maintained at Madison, Wis., in cooperation with the University of Wisconsin.

<sup>2</sup>Underlined numbers in parentheses refer to the list of numbered references at the end of the report.



## The Tree

Tamarisk (Tamarix aphylla) of the family Tamaricaceae (5) grows naturally in hot, dry climates. It is the only species of the genus that is evergreen and attains the height and size of a large tree (15). It often makes notably rapid growth and when once established is drought and alkali resistant, but it thrives best in medium to light loam soil and responds with the most vigorous growth when planted on good sites or where there is a high water table or irrigation. It is easily propagated from cuttings of the last year's wood (8, 15).

Trees are valued as ornamentals and shade trees because they may produce many spreading branches and dense, rounded crowns (4). They are notable for the bluish or grayish green, feathery, drooping growth of their foliage-like twigs. The trees are also valued for shelterbelts or wind-breaks, binders of sandy soil, and sources of fence posts, lumber, and fuel (2, 4, 12, 16, 17).

### Leaves

Tamarisk, also known as evergreen athel, has wiry, jointed twigs that are sometimes mistaken for leaves. The joints are composed of scale leaves about 1/16 inch long, each circling the twig and ending in a minute point (4). Twigs and leaves may be salty to the taste on trees growing on highly alkaline soils (3, 15).

### Flowers and Fruit

The flowers are very small. They are light pink in color, less than 1/16 inch long, and occur in slender, branched clusters (4), suggesting pearls. They appear in profusion in August in Arizona.

The fruit is a small capsule; the seeds do not germinate so far as is known (4, 16).

### Bark

The bark is rather smooth and grayish-brown in color (15).

### Roots

Tamarisk does not develop tap roots extensively but forms laterals that range for considerable distances away from the tree trunk and are found at depths of 8 to 24 inches (9, 16).

## Size

Trees may attain heights of 60 feet or more and diameters of 2 to 3 feet (16). Under favorable conditions trees may grow 10 to 18 feet in height and 1 to 2 inches in diameter in a year (15).

Fence-post material may be grown in 5 to 8 years, with 10 to 20 years required to produce sawlog size. An exceptionally well situated tree in Arizona measured 22 inches in diameter after 11 years of growth (2, 15, 16).

## Management Experiments

Although erect-growing, tamarisk, instead of producing a single vertical trunk, tends to send up several large trunks or branches that, though they appear nearly straight, have considerable curvature.

In 1942, the Arizona Agricultural Experiment Station at Tucson set out over 2,000 cuttings in the Yuma Valley where the water table is shallow and it was thought that irrigation would not be needed after 1 or 2 years. Most of the planting was on sandy soil on which farm crops had not succeeded; a few were on alfalfa land.

## Spacing

The trees were spaced 2.5, 5, and 8 feet apart. Nine plots were arranged for differential treatments. Some rows were reduced to single-shoot plants in June, some in September. The latter practice was found to be better (16). Growth was quite uniform for about 8 months; the trees were dormant November to February.

Trees grew to about 8 feet in height the first year and 13 to 21 feet the second year. The trees spaced 2.5 feet apart produced straight, vertical trunks. Those 5 and 8 feet apart produced poorly shaped trees, like apple trees with no main vertical stem (16).

## Pruning

Considerable pruning was carried out twice a year except on check trees that were also used as windbreaks. Large, competing limbs were cut back or removed (16).

## Thinning

In June the second year some rows of trees were thinned by removing every second tree. Time indicated that far more thinning should have been done (16).

## Discussion of Results

The best group of about 250 trees grew rapidly to about 40 feet in height, but they were very slender with a ratio for height to diameter of 110 to 1. At 4 years of age they were topped at about 18 feet and further thinnings were made, but still not enough thinning was done. The trees grew on in height, the crowns making a tight canopy. Three years later the trees were again topped and thinned, and after still another 3 years this was repeated. Diameter growth was nevertheless very slow except in some of the better situated trees. It was concluded that the thinning after the first 2 years should have been more drastic and that topping did not appear to be desirable (16).

Other conditions also interfered with the experiment. A severe salt incrustation on the leaves turned them gray. Analysis of the incrusting deposit showed that all the salts present in the ground water were present in the incrusting salts but not in the same proportion as in the soil. The trees became defoliated and dormant. Nutrients were found to be scanty in the soil in these plots. Some response to the addition of various fertilizers and particularly to the addition of nitrogen was obtained.

It was concluded from the experiments that vertical tamarisk trees can be grown in plantations by close spacing, in east-west rows, and with the use of successive drastic thinnings. The tree rows should be placed about 15 feet apart instead of 8 (16).

## The Wood

### Color

The wood is creamy white without colored heartwood (15).

### Weight

The average specific gravity, based on green volume and oven-dry weight, is about 0.62 or 38 pounds per cubic foot (table 1).

### Grain, Texture, Figure

The grain is often interlocked. Excellent "silver grain" figure or a mottled or wavy appearance is obtained by quarter sawing, due chiefly to the characteristic, abundant, large rays. When polished, the wood exhibits a bright sheen or luster. Veneer has been called soft in texture when steamed, but it becomes very hard when dried (15).

