AMERICAN PULPWOODS

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Published in
Pulp and Paper Magazine of Canada
1923
The Forest Products Laboratory, Madison, Wisconsin, has in the past received frequent requests as to the suitability of various woods for pulp and paper production and it has therefore seemed advisable to prepare for publication some of the available data on this subject. The Laboratory has carried on an extended investigation over a period of more than ten years and has collected experimental pulping data on practically all the possible species of American pulp woods. These data, insofar as the chemical pulps are concerned, have mainly been obtained from experimental cooks made at the Forest Products Laboratory, Madison, Wisconsin, in 100-pound semi-commercial digesters and from studies made on the resulting pulps. It has been found, however, that the general cooking conditions, yield, bleach, consumption, etc., as determined by experimental

*This is the revision of an article of the same title by Dr. Otto Kress, Sidney D. Wells, and Vince P. Edwardes, published in Paper, July 30, 1919, in which thirty new species have been added and many of those in the original article changed to conform with later experience.

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trials for pulp made from any given wood, compared quite favorably with the results obtained in commercial practice. The data for the various mechanical pulps were obtained from the experiments carried on at the ground-wood laboratory, Wausau, Wisconsin, where a commercial-sized grinder equipment was installed by the Forest Products Laboratory in cooperation with the American Paper and Pulp Association.

The yield of pulp from any given wood depends directly upon the specific gravity of the wood or weight per cubic foot and the pulping method employed. By varying the severity of the pulping treatment both yield and bleach consumption are changed. For example, white spruce sulphite pulp prepared for the manufacture of newsprint paper, would show an entirely different yield and bleach consumption from bleached white spruce pulp prepared for use in a white bond paper. It is therefore, evident that the character and use of the pulp will largely decide the severity of the cooking operation.

Certain woods, such as western larch, containing a high percentage of galactan, which is water-soluble, will show a decreased yield by either mechanical or chemical pulping.

Pulping data have been given for woods such as red and white oak, white ash and certain other woods not because we consider these species suitable for pulp purposes, but because the information was available. Many wood-using plants produce considerable tonnage of slabs and mill waste of woods not especially suitable for pulp production, and are interested in a possible outlet for this waste. In some cases, at their direct request, pulping trials have been made on woods known to be unsuitable for pulping purposes. Pulping data on trials made at the Laboratory have been included for two
foreign woods; viz., Norway spruce and Scotch pine which are quick growing woods of possible interest for planting purposes. The various woods have been listed, giving the official name as recognized by the Forest Service, also the common names in use and the range covering the growth of that particular species. This information has been taken directly from the "Check List of the Forest Trees of the United States", by George B. Sudworth.

In considering the pulping and other data given for the various woods, attention is drawn to the following points:

1. The weights of wood given are for bone-dry material per solid cubic foot. This is obtained by multiplying the specific gravity of the oven-dried wood based on the green volume by 62.3 lbs. (the weight of a cubic foot of water).

2. The fiber lengths as given are the average of all the available data taken from the Forest Service investigations and from other sources. Many of the measurements given are the results of averages of thousands of determinations; in other cases from only a few determinations.

3. The yield figures represent the yield of bone-dry screened and unbleached pulp per hundred cubic feet of solid bone-dry wood. For the purposes of this article, it has been assumed that the ordinary cord of rossed wood piled 4' x 4' x 8' is equivalent to 100 solid cubic feet of wood. To convert the yields on bone-dry basis to air-dry pulp containing 10 per cent moisture, divide the yield by 0.9.
The yield data are based on results obtained from experimental runs made under very favorable conditions. The pulp logs on arrival at the Laboratory are barked, sawed into convenient size and any wood containing knots and decayed spots is rejected. The chips are carefully sorted and are far more uniform in size and moisture content than can be obtained in commercial practice unless the mills operate under more favorable conditions than ordinarily exist. Further, each cook representing an individual experiment, it is possible to press, shreds, sample and screen the pulp with fewer mechanical losses than is feasible in handling the pulp in commercial practice from the blow pit to the wet machine or to the finished paper.

4. The comparison of the character and uses of the various pulps that may be obtained from the different woods offers certain difficulties. It has, therefore, been decided to consider white spruce as the standard wood for pulping by the sulphite, sulphate, and mechanical processes and to compare the pulp that might be obtained from any given wood by this process of pulping with the pulp obtained from white spruce. Aspen wood has likewise been adopted as the standard for reduction by the soda process, and soda pulps from other woods will be compared with it. Sulphate pulps made from deciduous woods bleach with greater ease economy than the corresponding soda pulps.

The bleachability of sulphate pulps has been given since recent work has demonstrated that with proper methods
and equipment sulphate pulps from many coniferous woods can be bleached with average amounts of bleaching powder to a very satisfactory white.

Further, no data are given on the possible soda pulping of the various firs, pines, hemlocks, larch, tamarack and other woods that can be reduced by the sulphate process. The Laboratory has made extensive pulping trials on the reduction of these woods by the soda process and it is, of course, recognized that this process can be and is at present employed to a limited extent for reduction of certain of these woods. In general, the soda process can be used for reduction of any wood suitable for the production of sulphate pulp.

No figures have been given for bleach consumption. It has appeared advisable to compare the ease of bleaching for any given pulp with the standard white spruce sulphite and aspen soda pulp.

The data given must, of course, be interpreted with the understanding that the figures and results are based on experimental pulping trials. We believe that it may be of interest if used with this reservation for comparing the character and yields of pulps that may be expected from different woods.

THE SPRUCES

BLACK SPRUCE -- Picea mariana. Wt. 23 lbs. Fiber 2.6 m.m.

Range -- Newfoundland and to Hudson Bay and northwestward to the Mackenzie River; southward in Michigan, Wisconsin, Minnesota, and in the eastern mountains to North Carolina and Tennessee.
Common Names -- Black spruce (N.H., Vt., Mass., R.I., N.Y., Pa., W. Va., N.Ca., S.Ca., Wis., Mich., Minn., Ont., Eng.); Double spruce (Me., Vt., Minn.); Blue spruce (Wis); Spruce (Vt.); White spruce (W.Va.); Yew pine (W.Va.); Juniper (N.Ca.); Spruce pine (W.Va., Pa.); He balsam (Del., N.Ca.); Epinette jaune (Quebec); Water spruce (Canada, Me.)

**Sulphite Pulp**

Yield -- 1,050 lbs.

Character -- Easily pulped; easily bleached; excellent strength and color.

Possible uses -- Same as white spruce.

**Sulphate Pulp**

Yield -- 1,150 lbs.

Character and uses -- Similar to white spruce.

**Mechanical Pulp**

Similar to white spruce.

**BLUE SPRUCE -- Picea parryana.** Wt. 23 lbs. Fiber 2.8 m.m.

Range -- Central Rocky Mountain region -- Colorado, Utah, and Wyoming.

Common Names -- Parry's spruce (Utah); Blue spruce (Colo.); Spruce balsam (Colo., Utah); White spruce (Colo., Utah); Silver spruce (Colo.); Colorado blue spruce (Colo.); Prickly spruce (lit.).

**Sulphite Pulp**

Yield -- 1,050 lbs.

Character -- Easily pulped; easily bleached; excellent strength and color.

Possible uses -- Same as white spruce.

**Sulphate Pulp**

Yield -- 1,150 lbs.

Character and uses -- Same as white spruce.

**Mechanical Pulp**

Similar to white spruce.
ENGELMANN SPRUCE -- Picea engelmanni. Wt. 21 lbs. Fiber.

Range -- Northern Arizona and through the Rocky Mountain region to British Columbia.

Common Names -- Engelmann's spruce (Utah); Balsam (Utah); White spruce (Oreg., Colo., Utah, Idaho); White pine (Idaho); Mountain spruce (Mont.); Arizona spruce (Cal. lit.).

Sulphite Pulp

Yield -- 990 lbs.

Character -- A little hard to pulp; excellent strength; excellent color.

Possible uses -- Same as white spruce.

Sulphate Pulp

Yield -- 1,000 lbs.

Character and possible uses -- Similar to white spruce.

Mechanical Pulp

Yield -- 2,000 lbs.

Character -- Strong fiber of good color.

Possible uses -- Same as white spruce.

NORWAY SPRUCE -- Picea excelsa. Wt. 30 lbs.

Range -- From the Urals and Lapland to the Pyrenees and Alps.

Common Names -- Spruce fir, Common spruce, White fir.

Sulphite Pulp

Yield -- 1,350 lbs.

Character -- Slightly more difficult to reduce than white spruce; good strength and color.

Possible uses -- Same as white spruce.

Sulphate Pulp

Yield -- 1,200 lbs.
Character -- Easily pulped; good strength.
Possible uses -- Same as white spruce.

Mechanical Pulp
Probably the same as the other spruces.

RED SPRUCE -- Picea rubens. Wt. 24 lbs. Fiber 3.7 m.m.

Range imperfectly known.

Common Names -- Red spruce; Yellow spruce (N.Y.); North American red spruce (foreign lit.).

Sulphite Pulp
Yield -- 1,080 lbs.
Character -- Easily pulped; good strength; easily bleached; excellent color.
Possible uses -- same as white spruce.

Sulphate Pulp
Yield -- 1,150 lbs.
Character -- High-grade strong fiber.
Possible uses -- same as white spruce.

Mechanical Pulp
Yield -- 2,400 lbs.
Character -- Excellent strength and color.
Possible uses -- similar to white spruce.

SITKA SPRUCE -- Picea sitchensis. Wt. 24 lbs. Fiber 3.5 m.m.

Range -- Coast region (extending inland about fifty miles from Alaska to northern California (Mendocine County).

Common Names -- Tideland spruce (Cal., Ore., Wash.); Menzies' spruce; Western spruce; Great Tideland spruce (Cal. lit.).

Sulphite Pulp
Yield -- 1,080 lbs.
Character -- Easily pulped; easily bleached; excellent
strength and color.
Possible uses -- Same as white spruce.

Sulphate Pulp

Yield -- 1,150 lbs.
Character and uses -- Similar to white spruce.

Mechanical Pulp

Yield -- 2,040 lbs.
Character -- Slightly grayish color.
Possible uses -- Similar to white spruce.

WHITE SPRUCE -- Picea canadensis. Wt. 24 lbs. Fiber 2.8 m.m.

Range -- Newfoundland to Hudson Bay and northwestward to Alaska; southward to northern New York, Michigan, Wisconsin, Minnesota, South Dakota, Montana, and British Columbia.

Common Names -- White spruce (Vt., N.H., Mass., N.Y., Wis., Mich., Minn., Ont.); Single spruce (Me., Vt., Minn.); Bog spruce (New Eng.); Skunk spruce (Wis., Me., New Eng., Ont.); Cat spruce (Me., New Eng.); Spruce (Vt.); Pine (Hudson Bay); Double spruce (Vt.).

