O.D.C. 62:174.2 Aspen

CANADA
DEPARTMENT OF FORESTRY
AND RURAL DEVELOPMENT

High total productivity of a young aspen stand in Manitoba

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Reprinted from
WOODLANDS REVIEW
OCTOBER, 1967

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Short-rotation management of fast-growing species is a means of getting quick return on investments and can fill future demand for fibre.

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WORLD DEMAND FOR WOOD is rising rapidly, and it is estimated that by the year 2000 the amount of fibre used in Canada for pulp and paper production will increase fivefold (Fowler, 1966). Meanwhile the cost of production is increasing, because of rising labour costs and the nomadic character of woods operations. Moreover the industry will eventually run out of economically harvestable old-growth timber and will be forced to grow its raw material in managed forests.

Short-rotation management should be considered as a means of getting quick returns on investments. Such practice would result in the cropping of small trees, with much of the total volume coming from limbs, leaves, and bark — parts which can not be economically utilized by conventional methods. If, however, techniques can be developed to use the whole tree, both yields and profits should be greatly increased.

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Suitable species

Fast-growing species that reproduce readily and have desirable wood characteristics with relatively little bark will be required for short-rotation management. Sycamore may be suitable for use in the southern United States, where researchers (McAlpine *et al.*, 1966) have reported production of good-quality pulp from whole young trees.

Similarly, in Canada, trembling aspen might be used because of its thin bark, rapid growth, ease of regeneration and widespread occurrence. Mature aspen trees are being used for the manufacture of pulp, fibreboard and chipboard; unbarked juvenile wood also appears suitable for these purposes.[2]

Since no data were available on the total productivity of young aspen, an exploratory study was held in south-eastern Manitoba to obtain this information. Following are the results of that study.

Survey method

The survey was carried out in mid-April, 1967, (before flushing), in a 13-year-old stand growing on well-drained light-textured low-relief till about 40 miles south-east of Winnipeg. The trees ranged in diameter from 0.2 to 2.8 in., and in height from 6 to 25 feet. The breast-height diameter of all trees was measured to the closest 1/10 inch. Nine sample plots (size 10 by 10 ft.) were established at random in the stand; the only prerequisite was that stocking on each should be uniform. In addition, 20 trees of different sizes were cut for constructing local volume tables and for es-

Sample plot statistics per acre, 13-year-old aspen stand (in order of productivity)

Plot number	*6*	*8*	*3*	*5*	*9*	*4*	*2*	*1*	*7*	*Average*
Number of trees	6534	3920	8712	10019	7841	8276	6534	9148	8276	7695
Total volume,* (cu. ft.)	669	978	1185	1194	1437	1533	1540	1876	1947	1373
Green weight,* (tons)	17.19	25.13	30.45	30.66	36.91	39.36	39.55	48.18	50.00	35.27
Oven-dry weight,* (tons)	7.77	11.36	13.76	13.86	16.68	17.79	17.88	21.78	22.60	15.94

*Includes the above-ground portion of the stand.

tablishing size-weight relationships. In the laboratory, the volumes of trees were determined by submersion and "green" and "oven-dry" weights were obtained.

High productivity

The results show an average total production of 1,373 cu. ft., or 35.27 tons of green matter, or 15.94 tons of dry matter per acre. Total volume production is about 40% higher than that from other unthinned aspen stands (Steneker and Jarvis, 1966). The difference presumably comes from different utilization standards. Past studies considered only the main stem without bark and excluded trees of less than 0.6 in.; we, on the other hand, included all the above-ground portion of the stand. Within the range of densities investigated, no significant correlation was found between total production and density. The ratios of dry weight to green weight in individual trees averaged 0.452 $\pm$ 0.018. Tree size had no significant effect.

These results indicate that young natural aspen stands contain substantial volumes of raw material. It is conceivable that even greater production can be obtained if, at the time of establishment, treatments are carried out to minimize vegetative competition, or fertilizers applied to increase growth. Further research is needed, however, to determine (1) pulping qualities of the material, (2) silvicultural implications of such short rotations, (3) reliable growth and yield information for young aspen stands at various densities on different sites, and (4) economical harvesting techniques for small trees. ●●

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