POTENTIAL OF BEECH AND STRIPED MAPLE TO DOMINATE REGENERATION ON EASTERN HARDWOOD SITES[1/]

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INTRODUCTION

One of the most challenging problems in managing eastern hardwood stands is establishing desirable natural regeneration. Shaded conditions after intermediate cuts, and persistent use of the selection method of regeneration, favors shade tolerant trees and shrubs in the understory. In northern hardwood stands American beech (Fagus grandifolia Ehrh.), striped maple (Acer pensylvanicum L.), and hobblebush (Viburnum alnifolium L.) are often abundant in the understory. In Appalachian and Central hardwood stands, American beech and striped maple may be common on cool northern slopes. Where these species dominate in the understory, they pose a challenge to regenerating desirable species, like maples, birch, ash, and oaks. Beech and striped maple can be controlled with herbicides or by repeated cutting, but we need greater knowledge of their ecological requirements and growth in relation to other trees to effectively manage their abundance in future stands. Preliminary studies are providing data on potential abundance of beech and striped maple, their regeneration habits and their height growth patterns under varying overstory conditions.

METHODS AND MATERIALS

Four northern hardwood stands were studied in Vermont that had little recent disturbance and an abundant understory of beech and striped maple. All woody stems greater than 4.5 ft. in height were measured on a 1/20 acre plot. Root systems of all understory beech were examined to determine if they had a T-shape indicative of sucker origin. Stems of numerous beech and striped maple were analyzed to determine patterns of height growth. In the four stands beech comprised from 27 to 85 percent and striped maple from 10 to 53 percent of all the understory trees over 4.5 ft. high. Among the four stands the two species constituted 80 to 100 percent of the understory trees.

Some beech stands may have high natural potential for suckering without damage to roots of mature trees, a stimulus that may induce suckering. Among the 4 plots beech suckers ranged from 44 to 73 percent of the beech counted. Of these suckers 4 to 20 percent had new lateral roots improving support of the stem and thus enhancing potential to reach commercial size. The remaining stems had only the original T-root and thus poor vertical stability. Suckers that lack new supporting laterals could persist, thereby shading out desirable regeneration but never reach harvestable size (Fig. 1).

In undisturbed stands suckers larger than 3 inches diameter at the base have not been found, but it is difficult to identify a larger stem of such origin if it has formed new lateral roots. Under the low density overwood of a shelterwood, beech suckers up to 12 years old, about 15 feet tall and 1-2 inches diameter were identified. In heavily cut shelterwoods with 40 sq. ft. basal area as overwood, beech, striped maple and pin cherry often dominated the regeneration with yellow birch and sugar maple secondary. A survey in four shelterwood stands indicated up to 14,000 beech suckers and about 9,700 beech seedlings per acre compared to 3,800 suckers and 5,000 seedlings in uncut stands.

Stem analyses are being made on striped maple and they show variable growth patterns depending on amount of overhead shade. Striped maple over 8" dbh, 45 to 50 feet tall, and up to 58 years old (Fig. 2) have been found. These trees are very shade tolerant and can have variable height growth patterns depending on the overhead competition. Small trees under heavy shade may be up to 35 years old and only 1 to 2 feet tall (Hibbs 1980). When these trees are released, they grow rapidly and can suppress desirable regeneration. Striped maple also seems adapted to adversity, if broken, it can resprout from basal buds; if stems or branches are in contact with the forest floor, they can form roots near each branch node. One small tree laid down by the snow was observed having new roots and upright stems occurring at 17 branch junctions.

These preliminary studies are the basis for planning intensive study on the origin, structure, and development of stands including stem analyses of desirable and undesirable trees to determine their patterns of growth and their time of entry into the stand. This basic information should be helpful in formulating silvicultural practices to help control the abundance of undesirable species (Fig. 3).

To avoid domination of beech and striped maple in the understory mechanical or herbicidal weeding should be done in conjunction with any overstory cutting. Dense shade following cutting will restrict growth of seedlings, suckers or stump sprouts. In an observed stand that had understory TSI the cut stumps of striped maple in a sunlit opening had sprouts about 5 ft. high after 2 years, but these succulent stems were frequently browsed by deer. In a dense portion of the stand stumps had sprouts about 2 ft. tall. If beech regeneration is mostly suckers, consider minimizing beech overstory and weed out the suckers that arise. Until we have better answers, implementing these practices should give seedlings of more desirable species in northern, Appalachian, or central hardwood stands a better opportunity against two very aggressive competitors, beech and striped maple.

1/ Poster presented at the Sixth Central Hardwood Forest Conference, Knoxville, TN, February 24-26, 1987.

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Figure 1. Beech sucker with a typical T-root system. This stem may not mature without development of new laterals.

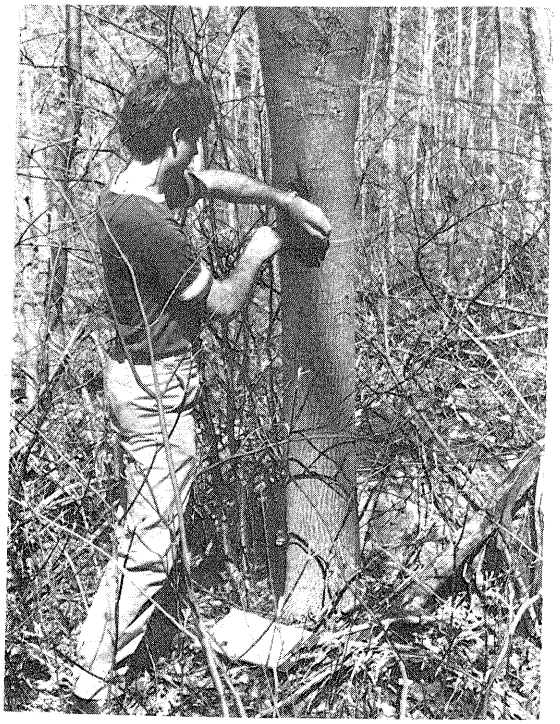

Figure 2. Eight-inch dbh striped maple, about 45 years old in a mature second growth northern hardwood forest with a history of partial cutting. Shrubs surrounding this tree are hobblebush.

Figure 3. A northern hardwood stand with beech, striped maple, and hobblebush dominating the understory. Without understory treatment these species may dominate the next stand for a considerable period of time.

LITERATURE CITED

Hibbs, David E., B.F. Wilson, and B.C. Fischer. 1980. Habitat requirements and growth of striped maple (Acer pensylvanicum L.). Ecology 61(3):490-496.