



CENTRAL HARDWOOD NOTES

Treatments To Encourage Natural Regeneration

Hardwoods can be regenerated best by clearcuttings, shelterwood cutting, or group selection. Regardless of the method chosen, regeneration comes from three sources:

1. New seedlings.
2. Stump sprouts (from stems with groundline diameter greater than 2 inches).
3. Advance reproduction (stems or sprouts from stems less than 2 inches in diameter at groundline).

New seedlings are a viable source of regeneration only for yellow-poplar, some of the birches, and, in some cases, white ash, basswood, and black cherry. Very high seedling densities and relatively rapid juvenile growth are characteristic of these species. With adequate seed sources they can be regenerated by removing all of the existing overstory, including undesirable stems of all sizes, or by removing more than half of the overstory and controlling subcanopy stems as the initial cut in a shelterwood.

All hardwoods sprout, and stump sprouts can become desirable stems in new stands. For example, stump sprouts are often an important source of oak regeneration on low-quality sites (see Note 3.03 *How to Assess Oak Regeneration Potential in the Missouri Ozarks*). For a mature stand, however, the potential contribution of stump sprouts to the next stand is finite and cannot be increased during the last 10 to 20 years of the rotation. Numbers of sprouts of undesirable species can be reduced by applying herbicides prior to overstory removal.

If you want to regenerate hardwoods other than yellow-poplar, birches, and in some cases white oak, basswood, and black cherry, and if stump sprout potential of these other species is inadequate, then advance reproduction must be present before the overstory of the existing stand is heavily cut. When advance reproduction of such species as oaks, hickories, ashes, and basswoods is present, you have the opportunity to maintain a component of these species in the next stand.

Except in areas with very high deer populations, advance reproduction of several species is usually present under mature hardwood stands. If the stand has not been disturbed for several decades, this advance reproduction is likely to be quite small and not capable of competing successfully when you remove the overstory. For most species, the larger the advance reproduction, the better its chance of becoming dominant or codominant in the next stand. Under fully-stocked stands, seedlings of commercially desirable species become established, live for a few years, and die. Only relatively shade-tolerant species are able to persist for extended periods and to increase in size. For example, red oak seedlings are intermediate in shade tolerance and can become established under dense stands

after good acorn crops. But 10 years after establishment only a few of these seedlings will have survived, and they will be very small. Clearly, some kind of disturbance is necessary to break this cycle of establishment and mortality, and to provide conditions that will permit small advance reproduction to grow.

Thinnings sometime allow large advance reproduction to develop. More often, however, thinnings merely allow shade-tolerant midstory trees to expand their crowns, with little or no development of advance reproduction. Thinnings, by definition, are not regeneration cuts, and should not be relied on to provide the large advance reproduction necessary to regenerate most species. Treatments to enhance the development of advance reproduction should be considered part of a shelterwood method, even though all of the regeneration developing after overstory removal may not come from advance reproduction.

Research to determine the treatments necessary to develop large advance reproduction of oaks, hickories, ashes, and basswood is continuing in several places. But two guidelines seem to be emerging:

1. Reduce stand stocking or basal area from below, leaving no gaps in the overstory.
2. Use herbicides to reduce basal area of tolerant, noncommercial species in the midstory and lower canopy.

These guidelines enhance the growth of small advance reproduction that is already established in the stand, but do not necessarily result in the establishment of new seedlings of the desired species.

If the reduction in stand stocking creates large canopy gaps, yellow-poplar, the birches, and black cherry can become established and grow, and will dominate the stand after overstory removal. If herbicides, rather than cutting, are used to reduce the stocking of the tolerant undesirables, these species will be prevented from recapturing growing space. Since this treatment enhances the growth of existing advance reproduction, you have to assess the advance reproduction prior to treatment (see Note 3.02 *Assessing Regeneration Potential*).

About 1,000 or more small stems per acre of advance reproduction of the desired species should be present on the site before stocking is reduced as described above. Probably 10 or more years will be required for the small advance reproduction to grow large enough to compete successfully when the overstory is removed. If fewer than 1,000 small advance stems of the desired species are present, you have three alternatives:

1. Change regeneration objectives.
2. Wait until advance reproduction of the desired species becomes established before applying the treatment.
3. Underplant oaks in conjunction with the treatment described above (see Note 3.06 *Seeding and Planting Upland Oaks*).

You should assess regeneration potential before regenerating any mature hardwood stand. If oaks, hickories, ashes, or basswoods are among the species you want in the next stand, large advance reproduction of these species must be present. If large advance reproduction of these species is not present, you must manipulate the stand to enhance the growth of small advance reproduction of these species without allowing intolerant species to become established and gain a competitive advantage. The best way to accomplish this is through a reduction in stocking that includes applying herbicide to undesirable shade-tolerant stems in the midstory, but leaves the stocking of the main canopy high enough to prevent intolerant species from regenerating.

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