Sulphite Pulp

Yield -- 1,030 lbs.
Character -- Easily pulped; easily bleached; excellent strength and color.
Possible uses -- White spruce is considered the standard sulphite pulpwood and is used for news, wrapping, book, high-grade printings, etc.

Sulphate Pulp

Yield -- 1,150 lbs.
Character -- Very strong fine fiber.
Possible uses -- Highest grade of kraft paper and strong fiber board.
Mechanical Pulp

Yield -- 2,400 lbs.

Character -- Excellent strength and color.

Possible uses -- For practically every purpose where groundwood pulp is required.

THE PINES

LIMBER PINE -- Pinus flexilis. Wt. 23 lbs. Fiber.

Range -- Rocky Mountain region from Montana to western Texas (Guadalupe and Limpia mountains) and New Mexico; in mountains of northern Arizona, Utah, Nevada, and California (Inyo Mountains and Mount Sillman).

Common Names -- White pine (Cal., Nev., Utah, Colo., N.Mex.); Pine (Utah, Mont.); Bull pine (Colo.); Rocky Mountain white pine (Cal.); Rocky Mountain pine; Limbed-twig pine (Cal. lit.); Western white pine (Cal. lit.) Arizona flexilis pine.

Sulphite Pulp

Yield -- 1,000 lbs.

Character -- Difficult to pulp and bleach; fair strength but shivey and poor color.

Possible uses -- Few.

Sulphate Pulp

Yield -- 1,040 lbs.

Character -- Good strength and color; fairly easily bleached.

Possible uses -- Similar to white spruce.

Mechanical Pulp

Probably the same as white pine.

PINON PINE -- Pinus edulis. Wt. 31 lbs. Fiber 2.0 m.m.

Range -- From Colorado (eastern base Pikes Peak) through New Mexico and to western Texas (mountains.)
Pinon pine (Colo.); New Mexican pinon (lit.).

Sulphite Pulp
Yield -- 1,330 lbs.
Character -- Easily pulped; difficult to bleach.

Sulphate Pulp
Fair strength, somewhat shivey, and fair color.
Yield -- 1,300 lbs.
Character and uses -- Similar to white spruce.

Mechanical Pulp
Probably the same as white pine.

SUGAR PINE -- Pinus lambertiana. Wt. 23 lbs. Fiber 4.1 m.m.

Range -- Coast region from Oregon (head of McKenzie and Rogue rivers) to California (Sierra Nevada Mountains and coast ranges to Santa Lucia Mountains; San Bernardino and Cuyamaca mountains.).

Common Names -- Sugar pine (Cal., Oreg.); Big Pine; Shade pine (Cal.) Great sugar pine; Little sugar pine; Gigantic pine (Cal. lit.); Purple-cones sugar pine.

Sulphite Pulp
Yield -- 1,010 lbs.
Character -- Easily pulped; a little difficult to bleach; poor strength; fair color.
Possible uses -- Dark colored wrappings.

Sulphate Pulp
Yield -- 1,150 lbs.
Character -- Fairly easily bleached.
Possible uses -- Similar to white spruce.

Mechanical Pulp
Probably the same as white pine.
WHITE PINE -- Pinus strobus. Wt. 22 lbs. Fiber 3.8 m.m.

Range -- From Newfoundland (White Bay region) and along the northern shores of St. Lawrence Gulf to northern Ontario (near Abitibi and Nipigon lakes) southern Manitoba (near southern end of Lake Winnipeg); southward through Northern and Eastern Minnesota, Northeastern (Mitchell county) and eastern border of Iowa (to Scott county), northern (counties) Illinois, southern shores of Lake Michigan, southern Michigan (North of Allegan, Eaton, and St. Clair counties), northeastern and eastern (border counties) Ohio, Georgia (Tallulah Falls).


Sulphite Pulp

Yield -- 1,210 lbs.

Character -- Difficult to pulp; difficult to bleach; fair strength, but shivey and poor color.

Possible uses -- Few.

Sulphate Pulp

Yield -- 1,100 lbs.

Character -- Excellent strength and color; fairly easily bleached.

Possible uses -- Similar to white spruce.

Mechanical Pulp

Yield -- 1,890 lbs.

Character -- Good strength and color, but pitchy.

Possible uses -- Similar to white spruce.

JACK PINE -- Pinus divaricata. Wt. 24 lbs. Fiber 2.5 m.m.

Range -- New Brunswick to New Hampshire and west through Great Lake and Hudson Bay (Southern shores) region to
Great Bear Lake, Mackenzie River, and Rocky Mountains; south into northern Maine, northern New York, northern Indiana and Illinois, and central Minnesota.

Common Names -- Scrub Pine (Me., Vt., N.Y., Wis., Mich., Minn., Ont.); Gray pine (Vt., Minn., Ont.); Jack pine (Mich., Minn., Canada); Princess pine (Ont.); Black jack pine (Wis.); Black pine (Minn.); Cypress (Hudson Bay); Canada Horn-cone pine (Cal., lit.); Chek pine; Sir Joseph Bank's pine (Eng.); "Juniper" (Canada); Bank-sian pine (lit.).

Sulphite Pulp
Yield -- 1,080 lbs.
Character -- Not easily pulped; very difficult to bleach; fair strength; poor color; pulp shivey and full of pitch.
Possible uses -- Mechanical difficulties when running this pulp over the paper machine prevent its use.

Sulphate Pulp
Yield -- 1,150 lbs.
Character -- Very strong tough fiber; fairly easily bleached.
Possible uses -- Similar to white spruce.

Mechanical Pulp
Yield -- 2,130 lbs.
Character -- Gray, somewhat soft, good strength, pitchy, poor finish.
Possible uses -- Medium grades of groundwood.

LOBLOLLY PINE -- Pinus taeda. Wt. 30 lbs. Fiber 3.0 m.m.

Range -- South Atlantic and Gulf States from New Jersey (Cape May), southern Delaware and West Virginia (Wood, Mineral, Hampshire, and Hardy counties) to central Florida (Cape Malabar and Tampa Bay) and west to eastern Texas (Colorado River; in Bastrop County); northward into
southeastern Indian Territory, Oklahoma, Arkansas, and southern border of Middle and West Tennessee.

Common Names -- Loblolly pine (Del., Va., N.C., S.C., Ga., Ala., Fla., Miss., La., Tex., Ark.,); Oldfield pine (Del., Va., N.C., S.C., Ga., Ala., Fla., Miss., La., Tex., Ark.); Torch pine (Eng. lit.); Rosemary pine (Va., N.C., in part); Slash pine (Va., N.C., in part); Longschat pine (Del.); Longshucks (Md., Va.); Black slash pine (S.C.); Frankincense pine (lit.); Shortleaf pine (Va., N.C., S.C., La.); Bull pine (Texas and Gulf region); Virginia pine; Sap pine (Va., N.C.); Meadow pine (Fla.); Cornstalk pine (Va., Md.); Black pine (Va., Foxtail pine (Va., Md.); Indian pine (Va., N.C.); Spruce pine (Va., in part); Bastard pine (Va., N.C.); Yellow pine (north Ala., N.C.); Swamp pine (Va., N.C.); Longstraw pine (Va., N.C., in part).

Sulphite Pulp

Yield -- 1,140 lbs.

Character -- Easily pulped; difficult to bleach; good strength and color.

Possible uses -- As a substitute for white spruce.

Sulphate Pulp

Yield -- 1,420 lbs.

Character -- Fairly easily bleached; strong but coarse fiber.

Possible uses -- Similar to white spruce.

Mechanical Pulp

Yield -- 2,450 lbs.

Character -- Short fiber and very pitchy.

Possible uses -- Only when mixed with better grades of groundwood fibers.

LODGEPOLE PINE -- Pinus murrayana. Wt. 24 lbs. Fiber 2.3 m.m.

Range -- From Alaska (Yukon River) and southward through interior British Columbia; the mountains of Washington
and Oregon to California (Sierra Nevada Mountains to San Jacinto Mountains); plateau east of the Rocky Mountains (latitude 56) and south through the Rocky Mountain region to New Mexico and Northern Arizona. Also Coast region from Alaska to California (Mendocino county).

Common Names -- Tamarack (Wyo., Utah, Mont., Cal.); Prickly pine (Utah); White pine (Mont.); Black pine (Wyo.); Lodgepole pine (Wyo., Mont., Idaho); Spruce pine (Colo., Idaho, Mont.); Tamarack pine (Cal.); Murray pine (Cal. lit.); Scrub pine; Knotty pine; Sand pine; (Oreg.); Bolander's pine; Henderson's pine; North Coast Scrub pine (Cal. lit.).

Sulphite Pulp

Yield -- 1,080 lbs.

Character -- Easily pulped; a little hard to bleach; excellent strength and color.

Possible uses -- As a substitute for white spruce.

Sulphate Pulp

Yield -- 1,120 lbs.

Character and uses -- Same as white spruce.

Mechanical Pulp

Yield -- 2,140 lbs.

Character and uses -- A little pitchy, but otherwise similar to white spruce.

NOTE -- The lodgepole pine which grows in the lowlands in the coastal region is very similar to jack pine. The Rocky Mountain region lodgepole pine, however, contains much less pitch and is to be preferred for sulphite and mechanical pulps.

LONGLEAF PINE -- Pinus palustris. Wt. 34 lbs. Fiber 3.7 mm.

Range -- Coast region, from southern Virginia (Norfolk) to Florida (Tampa Bay and Cape Canaveral) to eastern Texas (Trinity River); northward in Alabama to the northeastern part of the state (Clay and Walker counties) and northwestern (border counties) Georgia.
Common Names -- Long-leaved pine (Va., N.C., S.C., Ga., Ala., Fla., Miss., La., Tex.); Southern pine (N.C., Ala., Miss., La.); Yellow pine (Del., N.C., S.C., Ala., Fla., La., Tex.); Turpentine pine (N.C.); Rosemary pine (N.C.); Brown pine (Tenn.); Hard Pine (Ala., Miss., La.); Georgia pine (general, Del.); Fat pine (Southern States); Southern yellow pine (general); Southern hard pine (general); Southern heart pine (general); Southern pitch pine (pine general); Heart pine (N.C. and South Atlantic region); Pitch pine (Atlantic region); Long-leaved yellow pine (Atlantic region); Long-leaved pine (general); Heart pine (N.C. and South Atlantic region); North Carolina pitch pine (Va., N.C.); Georgia yellow pine (Atlantic region); Georgia heart pine (general); Georgia long-leaved pine (Atlantic region); Georgia pitch pine (Atlantic region); Florida yellow pine (Atlantic region); Long-leaved yellow pine (Atlantic region); Long-leaved pine (Atlantic region); Texas yellow pine (Atlantic region); Texas long-leaved pine (Atlantic region).

**Sulphite Pulp**

Yield -- 1,840 lbs. (crude pulp).

Character -- Cannot be bleached; very poor color; in general, this wood cannot be considered satisfactory for sulphite pulp.

Possible uses -- Few.

