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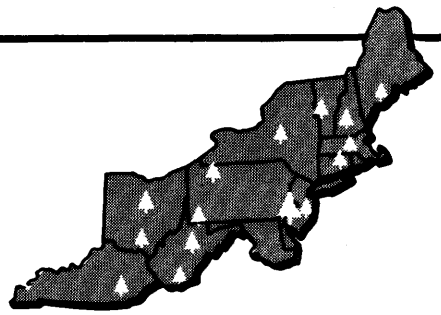

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APPALACHIAN HARDWOOD STUMP SPROUTS ARE POTENTIAL SAWLOG CROP TREES

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Abstract.—A survey of 8- and 12-year-old hardwood stump sprouts was made in north-central West Virginia. Species surveyed were yellow-poplar, black cherry, red oak, red maple, and basswood. Of the stumps cut 12 years ago, 66 percent produced at least one dominant or codominant sprout that originated at groundline and was free from forks in the lower 25 feet of the bole. The abundance and quality of these stump sprouts indicated that many of them can be considered as potential sawlog crop trees.

Many foresters feel that hardwood stump sprouts do not produce good sawlog crop trees. Because little is known about the possibility of selecting young sprouts as crop trees, a survey was made to determine the relative quality of 8- and 12-year-old Appalachian hardwood stump sprouts in north-central West Virginia. Five hardwood species were sampled: yellow-poplar (*Liriodendron tulipifera* L.), black cherry (*Prunus serotina* Ehrh.), northern red oak (*Quercus rubra* L.), red maple (*Acer rubrum* L.), and basswood (*Tilia americana* L.).

Methods

Only sprouts originating from stumps at least 12 inches in diameter were sampled. A potential sawlog crop tree was defined as a dominant or codominant sprout attached to the stump not more than 6 inches above groundline. It is generally recognized that stem form—sweep and crook—is an important factor in determining stem quality. However, stem form was not considered in this study because it could not be measured accurately on 8- and 12-year-old sprouts; and many crooked young trees have the ability to outgrow poor stem form.

The following measurements were taken on each potential sawlog crop tree: dbh, total height, and clear length—that is, height to the first live branch, and height to any fork below 25 feet. A fork was defined as the branching of the main stem into two or more stems of approximately the same diameter. Also, number of live sprouts was recorded for each stump.

Stumps were examined on 8 areas; 6 of the areas had been clearcut 8 years ago and 2 had been clearcut 12 years ago. The average age of the stands before cutting was between 50 and 60 years. Site indexes for the study areas ranged from red oak indexes 70 to 80. A total of 736 stumps with live sprouts were examined: 164 yellow-poplar, 206 basswood, 186 red oak, 134 red maple, and 46 black cherry. The number of

potential sawlog crop trees measured for each species was: yellow-poplar 250, basswood 520, red oak 294, red maple 244, and black cherry 111, a total of 1,419 sprouts.

Results

The survey data were summarized as follows: characteristics of stump sprouting (table 1) and characteristics of sprouts classified as potential sawlog crop trees (tables 2 and 3). The data were grouped by age of sprouts—8-year and 12-year. No attempt was made to compare the two age groups. Data were compared separately for each species.

8-year-old stumps.—Basswood had the greatest number of live stems per stump—16.8—and yellow-poplar the least—5.0 (table 1). Basswood also had the greatest number of potential crop trees per stump, averaging 2.5 stems. Red maple had an average of 1.9 potential crop trees per stump; yellow-poplar had 1.4, and red oak had 1.2. For all species, 86 percent of the stumps cut 8 years ago had at least one potential crop tree.

12-year-old stumps.—Red oak had the greatest number of live sprouts per stump—6.5 (table 1). All species were similar in this respect, having between 3.9 and 6.5 stems per stump. Black cherry had the greatest number of potential crop trees per stump—2.4. The other species had between 1.5 and 1.8. The average numbers of potential crop trees per stump were similar at 8 and 12 years.

Every black cherry stump examined had at least one potential crop tree; at least 88 percent of the stumps of each of the other species had at least one potential crop tree. The major cause for the lack of potential crop trees on some stumps was overtopping of sprouts by adjacent stems. A few stumps did not have any low-origin sprout stems.

Characteristics of potential crop trees.—About 89 percent of all stumps had at least one potential crop tree that originated at groundline (table 1).

Potential-crop-tree data were summarized separately for 8- and 12-year-old stems. Average dbh, clear length, and total height data are summarized in table 2; origin and forking characteristics are presented in table 3. Thirty-six percent of the yellow-poplar, 20 percent of the red oak and red maple, 15 percent of the basswood, and 46 percent of the black cherry sprouts were classified as potential sawlog crop trees.