### Mechanical Properties

Limited tests of Arizona tamarisk made at the U. S. Forest Products Laboratory during 1939-40 gave the results presented in table 1. From the standpoint of general strength properties, tamarisk compares favorably with beech, birch, sugar maple, and oak. It rates as very heavy, very hard, strong, and moderately stiff, with high shock resistance. The wood splits readily when it is first cut (15).

### Seasoning and Shrinkage

Volumetric shrinkage of tamarisk has been found to be about 14.2 percent in drying from the green to the ovendry condition. Tangential shrinkage is high, 12.4 percent as compared to radial shrinkage of 2.7 percent as measured on wood with an average growth of 2.6 rings per inch. As a result of this difference in directional shrinkage, logs may check badly if not manufactured at once. Flat-sawed, slash, or tangential-cut boards tend to cup and warp, but quartersawing produces boards with better dimensional stability. If the bark is left on post stock, it tends to reduce checking.

### Workability

Tamarisk splits readily when green. The wood is somewhat difficult to machine, but with care it can be turned satisfactorily and is capable of taking a high polish and producing attractive furniture and novelties (15).

### Durability

Tamarisk needs preservative treatment when used under conditions favorable to decay. It is readily treated with creosote. A life of 15 to 20 years in service has been reported for treated fence posts (15).

### Uses

Tamarisk is well suited for fence posts, as it grows rapidly and is easily given preservative treatment with creosote. Even unheated creosote

penetrates well longitudinally through the pores or vessels when the wood is treated at summer temperatures. Good posts can often be made from limbs, as well as from the main bole of the trees. As many as 100 posts have been obtained from one large tree (15). Posts may be produced at a cost of about 7 cents each (14).

The use of living tamarisk for windbreaks has been very successful (15).

The possibilities for the use of tamarisk for fine furniture, interior finish, and novelties depend, to a considerable extent, upon ability to obtain the proper sizes of defect-free logs from trees grown as forest trees rather than as the common, many-branched forms. The light color of the wood is an important asset, but proper handling and manufacture are also very important. Quartersawn or radially sliced veneer displays the "silver grain" or ray figure of the wood to advantage, and this method of cutting is helpful in controlling the effect of the characteristic differential shrinkage of the wood. It is reported that fine custom-built furniture of tamarisk has been produced and has aroused wide interest in this use (15).

#### Chemical Constitution

Because of interest in the possible use of tamarisk for pulp, a chemical analysis of the wood from one tree of Tamarix articulata (= T. aphylla) was made a number of years ago by the Pulp and Paper Division of the U. S. Forest Products Laboratory. Results are given below and indicate that the percentage of cellulose and alpha-cellulose is rather low and the percentage of extractive rather high.

Total cellulose.....	47.6 percent
Alpha-cellulose.....	37.1 percent
Lignin.....	19.5 percent
Total pentosans.....	17.9 percent

#### Extractives

By treatment with alcohol- benzene mixture.....	8.2 percent
By ether extraction.....	0.6 percent
By hot-water extraction.....	14.9 percent
By extraction with a 1 per- cent caustic soda solution..	24.8 percent

The lignin content is also comparatively low.

The cellulose is lower than is normally found in most species considered satisfactory for pulping.

The pulp produced from tamarisk had a good color; but the high extractive content (other than ether extractive), together with low total cellulose and alpha-cellulose content and the large amount of parenchyma tissue present, would reduce the economic value of the wood for paper pulp, cellulose, or rayon manufacture. The pulp might find use as filler stock for book and magazine papers.

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Table 1.--Strength properties of tamarisk (*Tamarix aphylla* (L.) Karst)<sup>1</sup>

Property	Green	Air dry
Moisture percent.....	86.9	12.0
Specific gravity - Vol. at test, oven-dry weight....	0.62	0.67
Vol. oven-dry, oven-dry weight....	0.71	.....
Shrinkage, green to oven-dry		
Radial.....	2.7	.....
Tangential.....	12.4	.....
Volumetric.....	14.2	.....
Average growth rate - rings per inch.....	2.6	.....
Static bending		
Fiber stress at proportional limit.....p.s.i.:	4,700	5,800
Modulus of rupture.....p.s.i.:	8,600	13,200
Modulus of elasticity.....1,000 p.s.i.:	1,020	1,380
Work to proportional limit....in.-lb. per cu. in.:	1.22	1.35
Work to maximum load.....in.-lb. per cu. in.:	11.5	13.5
Work, total.....in.-lb. per cu. in.:	22.5	23.4
Impact bending - 50-pound hammer		
Fiber stress at proportional limit.....p.s.i.:	11,120	17,060
Work to proportional limit....in.-lb. per cu. in.:	4.7	9.8
Drop causing complete failure.....in.:	38	40
Compression parallel to grain		
Fiber stress at proportional limit.....p.s.i.:	2,790	3,720
Maximum crushing strength.....p.s.i.:	3,860	6,200
Compression perpendicular to grain		
Stress at proportional limit.....p.s.i.:	860	690
Hardness -- ball test		
End.....lb.:	1,220	1,670
Side.....lb.:	1,300	1,440
Shear parallel to grain		
Maximum shearing strength.....p.s.i.:	1,580	2,260
Tension perpendicular to grain		
Maximum tensile strength.....p.s.i.:	980	1,140
Cleavage		
Load to cause splitting.....lb. per in. of width:	500	600

<sup>1</sup>Data from limited tests made at the Forest Products Laboratory, Madison, Wis., 1939-40.