**Sulphate Pulp**

Yield -- 1,600 lbs.

Character -- Strong, but coarse fiber.

Possible uses -- Similar to white spruce.

**MONTEREY PINE** -- Pinus radiata. Wt. 29 lbs. Fiber.

Range -- California (Point Pinos on Monterey Bay, and along the coast from Pescadero to San Simeon Bay.)

Common Names -- Monterey pine (Cal.); Spreading-cone pine (Cal. lit.); Nearly smooth-cone pine (Cal. lit.); Remarkable pine (Cal. lit.); Small-coned Monterey pine (Cal. lit.); Two-leaved Insular pine.

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3Refers to the two-leaved form Pinus radiata binnata (Engelm.) Lemm., found on Santa Rosa, Santa Cruz, and Guadaloupe Islands.
Sulphite Pulp

Yield -- 1,260 lbs.
Character -- Easily pulped; difficult to bleach; good color; fair strength.
Possible uses -- As a substitute for white spruce.

Sulphate Pulp

Character -- Easily pulped; difficult to bleach; good strength.
Possible uses -- Similar to white spruce.

NORWAY PINE -- Pinus resinosa. Wt. 27 lbs. Fiber 3.7 m.m.

Range -- From Newfoundland and along the northern shores of St. Lawrence Gulf to northern Ontario (north of Abitibi Lake) to southern Manitoba (near southern end of Lake Winnipeg); southward through the Northern States to Massachusetts (Middlesex County, Pennsylvania (Ches-ter County), northeastern Ohio (north of Cleveland) central Michigan (Saginaw), northern Wisconsin (Oshkosh and Eau Claire), and northeastern Minnesota.

Common Names -- Red Pine (Vt., N.H., N.Y., Wis., Minn., Ont.); Norway pine (Me., N.H., Vt., Mass., N.Y., Wis., Minn., Ont.); Hard pine (Wis.); Canadian red pine (Eng.)

Sulphite Pulp

Yield -- 1,230 lbs.
Character -- Difficult to pulp and bleach; poor strength.
Possible uses -- Few.

Sulphate Pulp

Yield -- 1,350 lbs.
Character -- Fairly easily bleached.
Possible uses -- Similar to white spruce.

Mechanical Pulp

Because of high pitch content is probably unsuitable for this purpose.
PITCH PINE - Pinus rigida. Wt. 29 lbs. Fiber.

Range -- From southern New Brunswick (St. Johns River) to eastern Ontario (north shore of Lake Ontario and lower Ottawa river) and southward in the Atlantic region to southern Virginia (Norfolk) and along the mountains to northern Georgia (Atlanta); west to western New York (Ithaca), northeastern Pennsylvania, eastern Ohio (border counties south of Canton) and Kentucky, eastern Tennessee (to Cumberland Mountains).


Sulphite Pulp

Yield -- 1,250 lbs.

Character -- Difficult to pulp and bleach; poor strength, pitchy.

Possible uses -- Few.

Sulphate Pulp

Yield -- 1,430 lbs.

Character -- Fairly easily bleached.

Possible uses -- Similar to white spruce.

Mechanical Pulp

Because of high pitch content is probably unsuitable for this purpose.
POND PINE -- Pinus scotina. Wt. 31 lbs. Fiber.

Range -- Coast region from North Carolina to Florida
(head of St. Johns River and probably farther south;
on the west coast from Pensacola to Citrus County and
probably much farther south.) Range imperfectly known.

Common Names -- Marsh pine (N.C.); Meadow pine (N.C.);
Bond pine (N.C., S.C., Fla., Miss., La.); Loblolly
pine (N.C., Fla.); Spruce pine (S.C., Ga.); Bastard
pine (S.C., Ga.); Bull pine (S.C., Ga.)

Sulphite Pulp

Yield -- 1,360 lbs.
Character -- Fairly easily pulped and bleached; fair
color.
Possible uses -- As a substitute for spruce.

Sulphate Pulp

Yield -- 1,400 lbs.
Character -- Fairly easily bleached; strong but coarse
fiber.
Possible uses -- Similar to white spruce.

Mechanical Pulp

Probably the same as Loblolly pine.

SAND PINE -- Pinus clausa. Wt. 29 lbs. Fiber.

Range -- Coast of Alabama (Baldwin County) and western
Florida (to Pease Creek); east coast of Florida from
St. Augustine to Halifax River.

Common Names -- Sand pine (Fla., Ala.); Oldfield pine
(Fla.); Florida spruce pine (Ala.); Scrub pine (Fla.);
Spruce pine (Fla.); Upland spruce pine (Fla.)

Sulphite Pulp

Yield -- 1,300 lbs.
Character -- Easily pulped; difficult to bleach and
shivey; fair strength; good color.
Possible uses -- As a substitute for white spruce.
Sulphate Pulp

Yield -- 1,220 lbs.
Character -- Fairly easily bleached.
Possible uses -- Similar to white spruce.

Mechanical Pulp

Because of high pitch content is probably unsuitable for this purpose.

SCOTCH PINE -- Pinus sylvestris. Wt. 37 lbs. Fiber.

Range -- Europe and Northern Asia up to 700 ft. above sea level in the far north; 6,500 ft. in Southern Europe.
Common Names -- Scots (Scotland), Scotch fir (England), Northern pine (general).

Sulphite Pulp

Yield -- 1,600 lbs.
Character -- Difficult to pulp and bleach; poor strength and pitchy.
Possible uses -- Few.

Sulphate Pulp

Yield -- 1,600 lbs.
Character -- Fairly easily bleached; strong, tough fiber.
Possible uses -- Similar to white spruce.

Mechanical Pulp

Because of pitch content is probably unsuitable for this purpose.

SCRUB PINE -- Pinus virginiana. Wt. 26 lbs. Fiber 2.8 m.m.

Range -- From New York (Staten Island) to South Carolina (Aiken River) and northern Alabama (Winston, Cullmaak).

From English data.
and DeKalb counties); west into southern Indiana, to middle Tennessee (Putnam County).

**Common Names** -- Jersey pine (N.J., Pa., Del., N.C., S.C.); Scrub pine (R.I., N.Y., Pa., Del., N.C., S.C., Ohio); Short Shucks (Md., Va.); Shortshat Pine (Del.); Spruce pine (N.J., N.C.); Shortleaved (N.C.); Cedar pine (N.C.); River pine (N.C.); Nigger pine (Tenn.); New Jersey pine (lit.)

**Sulphite Pulp**

Yield -- 1,000 lbs.

Character -- Easily pulped; difficult to bleach; good color.

Possible uses -- As a substitute for spruce.

**Sulphate Pulp**

Yield -- 1,250 lbs.

Character -- Fairly easily bleached; strong, but coarse fiber.

Possible uses -- Similar to white spruce.

**Mechanical Pulp**

Similar to Loblolly pine.

**SHORTLEAF PINE** -- *Pinus echinata* -- Wt. 31 lbs. Fiber 3.7 m.m.

Range -- From New York (Staten Island) to Florida (Chat-tahoochee region) and west to southern Missouri, eastern Oklahoma, and northeastern Texas.

**Common Names** -- Yellow pine (N.Y., N.J., Pa., Del., Va., N.C., Ala., Miss., La., Ark., Mo., Ill., Ind., Kans., (scarce); Ohio, (Eng. lit.); Shortleaved pine (N.C., S.C., Ga., Ala., Miss., Fla., La., Tex., Ark.); Spruce pine (Del., Miss., Ark.); Bull pine (Va.); Shortshat pine (Del.); Pitch pine (Mo.); Poor pine (Fla.); Shortleaved yellow pine; Rosemary pine (N.C.); Virginia yellow pine (Va., in part); North Carolina pine (N.C. and Va. in part); Carolina pine (N.C. and Va. in part); Slash pine (N.C., Va., in part); Oldfield pine (Ala., Miss.).

**Sulphite Pulp**

Yield -- 1,500 lbs.
Character -- Difficult to pulp and bleach; pitchy.
Possible uses -- Few.

Sulphate Pulp
Yield -- 1,450 lbs.
Character -- Fairly easily bleached; strong, but coarse fiber.
Possible uses -- Similar to white spruce.

Mechanical Pulp
Because of pitch content is probably unsuitable for this purpose.

SLASH PINE -- Pinus heterophylla. Wt. 37 lbs. Fiber.
Range -- Coast region (60 to 100 miles inland), from South Carolina (Charleston) to southern Florida (Cape Canaveral and Biscayne Bay) and west to Louisiana (Pearl River.)

Common Names -- Slash pine (Ala., Miss., Ga., Fla.); Swamp pine ( Fla., Miss., Ala., in part); Bastard pine ( Ala. lumbermen, Fla.); Meadow pine ( Fla., eastern Miss., in part); Pitch pine ( Fla.); She pitch pine ( Ga.); She pine ( Ga., Fla.); Spruce pine ( southern Ala.)

Sulphite Pulp
Because of high pitch content is probably unsuitable for this purpose.

Sulphate Pulp
Yield -- 1,650 lbs.
Character -- Fairly easily bleached; strong, but coarse fiber.
Possible uses -- Similar to white spruce.

Mechanical Pulp
Because of high pitch content is probably unsuitable for this purpose.
WESTERN YELLOW PINE -- Pinus ponderosa. Wt. 24 lbs. Fiber 3.6m.m.

Range -- From British Columbia (interior south of latitude 51°); and Dakota (Black Hills region), southward in the Pacific and Rocky Mountain region to western Texas and Mexico.

Common Names -- Yellow pine (Cal., Colo., Mont., Idaho, Utah, Wash., Ore.); Bull pine (Cal., Wash., Utah, Idaho, Ore.); Big pine (Mont.); Long-leaved pine (Utah, Nev.); Red pine; Pitch pine Southern yellow pine; Heavy-wooded pine, (Eng.); Western pitch pine; Heavy pine (Cal.); Foot-hills Yellow pine; Sierra Brownbark pine; Montana Black pine (Cal. lit.); "Gambier Parry's pine" (Eng. lit.)

Sulphite Pulp

Yield -- 1,130 lbs.

Character -- Not difficult to pulp; difficult to bleach, shivey; very poor strength and color.

Possible uses -- Few.

Sulphate Pulp

Yield -- 1,100 lbs.

Character -- Fairly easily bleached; fine, high grade, very strong, and tough fiber.

Possible uses -- Same as white spruce.

Mechanical Pulp

Yield -- 2,060 lbs.

Character -- Fibers are long, coarse and soft, creamy color and somewhat pitchy.

Possible uses -- Where a medium quality of groundwood will answer the purpose.

THE FIRS

ALPINE FIR -- Abies lasiocarpa. Wt. 21 lbs. Fiber.

Range -- Rocky Mountain region from Colorado to Montana.
and Idaho, and westward through northern Oregon and northward to Alaska (latitude 60 degrees.)

