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AMERICAN WOODS USED IN PAPER MAKING

The following summarizes the pulping qualities of the principal woods used in the United States for the production of pulp and paper. About 70 percent of all the wood (estimated in standard cords) used by this industry in the United States consists of spruce, hemlock, and pine; about 14 percent consists of 5 species of both soft and hardwoods; the remainder includes about 13 species of soft and hardwoods and wood waste. Experiments at the Forest Products Laboratory indicate that with slight modifications in the standard pulping processes many others might be used. Reports of results of the experiments on a number of these woods can be obtained from the Laboratory.

Softwoods

SPRUCES. All spruces are suitable for pulping by any process, and all make high-quality pulp.

HEMLOCKS. Western hemlock is very similar to the spruces in its pulping quality, although in the groundwood or mechanical process it requires more power than spruce to produce pulp of the same strength. Eastern hemlock is not so suitable for groundwood as the western hemlock. Chemical pulps made from it are darker, require more bleach, and are usually weaker than spruce pulps.

PINES. All pines reduce readily in the alkaline (soda and sulfate) processes. The pulps can be bleached satisfactorily under proper conditions. The young, fast-growth southern pines, shore, ponderosa, sugar, limber, pinon, eastern white, and jack pines are all suitable for groundwood pulps. Jack pine groundwood, however, when used in too high proportion in a paper furnish, is apt to

cause trouble because of pitch. The same is true of many other pines which, in addition, are not well suited to the groundwood process because of dark color. Young southern yellow pines, jack, shore, red, pond, sand, and Virginia pines can be made into good sulfite pulp with a reasonable bleach consumption by slight modifications of the standard process. With other pines uniformity of digestion is a problem because of the presence of difficultly digestible heartwood.

FIRS. All true firs are as readily pulped by any process as spruce and with one exception are comparable in quality. Red fir gives a rather dark mechanical pulp, and the sulfite and sulfate pulps are more difficult to bleach than spruce.

BALDCYPRESS, DOUGLAS-FIR, LARCHES (TAMARACKS), AND REDCEDARS. These woods are not suitable for the generally acceptable grades of groundwood pulp. Douglas-fir logs after a pretreatment with steam or hot dilute alkali are ground for pulp to be used in shipping container boards. These woods are digested with greater difficulty by the sulfite process, but with modifications the process may be used with some of them to produce pulps of commercial quality. They all may be reduced by alkaline processes to pulps not quite so strong, but otherwise comparable to pine pulps.

WHITE-CEDARS. These species are readily pulped by all processes for fairly acceptable quality pulps. The yields, in comparison with other woods, are normal on a weight basis, but because of somewhat lower density they give lower yields on a cord basis. Therefore, their use is not generally practicable without suitable adjustments in cord prices.

Hardwoods

POPLARS. A number of species are classified under this heading because of similar pulping characteristics rather than because of botanical similarity, although

some of them are quite closely related. As a group they constitute the largest quantity of hardwoods used for pulp and paper manufacture. Included in the group are the aspens, the cottonwoods, and balsam and tuliptree poplars. All are adapted to pulping by the several chemical processes and the groundwood process. The bleached chemical pulps are used extensively in printing papers of the higher grades. The unbleached pulps are useful in the cheaper printing and wrapping papers. The pulps produced by the groundwood process are limited either to specialties, such as tissues, or to the heavy structural boards, such as insulation. Experiments at this Laboratory have demonstrated that appreciable proportions of "poplar" neutral sulfite semichemical and groundwood pulps may be utilized in the manufacture of newsprint.

BEECH, BIRCH, MAPLE, SWEETGUM, AND TUPELO (GUM). This group, including the various varieties of these species, constitutes the second largest quantity-group of hardwoods used for pulp. Like the "poplars," they are all adapted to pulping by the chemical processes. Their principal use is in the white printing and cheap wrapping papers. Recent experimental work shows that most of them are adapted to the manufacture of newsprint paper.

MISCELLANEOUS HARDWOODS. Species under this heading include principally ash, chestnut (after tannin extraction), elm, oaks, and willows, as well as the lesser-used species of alder, basswood, buckeye, butternut, catalpa, sugarberry, magnolia, mangrove, hickory, locust, sassafras, and sycamore. All may be pulped by the soda and sulfate processes, most of them quite readily. The sulfite and neutral sulfite semichemical processes are also adapted to most of these woods. The lighter-colored species are suitable for pulping by the groundwood process. Their principal use is in book, magazine, and cheap printing papers and in corrugating board.