About 66 percent of all 12-year-old stumps had

Table 1.—*Characteristics of stump sprouting*

Age class and species	Stumps surveyed	Live sprouts per stump	Potential crop trees per stump	Stumps without potential crop trees
	No.	*No.*	*No.*	*No.*
8-year-old:				
Yellow-poplar	119	5.0	1.4	14
Basswood	206	16.8	2.5	31
Red oak	51	7.9	1.2	9
Red maple	78	11.1	1.9	6
12-year-old:				
Yellow-poplar	45	3.9	1.8	2
Red oak	135	6.5	1.7	13
Red maple	56	5.5	1.5	7
Black cherry	46	5.2	2.4	0

Table 2.—*Average dbh, height, and clear length of sprout-origin potential sawlog crop trees*

Age class and species	Dbh	Clear length	Total height
	Inches	*Feet*	*Feet*
8-year-old:			
Yellow-poplar	3.1	7.2	28.9
Basswood	2.6	9.5	25.7
Red maple	2.1	5.7	22.0
Red oak	1.9	6.3	21.4
12-year-old:			
Yellow-poplar	4.7	19.0	40.0
Red maple	3.2	10.7	31.5
Red oak	3.0	11.9	30.8
Black cherry	4.4	14.4	42.8

Table 3.—*Origin and forking characteristics of sprout-origin potential sawlog crop trees*

Age class and species	Crop trees surveyed	Crop trees originating at groundline	Crop trees with no forks below 25 feet
	No.	*Pct.*	*Pct.*
8-year-old:			
Yellow-poplar	167	81	93
Basswood	520	88	77
Red maple	156	94	84
Red oak	61	95	85
12-year-old:			
Yellow-poplar	83	84	93
Red maple	88	89	69
Red oak	233	78	62
Black cherry	111	74	70

at least one stem of groundline origin with no forks below 25 feet. By species, yellow-poplar had 84 percent, red oak 59 percent, red maple 73 percent, and black cherry 65 percent of the stumps in this class.

Low forking was found to be much more of a problem with black cherry, red maple, and red oak than with yellow-poplar and basswood (table 3). No apparent reason for this difference in branching characteristic was observed.

Discussion

Stump sprouts traditionally have been associated with butt rot resulting from decay of the parent stem. However, several points about stump sprouts must be considered.

First, much of the butt rot observed in the past may have been initiated by fire at a time when fire protection was not nearly as good as it is today.

Second, sprouts originating high on the stump are more susceptible to butt rot (*Roth and Hepting 1943*). Improved timber-harvesting practices have led to lower stump heights, which means fewer high-origin sprouts. Also, increased intensity of forest management includes thinning sprouts at an early age, and this eliminates many high-origin sprouts.

Third, single sprouts originating from small stumps may be mistaken for seedling-origin stems (*Roth and Sleeth 1939*). In past comparisons of sprouts versus seedlings, the best sprouts may often have been considered seedlings.

Research results indicate that, at an early age, sprouts generally grow faster than seedlings. Dbh and total height data for 12-year-old sprouts were compared to similar data for seedlings (table 4). Total heights of the sprouts averaged about 1.4 times that of the seedlings, and dbh for the sprouts averaged 1.6 times that of the seedlings. Faster early growth must be considered as an advantage of sprouts.

Table 4.—*Comparisons of 12-year-old seedling-origin[a] and stump-sprout-origin potential sawlog crop trees*

Species	Dbh		Height	
	Seedlings	Sprouts	Seedlings	Sprouts
	Inches		*Feet*	
Yellow-poplar	2.5	4.7	24	40
Black cherry	2.7	4.4	26	43
Red oak	1.8	3.0	23	31

[a]Seedling-origin data from Trimble (*1973, 1974*) for red oak site index 75 or greater.

Conclusions

Eighty-nine percent (655) of the 8- and 12-year-old stumps produced at least one potential crop tree, that is, a dominant or codominant sprout that originated on the stump less than 6 inches above groundline. About 66 percent (186) of the 12-year-old stumps had at least one dominant or

Figure 1.—Twelve-year-old black cherry stump sprouts before thinning.

Figure 2.—Twelve-year-old black cherry stump sprouts after thinning.

codominant sprout of groundline origin that did not fork in the lower 25 feet of the bole.

Although the future quality of stump sprouts cannot be predicted with certainty, a high proportion of stumps will produce some stems of crop-tree quality (fig. 1 and fig. 2).

The results of the study indicate that many stump sprouts have a high potential for producing quality stems.

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