Common Names -- Sub-Alpine fir (Utah); Balsam (Colo., Utah, Idaho, Ore.); White fir (Idaho, Mont.); White balsam; Oregon Balsam-tree (Cal.); Pumpkin-tree; Alpine fir; Mountain balsam (mountains of Utah and Idaho); Down-cone fir (lit.); Downy-cone Sub-Alpine fir (Cal. lit.)

Sulphite Pulp

Yield -- 1,010 lbs.

Character -- Easily pulped; easily bleached; good strength excellent color.

Possible uses -- As a substitute for white spruce.

Sulphate Pulp

Yield -- 1,050 lbs.

Character -- Excellent strength; long fiber.

Possible uses -- Same as white spruce.

Mechanical Pulp

Yield -- 2,070 lbs.

Character -- Fair strength; white fiber.

Possible uses -- Same as white spruce.

BALSAM FIR -- Abies balsamea. Wt. 21 lbs. Fiber 2.7 m.m.

Range -- From Newfoundland and Labrador to Hudson Bay and northwestward to Great Bear Lake region, and south to Pennsylvania (and along high mountains to Virginia), Michigan and Minnesota.

Common Names -- Balsam fir (N.H., Vt., Mass., R.I., N.Y., Pa., W.Va., Wis., Mich., Minn., Nebr., Ohio, Ont., Eng. cult.); Balsam (Vt., N.H., N.Y.); Canada balsam (N.C.); Balm of Gilead (Del.); Balm of Gilead fir (N.Y., Pa.); Blister pine (W.Va.); Fir pine (W.Va.); Firtrec (Vt.); Single spruce (N.Bruns. to Hudson Bay), Silver pine (Hudson Bay); Sapin (Quebec); Cho-koh-tung "Blisters" (N.Y. Indians).

Sulphite Pulp

Yield -- 970 lbs.
Character -- Easily pulped; easily bleached; good strength excellent color.

Possible uses -- As a substitute for white spruce.

**Sulphate Pulp**

Yield -- 1,010 lbs.

Character -- High-grade kraft fiber.

Possible uses -- Same as white spruce.

**Mechanical Pulp**

Yield -- 1,910 lbs.

Character -- Strong and good color; good fiber length.

Possible uses -- Same as white spruce.

**LOWLAND WHITE FIR** -- Abies grandis. Wt. 23 lbs. Fiber 3.2 m.m.

Range -- Coast region from Vancouver Island to California (Hendocino County), and from Washington and Oregon to Northern Idaho and Montana.

Common Names -- White fir (Cal., Orc., Idaho); Silver fir (Mont., Idaho); Oregon white fir (Cal.); Western white fir; Grand or Oregon white fir (Cal. lit.); Great California fir (lit.)

**Sulphite Pulp**

Yield -- 980 lbs.

Character -- Easily pulped; easily bleached, fair strength; excellent color.

Possible uses -- As a substitute for white spruce.

**Sulphate Pulp**

Yield -- 1,140 lbs.

Character -- Good strong grade of kraft pulp.

Possible uses -- Same as white spruce.

**Mechanical Pulp**

Yield -- 1,950 lbs.
Character -- Good strength, color and fiber.
Possible uses -- Same as white spruce.

**NOBLE FIR** -- *Abies nobilis*. Wt. 22 lbs. Fiber ......

**Range** -- Washington (coast mountains in southwestern part of state; Olympic Mountains on Solduc River; from Mount Baker (southward in the Cascade Mountains) to Oregon (Browder Ridge on head waters of McKenzie River in Lane County). Range at present but little known.

**Common Names** -- Red fir (Ore.); "Larch" (Ore. lumbermen); Noble fir (Ore.); Big tree; Feather red fir (Cal. lit.); Noble or Bracted red fir (Cal. lit.); Tuck Tuck (Pacific Indians).

**Sulphite Pulp**

Yield -- 1,010 lbs.

Character -- Easily pulped; easily bleached; fair strength; excellent color.

Possible uses -- As a substitute for white spruce.

**Sulphate Pulp**

Yield -- 1,080 lbs.

Character -- Good quality of strong pulp.

Possible uses -- As a substitute for white spruce.

**Mechanical Pulp**

Yield -- 1,920 lbs.

Character -- Good color; very long strong fiber.

Possible uses -- Same as white spruce.

**RED FIR** -- *Abies magnifica*. Wt. 23 lbs. Fiber ......

**Range** -- Southern Oregon (Cascade Mts.) and California (Mount Shasta and along the western slopes of Sierra Nevada Mountains.)

**Common Names** -- Red fir (Cal.); California Redbark fir (Cal.); Magnificent fir (Cal. lit.); California red fir (Cal. lit); Golden fir (Cal. lit.)
Sulphite Pulp
Yield -- 1,080 lbs.
Character -- Easily pulped; a little hard to bleach; good strength; fair color.
Possible uses -- As a substitute for white spruce.

Sulphate Pulp
Yield -- 1,150 lbs.
Character -- Good strong fiber.
Possible uses -- Same as white spruce.

Mechanical Pulp
Yield -- 1,915 lbs.
Character -- Fair strength; pinkish color.
Possible uses -- As a substitute for white spruce.

SILVER FIR -- Abies amabilis. Wt. 22 lbs. Fiber.

Range -- From British Columbia (Fraser River and southward in the Cascade Mountains) to Washington and Oregon.

Common Names -- Red fir; Red silver fir (Western mountains) Fir (Cal.); Lovely fir (Cal. lit.); Lovely red fir (Cal. lit.); Amabilis or Lovely fir (Cal. lit.); "Larch" (Ore. lumbermen).

Sulphite Pulp
Yield -- 1,060 lbs.
Character -- Easily pulped; easily bleached; fair strength; excellent color.
Possible uses -- As a substitute for white spruce.

Sulphate Pulp
Yield -- 1,100 lbs.
Character -- Excellent strength; long fiber.
Possible uses -- Same as white spruce.
**Mechanical Pulp**

Yield -- 1,870 lbs.

Character -- Long fiber of excellent strength; color slightly grayish.

Possible uses -- Same as white spruce.

**WHITE FIR** -- Abies concolor. Wt. 22 lbs. Fiber 3.5 m.m.

Range -- Oregon (Siskiyou Mountains to southern California (San Bernardino County); Northern Arizona and New México to Colorado and Utah (Wasatch Mountains).

Common Names -- White fir (Cal., Idaho, Utah, Colo.); Balsam fir (Cal., Idaho, Colo.); Silver fir (Cal.); Balsam (Cal.); White balsam (Utah); Bastard pine (Utah); Balsam-trees (Idaho); Black gum (Utah); California white fir (Cal.); Colorado white fir (Cal. lit.); Concolor silver fir (Eng. lit.)

**Sulphite pulp**

Yield -- 950 lbs.

Character -- Easily pulped; easily bleached; good strength; good color.

Possible uses -- As a substitute for white spruce.

**Sulphate pulp**

Yield -- 1,100 lbs.

Character -- Good strong grade of kraft pulp.

Possible uses -- Same as white spruce.

**Mechanical pulp**

Yield -- 2,010 lbs.

Character -- Fair strength; good fiber; satisfactory color.

Possible uses -- Same as white spruce.

**DOUGLAS FIR** -- Pseudotsuga taxifolia.

Washington and Oregon, Wt. 28 lbs. Fiber 4.4 m.m. Montana and Wyoming, Wt. 25 lbs. Fiber --
Range -- From the Rocky Mountain region (in United States) and northward to central British Columbia; Pacific Coast.

Common Names -- Red fir (Ore., Wash., Idaho, Utah, Mont., Colo.); Douglas spruce (Cal., Colo., Mont.); Douglas fir (Utah, Ore., Colo.); Yellow fir (Ore., Mont., Idaho, Wash.); Spruce (Mont.); Fir (Mont.); Oregon pine (Cal., Wash., Ore.); Red pine (Utah, Idaho, Colo.); Puget Sound pine (Wash.); Douglas-tree; Cork-barked Douglas spruce.

Sulphite Pulp

Yield -- 1,200 lbs.

Character -- Hard to pulp; difficult to bleach; fair strength; poor color; pitchy.

Possible uses -- Few.

Sulphate Pulp

Yield -- 1,170 lbs.

Character -- Good grade of kraft pulp but not as strong as white spruce.

Possible uses -- Similar to white spruce.

Mechanical Pulp

Because of high pitch content is probably unsuitable for this purpose.

THE CEDARS

INCENSE CEDAR -- Libocedrus decurrens. Wt. 23 lbs. Fiber 2.0 m.m.

Range -- From Oregon (North Fork of Santiam River and southward on the Western slopes of the Cascade Mountains through California (Western slopes of Sierra Nevada mountains and coast ranges from southern border of Mendocino County to San Bernardino, San Jacinto, and Cuyama mountains); Western Nevada; Lower California (Mount San Pedro Martir).

Common Names -- White cedar (Cal., Ore.); Cedar (Cal., Ore.); Incense cedar (Cal., Ore.); Post cedar (Cal., Nev.); Juniper (Nev.); Bastard cedar (Cal., Wash.); Red cedar; California post cedar (Cal. lit.)
Sulphite Pulp
Yield -- 920 lbs.
Character -- Difficult to bleach; good strength; poor color.
Possible uses -- Few.

Sulphate Pulp
Yield -- 950 lbs.
Character -- Strong and hard fiber; dark colored.
Possible uses -- As a substitute for white spruce.

PORT ORFORD CEDAR -- Chamaecyparis lawsoniana. Wt. 26 lbs.
Fiber 3.6 m.m.
Range -- Coast region from southwestern Oregon (Coos Bay) to California (Klamath River) extending inland about 40 miles.
Common Names -- Port orford cedar (Ore., Cal.); Oregon cedar (Ore., Cal.); White cedar (Ore., Cal.); Ginger pine (Cal.); Lawson's cypress (Ore., Cal.)

Sulphite Pulp
Yield -- 1,150 lbs.
Character -- Fairly easily pulped; rather difficult to bleach; fair strength and color.
Possible uses -- Same as white spruce.

Sulphate Pulp
Yield -- 960 lbs.
Character -- Difficult to pulp and bleach; good strength; hard and fine fiber.
Possible uses -- Same as white spruce.

RED CEDAR -- Juniperus virginiana. Wt. 27 lbs. Fiber 2.8 m.m.
Range -- Nova Scotia and New Brunswick to Florida and west in Ontario (Georgian Bay) to Dakota, central Nebraska and Kansas, and Indian Territory. Actual range imperfectly
known at present, the supposed Rocky Mountain and Western range being represented by a new, distinct species (J. scopularum Sarg.)


Sulphite Pulp

Yield -- 1,300 lbs.

Character -- Difficult to pulp and bleach; very shivey and dark colored.

Possible uses -- Few.

Sulphate Pulp

Yield -- 1,000 lbs.

Character -- Difficult to pulp and bleach; shivey but fairly strong and fine fibered.

Possible uses -- Wrappings.

WESTERN RED CEDAR -- Thuja plicata -- Wt. 19 lbs. Fiber 3.8 m.m.

Range -- From coast of southern Alaska to northern California (Mendocino County); eastward through British Columbia and northern Washington to northern Idaho (Cour d'Alene, Bitter Root, and Salmon River mountains and Montana; western slopes Rocky Mountains.

Common Names -- Red cedar (Idaho, Ore., Wash.); Canoe cedar (Ore., Wash.); Arborvitæ (Cal.); Shinglewood (Idaho); Gigantic cedar (Cal.); Cedar (Orc.); Gigantic red cedar (Cal. lit.); Western cedar; Gigantic or Pacific red cedar (Cal. lit.); Lobb's arborvitæ (in cult. Eng.); Pacific red cedar (Cal. lit.).

Sulphite Pulp

Yield -- 630 lbs.

Character -- Difficult to bleach: dark colored but fair strength.
Possible uses -- Few.

**Sulphate Pulp.**

Yield -- 830 lbs.

Character -- Rather difficult to bleach; fair strength.

Possible uses -- Same as white spruce.

**SOUTHERN WHITE CEDAR** -- Chamaecyparis thyoides. Wt. 20 lbs. Fiber 2.1 m.m.

Range -- Coast region from southern Maine to northern Florida and westward to Mississippi (Pearl River).

Common Names -- White cedar (Mass., R.I., N.Y., N.J., Pa., Del., N.C., S.C., Fla., Ala., Miss.); Swamp cedar (Del.); Post cedar (Del.); Juniper (Ala., N.C., Va.)

**Sulphite Pulp**

Yield -- 1,000 lbs.

Character -- Fairly easy to pulp; rather difficult to bleach; fair strength and color.

**Sulphate Pulp**

Yield -- 780 lbs.

Character -- Readily pulped; difficult to bleach; hard and fine fiber.

Possible uses -- As a substitute for spruce.

**BALD CYPRESS** -- Taxodium distichum. Wt. 27 lbs. Fiber 3.3 m.m.

Range -- From southern Delaware (Sussex County and southward in the coast region) to Florida (Mosquito Inlet and Cape Roman); westward in the Gulf coast region to Texas (Devils River); and northward through Louisiana, Arkansas, and eastern Mississippi and Tennessee, southeastern Missouri, western and northwestern Kentucky, southern Illinois, and southwestern Indiana (Knox county).

Common Names -- Bald cypress (Del., N.C., S.C., Ala., La., Fla., Tex., Ark., Mo., Ill., Ind.); White cypress (N.C., S.C., Fla., Miss.); Black cypress (N.C., S.C., Ala., Tex.); Red Cypress (Ga., Miss., La., Tex.); Swamp cypress...
Cypress (Del., N.C., S.C., Fla., Miss., Ky., Mo., Ill.); Deciduous Cypress (Del., Ill., Tex.); Southern Cypress ( Ala.)

Sulphite Pulp

Yield -- 1,160 lbs.

Character -- Difficult to cook; very difficult to bleach; poor strength and color.

Possible uses -- Few.

Sulphate Pulp

Yield -- 1,350 lbs.

Character -- Fiber long but tender.

Possible uses -- As a substitute for white spruce.

REDWOOD -- Sequoia sempervirens -- Wt. 23 lbs. Fiber 5.5m.m.

Range -- From the southern borders of Oregon (on Chetco River (about six miles from mouth, and on Winchuck River), and southward in the coast region (twenty to thirty miles inland) through California (to Salmon Creek Canyon, twelve miles south of Punta Gorda, Monterey County).

Common Names -- Sequoia (Cal.); Coast Redwood (Cal.); Redwood (Cal. and Am. lit.); California redwood (Eng. lit.)

Sulphite Pulp

Yield -- 1,100 lbs.

Character -- Easily pulped; difficult to bleach; fair strength; dark colored.

Possible uses -- Low grade wrappings.

Sulphate Pulp

Yield -- 950 lbs.

Character -- Long fibered but tender.

Possible uses -- As a substitute for spruce.
CAROLINA HEMLOCK. -- Tsuga caroliniana. Wt. 30 lbs. Fiber --

Range -- Mountains of southwestern Virginia, western North Carolina, and northern Georgia; very local.

Common Names -- Hemlock (N.C., S.C.); Southern hemlock (lit.)

Sulphite Pulp
Yield -- 1,290 lbs.

Character -- Fairly easily pulped; a little hard to bleach; good strength and fair color.

Possible uses -- As a substitute for white spruce.

Sulphate Pulp
Yield -- 1,260 lbs.

Character -- Good strong pulp.

Possible uses -- As a substitute for white spruce.

Mechanical Pulp

Probably the same as hemlock.

HEMLOCK -- Tsuga canadensis. Wt. 24 lbs. Fiber 3.0 m.m.

Range -- Nova Scotia to Minnesota (Carleton County), Wisconsin, Michigan, and southward in the Atlantic region along the mountains to Northern Alabama (Winston county) and Georgia.


Sulphite Pulp

Yield 1,080 lbs.

Character -- Not easily pulped; a little hard to bleach; good strength; fair color.
Possible uses -- As a substitute for white spruce.

Sulphate Pulp

Yield -- 1,150 lbs.

Character -- Good strong pulp.

Possible uses -- Similar to white spruce.

Mechanical Pulp

Yield -- 2,030 lbs.

Character -- Short fiber; pinkish color.

Possible uses -- As a substitute for white spruce.

WESTERN HEMLOCK -- Tsuga heterophylla. Wt. 23 lbs. Fiber 2.7 m.r.

Range -- Alaska to Idaho and Montana and southward (in the Cascade and coast ranges) to California (Marin County).

Common Names -- Hemlock spruce (Cal.); Western hemlock (Cal.); Hemlock (Ore., Idaho, Wash.); Western hemlock spruce (lit.); California hemlock spruce; Western hemlock fir (Eng.); Prince Albert's fir (Eng.); Alaska pine (Northwestern lumbermen.)

Sulphite Pulp

Yield -- 1,050 lbs.

Character -- Easily pulped; easily bleached; good strength; fair color.

Possible uses -- Same as white spruce.

Sulphate Pulp

Yield -- 1,100 lbs.

Character -- Good strong fiber.

Possible uses -- Similar to white spruce.

Mechanical Pulp

Yield -- 2,160 lbs.
Character -- Good strength and fiber; grayish color.
Possible uses -- Similar to white spruce.

THE LARCHES

**TAMARACK** -- Larix laricina. Wt. 31 lbs. Fiber 2.6 m.m.

**Range** -- From Newfoundland and Labrador to northern Pa.,
northern Indiana, Illinois, central Minnesota, and
northwestward to Hudson Bay (Cape Churchill, Great
Bear Lake, and McKenzie River) (in Arctic Circle).

**Common Names** -- Larch (Vt., Mass., R.I., Conn., N.Y.,
N.J., Pa., Del., Wis., Minn., Ohio, Ont.); Tamarack,
(Me., N.H., Vt., Mass., R.I., N.Y., N.J., Pa., Ind.,
Ill., Wis., Mich., Minn., Ohio, Ont.); Hackmatack (Me.,
N.H., Mass., R.I., Del., Ill., Minn., Ont.); American
Larch (Vt., Wis., nursery-men); Juniper (Me., N. Bruns.
to Hudson Bay); Black larch (Minn.); Epinette rouge
(quebec); Ka-neh-tens -- "The leaves fall" (Indians,
N.Y.); Red larch (Mich.); Hackmack (lit.)

**Sulphite Pulp**

Yield -- 1,270 lbs.
Character -- Difficult to pulp; difficult to bleach;
good strength; poor color.
Possible uses -- Low grade wrappings.

**Sulphate Pulp**

Yield -- 1,400 lbs.
Character -- Strong, tough pulp.
Possible uses -- Similar to white spruce.

**Mechanical Pulp**

Yield -- 2,620 lbs.
Character -- Short fibered and gray color.
Possible uses -- As a substitute for white spruce.

**WESTERN LARCH** -- Larix occidentalis. Wt. 28 lbs. Fiber
2.6 m.m.

**Range** -- Southern British Columbia (south of latitude
53 degrees) and south in the Cascade Mountains to the
Columbia River and to western Montana; also in Blue
Mountains of Washington and Oregon.
Common Names -- Tamarack (Oreg.); Hackmatack; Larch (Idaho, Wash., etc.); Red American Larch; Western Tamarack; Western Larch (Eng.); Great Western Larch (Cal. lit.).

Sulphite Pulp

Yield -- 1,200 lbs.
Character -- Difficult to pulp; Difficult to bleach; Poor strength and color.
Possible uses -- Low grade wrappings.

Sulphate Pulp

Yield -- 1,290 lbs.
Character -- Good quality of kraft fiber.
Possible uses -- Same as white spruce.

Mechanical Pulp

Yield -- 2,100 lbs.
Character -- Brown color, short fiber and fair strength.
Possible uses -- Where a medium quality of ground-wood will answer the purpose.

THE POPLARS AND WILLOWS

ASPEN -- Populus tremuloides. Wt. 23 lbs. Fiber 1.0 m.m.

Range -- Southern Labrador to Hudson Bay (southern shores) and northwestward to the Mackenzie River (near mouth and Alaska (Yukon River); southward to Pa. (mountains), northeastern Missouri, southern Nebraska, and throughout the western mountains to northern New Mexico and Arizona and central California; Lower California (San Pedro Martir Mountains) and Mexico (mountains to Chihuahua).

Common Names -- Aspen (N.H., Mass., R.I., Conn., N.Y., N.J., Pa., Del., Ill., Ind., Wis., Mich., Minn., N.Dak., Nebr., Ohio, Ont., Oreg., Utah, Idaho, Nev., Mont., Colo., Cal.) Quaking Asp (N.Y., Pa., Del. Cal., N.Mex., Idaho, Colo., Ariz., Ill., Iowa, Minn., Mont., Nebr., Utah, Oreg., Nev.); Mountain Asp. (Mont.); American Aspen (Vt.); Aspen Leaf (Pa.); White Poplar (Mass.); Trembling Poplar (Minn., Cal.); American Poplar (Minn., Colo.); Poplar (Vt., N.Y., Ill., Ind., Minn., Mont.); Popple (Wis., Iowa, Mont.); Tremble (Quebec); Trembling Aspen (Iowa); Aspen Poplar (Cal., Mont.).
Sulphite Pulp --
Yield -- 1,030 lbs.
Character -- Easily pulped; Easily bleached; Very weak; Excellent color.
Possible uses -- Used with longer fibered stock for better grade of papers.

Soda Pulp.
Yield -- 1,080 lbs.
Character -- Easily bleached; Soft and short fibered.
Possible uses -- When bleached and mixed with longer fibered bleached stock is well adapted for book, envelope, and high grade printings.

Mechanical Pulp.
Yield -- 2,170 lbs.
Character -- Poor strength; Short fibered; Good color but may have black specks present.
Possible uses -- As a filler when used with longer fibered stocks.

BALM OF GILEAD -- Populus balsamifera. Wt. 26 lbs. Fiber 1.0 m.m.
Range -- Coast of Alaska and Valley of Mackenzie River (latitude 60°) to Hudson Bay and Newfoundland; southward to northern New England and New York (Taughannock Falls Cayuga Lake), central Michigan, and Minnesota, Dakota (Black Hills), northwestern Nebraska, northern Montana, Idaho, Oregon, and Nevada.

Sulphite Pulp

Yield -- 1,300 lbs.
Character -- Easily pulped; Easily bleached; Excellent color.
Possible uses -- Same as aspen.

Soda Pulp

Yield -- 1,170 lbs.
Character -- Easily bleached; Short fiber and soft.
Possible uses -- Same as aspen.

Mechanical Pulp

Similar to aspen.

COTTON WOOD -- Populus deltoides. Wt. 23 lbs. Fiber 1.3 m.m.

Range -- From Quebec (Lower Maurice River) and Vermont (Lake Champlain) through Western New England and New York, Pa. (west of Alleghenies), Maryland, and Atlantic States to western Florida and west to the Rocky Mountains from southern Alberta to northern New Mexico.

Common Names -- Cottonwood (N. H., Vt., Mass., R. I., N. Y., N. J., W. Va., N. C., Ala., Fla., Miss., La., Tex., Cal., Ky., Mo., Ill., Wis., Kans., Nebr., Iowa, Minn., Mich., Ohio, Ont., Colo., Mont., N. Dak., S. Dak.); Big cottonwood (Miss., Neb.); Yellow cottonwood (Ark., Iowa, Nev.); Cotton-tree (N. Y.); Carolina poplar (Pa., Miss., La., N. Mex., Ind., Ohio); Nebraska poplar (Texas, Colo.); Vermont poplar (Vt.); Whitewood (Iowa); Broad-leaved cottonwood (Colo.).

Sulphite Pulp

Yield -- 1,035 lbs.
Character -- Easily pulped; Easily bleached; Very weak; Excellent color.
Possible uses -- Same as aspen.
Soda Pulp

Yield -- 1,030 lbs.

Character -- Soft and easily bleached.

Mechanical Pulp

Yield -- 2,180 lbs.

Possible uses -- Same as aspen.

Character -- Weak, short fibered, good color.

Possible uses -- As a filler when used with longer fibered stocks.

LARGE TOOTH ASPEN -- Populus grandidentata. Wt. 22 lbs.

Fiber 1.1 m.m.

Range -- Nova Scotia through New Brunswick, Southern Quebec and Ontario to northern Minnesota; southward to Delaware (and along the Allegheny Mountains to North Carolina, central Kentucky and Tennessee), southern Indiana, and Illinois.

Common Names -- Large-toothed aspen (N.J., Pa., Del., S.C., Mich., Minn.); Poplar (Me., N.H., Vt., Mass., R.I., Conn., N.Y., N.J., Pa., W.Va., N.C., S.C., Ga., Ill., Ohio); Large-toothed poplar (N.C.); Large poplar (Tenn.); White poplar (Mass.); Popple (Me.); Large American aspen (Ala.).

Sulphite Pulp

Yield -- 1,000 lbs.

Character -- Easily pulped and bleached; Very weak but excellent color.

Possible uses -- Used with longer-fibered stock for better grade of papers.

Soda Pulp

Yield -- 1,000 lbs. opaque.

Character -- Easily pulped and bleached; Soft, opaque, and short fiber.

Possible uses -- Same as aspen.
Mechanical Pulp

Same as aspen.

NORWAY POPLAR. Probably cottonwood. Pulping tests the same as for cottonwood.

YELLOW POPLAR -- Liriodendron Tulipifera. Wt. 26 lbs. Fiber 1.8 m.m.

Range -- From Rhode Island to southwestern Vermont and west to Lake Michigan (through southern Michigan as far north as Grand River); south to Florida, southern Alabama, and Mississippi; west of Mississippi River in southeastern Missouri and adjacent Arkansas.


Sulphite Pulp

Yield -- 1,170 lbs.

Character -- Easily pulped; Difficult to bleach; Poor color.

Possible uses -- As a substitute for aspen.

Soda Pulp

Yield -- 1,150 lbs.

Character -- Soft, opaque and easily bleached.

Possible uses -- Same as aspen.

Mechanical Pulp

Same as aspen but slightly stronger.
BASSWOOD -- Tilia americana. Wt. 21 lbs. Fiber 1.1 m.m.

Range -- New Brunswick to Virginia and (along Allegheny Mountains) to Georgia and Alabama (Mountains); west (in Canada) to Lake Superior (eastern shores) and to Lake Winnipeg (southern shores) and Assiniboine River (in United States), to eastern Dakota, eastern Neb., Kansas, Oklahoma, and eastern Texas.


Soda Pulp

Yield -- 1,020 lbs.

Character -- Soft and easy bleaching.

Possible uses -- Similar to aspen.

Mechanical Pulp

The same as aspen.

BLACK WILLOW -- Salix nigra. Wt. 21 lbs. Fiber 0.8 m.m.

Range -- New Brunswick to southern Florida and west to eastern Dakota, Nebraska, Kansas, Oklahoma, southern Arizona, and south into Mexico. In California from the Sierra Nevada to Colusa County, and Sacramento River to Arizona.

Sulphite Pulp

Yield -- 1,100 lbs.
Character -- Easily pulped; Easily bleached; Very weak;
            Excellent color.
Possible uses -- Same as aspen.

Soda Pulp

Yield -- 950 lbs.
Character -- Soft and easily bleached.
Possible uses -- Similar to aspen.

Mechanical Pulp

The same as aspen.

LONG LEAF WILLOW -- Salix fluviatilis. Wt. 23 lbs. Fiber
7. m.m.

Range -- Quebec (Lake St. John and Island of Orleans) and
southward through western New England to the Potomac
River; northwestward to the Arctic Circle (valley of
Mackenzie River) and British Columbia and California;
southward in the Mississippi River basin to northern
Mexico and lower California.

Common Names -- Sandbar willow (R.I., Miss., Cal., Kans.,
Nebr., Minn., S.Dak., Wis., Ont.); Longleaf willow (Ala.,
Kans., Mich.); Long-leaved willow (Tenn., Minn., Nebr.,
Colo., Cal., Idaho, Wash.); Narrow-leaved willow (Neb.);
Shrub willow (Neb.); White willow (Mo.); Red willow
(Mont.); Osier willow (Mont.); Willow (Vt., N.Y., Ky.,
Ind., Miss., Tex., Cal., Nev., Utah, Mont.).

Sulphite Pulp

Yield -- 1,100 lbs.
Character -- Easily pulped and bleached; Very weak and
            poor color.
Possible uses -- Same as aspen.
Soda Pulp
Yield -- 1,030 lbs.
Character -- Easily pulped; Rather difficult to bleach;
Soft opaque and short fiber.
Possible uses -- Same as aspen.

Mechanical Pulp
Same as aspen.

RED ALDER -- Alnus Oregona. Wt. 23 lbs. Fiber 1.2 m.m.
Range -- From Sitka (through islands and coast ranges of
British Columbia, western Washington, and Oregon) to
California (coast ranges to Santa Inez Mountains, near
Santa Barbara).
Common Names -- Alder (Cal., Oreg.); Red Alder (Cal.,
Oreg.); Western or Red Alder.

Soda Pulp
Yield -- 1,160 lbs.
Character -- Soft; a little harder to bleach than aspen.
Possible uses -- Same as aspen.

Mechanical Pulp
Probably the same as aspen.

BALSA -- Ochroma lagopus. Wt. 7 lbs. 5 Fiber 1.33 m.m. 6
Range -- Tropical America, Cuba, Jamaica and Porto Rico.
Common Names -- Lanero (Cuba); Corkwood; Downtree, Dum
and Bombast Mahoc (Jamaica).

5 From comparatively few specimens.
6 The result of 50 measurements.
Sulphate Pulp

Yield -- 280 lbs.

Character -- Easily pulped and bleached.

Possible uses -- Because of extremely low yield per cord, it is probable that this wood has no value as a source of pulp.

THE MAPLES

BOXELDER -- Acer negundo. Wt. 30 lbs. Fiber ------

Range -- Vermont (Lake Champlain and Winoski River), New York (Cayuga Lake), eastern Pennsylvania, and south to Florida (Hernando County); Northwestward to Winnipeg (Dogs Head Lake and along southern branch of the Saskatchewan River), to the eastern base of the Rocky Mountains (In British America), to Montana (Rocky Mountains), Utah (Wasatch Mountains), western Texas, New Mexico, and eastern Arizona.


Sulphite Pulp

Probably the same as red maple.

Soda Pulp

Yield -- 1,300 lbs.

Character -- Easily pulped; Rather difficult to bleach; Soft opaque and short fiber.

Possible uses -- Same as aspen.
Mechanical Pulp

Probably the same as black gum.

RED MAPLE -- Acer rubrum. Wt. 30 lbs. Fiber .8 m.m.

Range -- From New Brunswick, Quebec, and Ontario (Latitude 49°) to Florida (Caloosa and Indian rivers); west to Lake of the Woods, eastern Dakota and Nebraska, Indian Territory, and Texas (Trinity River).


Sulphite Pulp

Yield -- 1,450 lbs.

Character -- Easily pulped and bleached; Very weak and rather poor color.

Possible uses -- Same as aspen.

Soda Pulp

Yield -- 1,300 lbs.

Character -- Easily pulped and bleached; Soft opaque and short fiber.

Possible uses -- Same as aspen.

Mechanical Pulp

Probably the same as black gum.

SUGAR MAPLE -- Acer saccharum. Wt. 35 lbs. Fiber
Range — From southern Newfoundland (along the St. Lawrence and Saguenay rivers, Lake St. John, and northern borders of Great Lakes) to Lake of the Woods and Minnesota; south (through the Northern states and on the Allegheny Mountains) to northern Georgia and western Florida; west to eastern Nebraska, eastern Kansas, and eastern Texas.


Sulphite Pulp

Yield — 1,540 lbs.

Character — Easily pulped and bleached; Very weak but excellent color.

Possible uses — Same as aspen.

Soda Pulp

Yield — 1,500 lbs.

Character — More difficult to pulp and bleach than aspen; Soft, opaque, short fiber.

Possible uses — Same as aspen.

Mechanical Pulp

Probably similar to black gum.

THE BIRCHES, BEECHES, ETC.

PAPER BIRCH — Betula papyrifera. Wt. 34 lbs. Fiber 1.2 m.m.
Range -- From Labrador to Hudson Bay (Southern Shores),
Great Bear Lake, Yukon River and coast of Alaska; south-
ward to New York (Long Island) and northern Pa., central
Michigan, and Minnesota, northern Nebraska (Bluffs of
Niobrara River), Dakota (Black Hills), northern Montana,
and northwestern Washington (near Seattle).

Common Names -- Paper Birch (N.H., Vt., Mass., R.I., Conn.,
N.Y., Wis., Mich., Minn., Ont.); Canoe birch (Me., Vt.,
N.H., R.I., Mass., N.Y., Pa., Wis., Minn., Mich., Ont.);
White birch (Me., N.H., Vt., R.I., N.Y., N.J., Wis.,
Minn., Mich., Nebr., Ont.); Silver birch (Minn., N.Y.);
Large white birch (Vt.); Boleau (Quebec).

Sulphite Pulp

Yield -- 1,500 lbs.
Character -- Easily pulped; Difficult to bleach; Poor
strength and color.
Possible uses -- Few.

Soda Pulp

Yield -- 1,350 lbs.
Character -- More difficult to reduce than aspen; Soft
easily bleached and opaque.
Possible uses -- Similar to aspen.

Mechanical Pulp

Yield -- 3,000 lbs.
Character -- Short fiber and poor strength; Pinkish color.
Possible uses -- As a filler with long fibered stocks.

YELLOW BIRCH -- Betula lutea. Wt. 34 lbs. Fiber 1.5 m.m.

Range -- From Newfoundland and along the northern shores of
St. Lawrence Gulf to Abitibi Lake and Rainy River; south-
ward to northern Minnesota and through the Northern States
to eastern Tennessee, North Carolina, and Delaware.

Common Names -- Yellow birch (Me., N.H., Vt., Mass., Conn.,
R.I., N.Y., N.J., Pa., N.C., S.C., Ill., Mich., Wis.,
Minn., N.Dak., Ont.); Gray birch (Vt., R.I., Pa., Mich.,
Minn.); Swamp birch (Minn.); Silver birch (N.H.); Merisier
Quebec); Merisier Rouge (Quebec).
Sulphite Pulp
Yield -- 1,590 lbs.
Character -- Easily pulped; Easily bleached; very weak; Good color.
Possible uses -- Same as aspen.

Soda Pulp
Yield -- 1,360 lbs.
Character -- More difficult to reduce than aspen; Soft, easily bleached.
Possible uses -- Same as aspen.

Mechanical Pulp
The same as paper birch.

BEECH -- Fagus atropunicea. Wt. 36 lbs. Fiber 1.1 m.m.
Range -- Nova Scotia to Lake Huron (north shores) and northern Wisconsin; south to western Florida and west to southeastern Missouri and Texas (Trinity River).

Soda Pulp
Yield -- 1,530 lbs.
Character -- Slightly more difficult to reduce than aspen; soft, easily bleached.
Possible uses -- Same as aspen.

BLACK GUM -- Nyssa sylvatica. Wt. 30 lbs. Fiber 1.7 m.m.
Range -- From Maine (Kennebec River) to Florida (Kissimmee River and Tampa Bay) and west to southern Ontario, southern Michigan (up to Gratiot County), southeastern Missouri, and Texas (Brazos River).


Soda Pulp

Yield -- 1,300 lbs.

Character -- Soft. A little harder to cook and bleach than aspen.

Possible uses -- Similar to aspen.

Mechanical Pulp

Yield -- 2,610 lbs.

Character -- Very short but tough fiber; Very white color.

Possible uses -- As a filler with longer fibered stock.

COTTON GUM -- Nyssa aquatica. Wt. 29 lbs. Fiber 1.6 mm.

Range -- Coast region from southern Virginia to northern Florida, and through the Gulf States to Texas (Nueces River); northward through Arkansas, west Tennessee and Kentucky, southern and southeastern Missouri to southern Illinois (lower Wabash River).

Common Names -- Large tupelo (Ala., La., Tex.); Tupelo gum (Ga., Ala., Miss., La.); Sour gum (Ark., Mo.); Swamp tupelo (S.C., La.); Cotton gum (N.C., S.C., Fla.); Tupelo (N.C., S.C.); Wild olive tree (La.); Olivier a grandes feuilles (La.); Oliver tree (Miss.); Bay poplar (Ala.).

Sulphite Pulp

Yield -- 1,160 lbs.

Character -- Easily pulped; Easily bleached; Poor strength; Fair color.

Possible uses -- Same as aspen.
Soda Pulp

Yield -- 1,200 lbs.

Character -- Soft, but harder to bleach than aspen.

Possible uses -- Similar to aspen.

RED GUM -- Liquidambar styraciflua. Wt. 27 lbs. Fiber 1.6 m.m.

Range -- From Connecticut (Fairfield County) to southeastern Missouri and Arkansas; south to Florida (Cape Canaveral and Tampa Bay) and Texas (Trinity River).

Common Names -- Sweet gum (Mass., R.I., N.Y., N.J., Pa., Del., Va., W.Va., N.C., S.C., Ga., Ala., Fla., Miss., La., Tex., Ark., Ky., Mo., Ill., Ind., Ohio); Liquidambar (R.I., N.Y., Del., N.J., Pa., La., Tex., Ohio, Ill.); Red gum (Va., Ala., Miss., Tex., La.); Gum (Va.); Gum-tree (S.C., La.); Alligator-wood (N.J.); Gilsted (N.J.); Starleaved gum; Satin walnut (lumber markets).

Sulphite Pulp

Yield -- 1,190 lbs.

Character -- Easily pulped; Difficult to bleach; Very poor strength; Dark colored.

Possible uses -- Few.

Soda Pulp

Yield -- 1,080 lbs.

Character -- A little more difficult to reduce than aspen; Soft and hard to bleach.

Possible uses -- Same as aspen.

CUCUMBER-TREE -- Magnolia acuminata. Wt. 27 lbs. Fiber 1.3 m.m.
Range -- From Western New York through southern Ontario to southern Illinois and south in the Appalachian Mountains to southern Alabama (Stockton) and northeastern Mississippi (Meridian); central Kentucky and Tennessee (near Nashville and eastern part of state); northeastern, southern and southwestern Arkansas.


Sulphite Pulp

Yield -- 1,250 lbs.

Character -- Easily pulped; Somewhat weak; Difficult to bleach; Dark colored.

Possible uses -- Few.

Soda Pulp

Yield -- 1,200 lbs.

Character -- A little harder to reduce and bleach than aspen.

Possible uses -- Same as aspen.

Mechanical Pulp

Probably similar to black gum.

SWEET MAGNOLIA -- Magnolia glauca. Wt. 39 lbs. Fiber 1.3 m.m.

Range -- Massachusetts (Gloucester, Essex County); Long Island (Turtle Pond, Suffolk County); from New Jersey to Florida (Biscayne Bay on the east coast, and to Tampa Bay on the west coast); west in the Gulf region to Texas (Trinity River).

Sulphite Pulp

Yield -- 1,680 lbs.

Character -- Easily pulped and bleached; Fair strength; Poor color.

Possible uses -- Can be used without pulps from conifers in manufacturing of book, magazine, and similar papers.

Soda Pulp

Yield -- 1,680 lbs.

Character -- Easily pulped; Rather difficult to bleach;
Soft opaque fiber.

Possible uses -- Same as aspen.

Mechanical Pulp

Probably similar to black gum.

SYCAMORE -- Platanus occidentalis. Wt. 29 lbs. Fiber 1.7 m.m.

Range -- Southeastern New Hampshire and southern Maine to Northern Vermont and Lake Ontario (Don River, near north shores of the lake); west to eastern Nebraska and Kansas and south to northern Florida, central Alabama and Mississippi, and Texas (Brazos river and thence south to Devils river).


Sulphite Pulp

Yield -- 1,300 lbs.

Character -- Easily pulped and bleached; Poor strength.

Possible uses -- Similar to aspen.
Soda Pulp

Yield -- 1,300 lbs.

Character -- Soft, easily bleached.

Possible uses -- Similar to aspen.

OHIO BUCKEYE -- Aesculus glabra. Wt. 21 lbs. Fiber ----

Range -- From Pennsylvania (western slopes Allegheny Mountains) to northern Alabama (Tennessee River Valley and Mountains) and west to southern Iowa, central Kansas, and Indian Territory.

Common Names -- Ohio buckeye (Miss., Ga., Ark., Mo., Ohio); Buckeye (Pa., Ky., Mo., Ill., Ind., Ohio, Iowa, Kans.); Fetid buckeye (W.Va.); Stinking buckeye (Ala., Ark.); American horse chestnut (Pa.).

Sulphite Pulp

Yield -- 940 lbs.

Character -- Easily pulped; Rather difficult to bleach; Silver gray color.

Possible uses -- Same as aspen.

Soda Pulp

Yield -- 940 lbs.

Character -- Fairly easily pulped; Rather difficult to bleach; Soft, opaque, short fiber.

Possible uses -- Same as aspen.

MANGROVE -- Rhizophora mangle. Wt. 56 lbs. Fiber ----

Range -- Southern coast of Florida (Mosquito Inlet and Cedar Keys to southern islands); Mississippi delta; Texas coast; eastern and western coasts of Mexico; Lower California; from Central America along northern and eastern coast of South America to the limits of the tropics; Bermudas, Bahamas, West Indies; Galapagos Islands.

Common Names -- Mangrove (Fla.)

Sulphite Pulp -- Did not test.

From comparatively few specimens.
Soda Pulp

Yield -- 2,400 lbs.
Character -- Readily pulped; Difficult to bleach; Short fiber.
Possible uses -- The same as aspen.

Butternut -- Juglans cinerea. Wt. 22 lbs. Fiber 1.2 m.m.

Range -- Southern New Brunswick to Delaware and on the Appalachian Mountains to Georgia and Alabama (head waters of Black Warrior River, Winston County); westward through Ontario to Dakota, southeastern Nebraska, southern Missouri, and northeastern Arkansas.


Sulphite Pulp

Yield -- 1,000 lbs.
Character -- Easily pulped and bleached; Weak and poor color.
Possible uses -- Same as aspen.

Soda Pulp

Yield -- 1,000 lbs.
Character -- Easily pulped; Difficult to bleach; Short, opaque fiber.
Possible uses -- Same as aspen.

Chestnut, Elms, Oaks, and Other Ring Porous Woods

Catalpa -- Catalpa catalpa. Wt. 31 lbs. Fiber ---
Range -- Supposed to be indigenous only in southwestern Georgia, western Florida, central Alabama and Mississippi, but widely cultivated and naturalized elsewhere east of the Rocky Mountains.


Sulphite Pulp

Yield -- 1,390 lbs.
Character -- Fairly easily pulped; Difficult to bleach;
Short fiber, specky and pink.
Possible uses -- Same as aspen.

Soda Pulp

Yield -- 1,340 lbs.
Character -- Easily pulped and bleached; Short opaque fiber.
Possible uses -- Same as aspen.

CHESTNUT -- Castanea dentata -- Wt. 25 lbs. Fiber 1.0 m.m.

Range -- From southern Maine to northwestern Vermont (Winooski River), southern Ontario, and southern shores of Lake Ontario to southeastern Michigan; southward to Delaware and southeastern Indiana, and on the Allegheny Mountains to central Kentucky and Tennessee, central Alabama, and Mississippi.

Sulphite Pulp -- (Unextracted wood.)

Yield -- 1,100 lbs.
Character -- Very difficult to bleach; Dark colored, weak pulp.
Possible uses -- None.

Soda Pulp

Yield (on extracted chips) 950 lbs.
Character -- Soft, easy bleaching, a little hard to cook.
Possible uses -- Similar to aspen. (Unextracted wood can be pulped but is very difficult to reduce and bleach.)

HACKBERRY -- Celtis occidentalis. Wt. 30 lbs. Fiber 1.1 m.m.

Range -- From St. Lawrence River (St. Helens Islands, near Montreal) to southern Ontario; in the United States from Massachusetts (Massachusetts Bay) to northwestern Nebraska, North Dakota, southern Idaho (Boise City), eastern Washington and Oregon (Snake River), western Washington (Puget Sound), Nevada (East Humboldt Mountains), New Mexico, and south to Florida (Biscayne Bay and Cape Romano), middle Tennessee, Missouri, eastern Kansas, Indian Territory, and eastern Texas.


Sulphite Pulp

Yield -- 1,300 lbs.
Character -- Easily pulped and bleached; Short fiber exceptionally light colored.
Possible uses -- Same as aspen.
**Soda Pulp**

Yield -- 1,200 lbs.

Character -- Easily pulped, Rather difficult to bleach; Short fiber not very opaque.

Possible uses -- Same as aspen.

**SASSAFRAS** -- Sassafras sassafras. Wt. 26 lbs. Fiber .9 m.m.

Range -- From eastern Massachusetts through southern Vermont, southern Ontario, and central Michigan, southeastern Iowa, eastern Kansas, and Indian Territory; south to central Florida and Texas (Brazos River).


**Sulphite Pulp**

Character -- Very difficult to pulp.

**Soda Pulp**

Yield -- 780 lbs.

Character -- Easily pulped; Difficult to bleach; Short, opaque fiber.

Possible uses -- Same as aspen.

**CORK ELM** -- Ulmus racemosa. Wt. 36 lbs. Fiber 1.32.

Range -- From Quebec (eastern townships) through Ontario, and south through northwestern New Hampshire to southern Vermont; westward through northern New York, southern Michigan, and Wisconsin (Lake Mendota, near Madison) to northeastern Nebraska (Meadville, Keyapaha County), southeastern Missouri, and middle Tennessee.
Common Names -- Cork elm (Vt., Mass., R.I., N.Y., N.J., Ark., Ky., Mo., Wis., Mich., Ohio, Iowa); Rock elm (R.I., W.Va., Ky., Mo., Ill., Wis., Iowa, Mich., Nebr., Ont.); Hickory elm (Mo., Ill., Ind., Iowa); White elm (Ont.); Thomas elm (Tenn.); Northern cork-barked elm (Tenn.); Cork-bark elm (N.Y.); Northern cork elm (Vt.); Wahoo (Ohio); Cliff elm (Wis.); Corky white elm.

Sulphite Pulp

Yield -- 1,620 lbs.

Character -- More difficult to pulp and bleach than aspen; Poor color and strength.

Possible uses -- Few.

Soda Pulp

Yield -- 1,620 lbs.

Character -- Easily pulped and bleached; Soft, and short fibered.

Possible uses -- Same as aspen.

SLIPPERY ELM -- Ulmus pubescent. Wt. 30 lbs. Fiber 1.7 m.m.

Range -- From Lower St. Lawrence River (Orleans Island) through Ontario to North Dakota and eastern Nebraska; south to western Florida, central Alabama, and Mississippi and Texas (San Antonio River).


Sulphite Pulp

Yield

Character -- Difficult to pulp.
Soda Pulp

Yield -- 1,260 lbs.

Character -- Easily pulped; Rather difficult to bleach; Short fiber.

Possible uses -- Same as aspen.

WHITE ELM -- Ulmus americana -- Wt. 27 lbs. Fiber 1.6 m.m.

Range -- From southern Newfoundland to Lake Superior (North shores) and to the eastern base of the Rocky Mountains (here up the Saskatchewan River to latitude 54° 30'); south to Florida (Cape Canaveral and Pease Creek); west to Dakota (Black Hills), western Nebraska, western Kansas, Indian Territory, and Texas (Rio Concho River).


Sulphite Pulp

Not tested.

Soda Pulp

Yield -- 1,080 lbs.

Character -- Easily pulped; Fairly easily bleached; Short fiber.

Possible uses -- Same as aspen.

WHITE ASH -- Fraxinus americana. Wt. 34 lbs. Fiber 1.2 m.m.

Range -- From Nova Scotia and Newfoundland to Florida and westward to Ontario and northern Minnesota, eastern Nebraska, Kansas, Oklahoma, and Texas, (Trinity River).
Common Names -- White ash (Me., N.H., Vt., Mass., R.I.,
Conn., N.Y., N.J., Del., Pa., Va., W.Va., N.C., S.C.,
Ga., Fla., Ala., Miss., La., Tex., Ky., Mo., Ill., Ind.,
Iowa, Kansas, Nebr., Mich., Ohio, Ont., Minn., N.Dak.,
Wis.); Ash (Ark., Iowa, Wis., Ill., Mo., Minn.); American
ash (Iowa); Franco-Frene (Quebec); Cane ash (Ala., Miss.,
La.).

Sulphite Pulp

Yield -- 1,530 lbs.

Character -- Easily pulped; A little hard to bleach;

Very weak; Poor color.

Possible uses -- Few.

Soda Pulp

Yield -- 1,350 lbs.

Character -- Very difficult to reduce and bleach.

Possible uses -- Few.

RED OAK -- Quercus rubra. Wt. 35 lbs. Fiber 1.5 m.m.

Range -- Nova Scotia and southern New Brunswick through
Quebec and along the north shores of Lake Huron to
near Lake Namekagon; south to middle Tennessee and Vir-
ginia, and along the Appalachian Mountains to northern
Georgia; west to eastern Nebraska, central Kansas.

Common Names -- Red oak (Me., Vt., N.H., Mass.; R.I., N.Y.,
Ky., Ill., Ind., Iowa, Nebr., Kansas, Mich., Minn., S.Dak.,
Ont.); Black oak (Vt., Conn., N.Y., Wis., Iowa, Nebr.,
S.Dak., Ont.); Spanish oak (Pa., N.C.),

Sulphite Pulp

Yield -- 1,600 lbs.

Character -- Easily pulped; Easily bleached; Very weak;

Poor color.

Possible uses -- Few.
**SODA PULP**

**Yield** -- 1,400 lbs.

**Character** -- Very difficult to pulp and bleach.

**Possible uses** -- Few.

**WHITE OAK** -- quercus alba. Wt. 37 lbs. Fiber 1.5 m.m.

**Range** -- From southern Maine to southwestern Quebec and through central and southern Ontario, lower peninsula of Michigan and southern Minnesota to southeastern Nebraska and eastern Kansas; south to northern Florida and Texas (Brazos River).


**SULPHITE PULP**

**Yield** -- 1,600 lbs.

**Character** -- Difficult to pulp and bleach.

**Possible uses** -- Few.

**SODA PULP**

**Yield** -- 1,480 lbs.

**Character** -- Difficult to pulp and bleach.

**Possible uses** -- Few.

**HICKORY** -- Hicoria alba. Wt. 40 lbs. Fiber 1.4 m.m.

**Range** -- Ontario to Florida (Cape Canaveral and Tampa Bay) and west to Missouri, eastern Kansas, Indian Territory and Texas (Brazos River).
Common Names -- Mocker nut (Mass., R.I., N.Y., N.J., Del., Ala., Miss., La., Tex., Ark., Ill., Iowa, Kans.); White-heart hickory (R.I., N.Y., Pa., Del., N.C., Tex., Ill., Ont., Iowa, Kans., Minn., Nebr.); Bullnut (N.Y., Fla., Miss., Tex., Mo., Ohio, Ill., Minn.); Black hickory (Tex., Miss., La., Mo.); Big-bud, Red hickory (Fla.); Hickory (Ala., Tex.); Hardbark hickory (Ill.); Hickory (Pa., S.C., Nebr.); Common hickory (N.C.); White hickory (Pa., S.J.); Hickory nut (Ky.); Big hickory nut (W.Va.); Hog nut (Del.).

Sulphite Pulp

Yield -- 1,680 lbs.

Character -- Difficult to pulp; Readily bleached; Short fiber.

Possible uses -- Same as aspen.

Soda Pulp

Yield -- 1,380 lbs.

Character -- Readily pulped; Difficult to bleach; Short fiber.

Possible uses -- Same as aspen.

LOCUST -- Robinia pseudacacia. Wt. 41 lbs. Fiber

Range -- From Pennsylvania (on the Appalachian Mountains from Locust Ridge in Marion County) to northern Georgia. Widely naturalized through cultivation and other agencies throughout the United States east of the Rocky Mountains; possibly indigenous in parts of Arkansas (Crowleys Ridge, etc.) and eastern Indian Territory; also in the Great Smoky Mountains of eastern Tennessee (Sevier County).

Sulphite Pulp

Yield -- 1,970 lbs.
Character -- Difficult to pulp; Very difficult to bleach;
Short fiber.
Possible uses -- Few.

Soda Pulp

Yield -- 1,700 lbs.
Character -- Fairly easily pulped; Very difficult to
bleach; Short opaque fiber.
Possible uses -- Same as aspen.

YUCCA -- Yucca constricta. Wt. 18 lbs. Fiber ----
Range -- Southwestern Texas to southern Arizona; northern
Mexico.

Soda Pulp

Yield -- 720 lbs.
Character -- Readily pulped; Rather difficult to bleach;
Short pithy fiber.
Possible uses -- Few

CABBAGE PALMETTO -- Sabal palmetto. Wt. 23 lbs. Fiber ----
Range -- Coast region from North Carolina (Smiths Island,
Cape Fear River) to Florida (Key Largo), and on the Gulf
coast to the Apalachicola River.

Common Names -- Cabbage palmetto (N.C., S.C.); Bank's pal-
metto (N.C.); Palmetto (N.C., S.C.); Cabbage-tree (Miss.,
Fla.); Tree palmetto (La.).
Sulphate Pulp
Yield -- 1,400 lbs.
Character -- Readily pulped at low pressure; Fairly easily bleached; Pithy fiber of fair felting properties.
Possible uses -- In the manufacture of book, magazine, and similar papers.

Soda Pulp
Yield -- 1,150 lbs. of a low grade pithy fiber.
Character -- Coarse, tender fiber; Impossible to bleach; Poor color.
Possible uses -- Few.

Note: Requests for copies of this pamphlet should be addressed to the Forest Products Laboratory, Madison, Wisconsin.