



FORESTRY EXTENSION NOTES

NATURAL REGENERATION OF OAK IN IOWA

The oak and oak/hickory forests make up about 46% of Iowa's forestland. Approximately a third of these woodlands have adequate oak regeneration for the woodlands of the future. In most locations in Iowa, because oak is moderately intolerant to shade, most woodlands are regenerating to more shade tolerant species. As a result, much of the natural regeneration that is present is not oak but often includes such more tolerant species such as ironwood, hickories, ashes, hard maples, elms, black cherry and woody shrubs. Because of its relatively high value, woodland managers may desire to perform cultural practices to favor the regeneration of oak species.

Requirements for Oak Regeneration

Regeneration is a forestry practice aimed at the establishment of new trees as the old trees become mature and are harvested. Forest management techniques are implemented either before, during, or after a harvest cutting. The techniques used are determined by the condition of the woodland and the management objectives of the owner. The forest soils, topography, species, woodland density, and existing reproduction are all factors in the selection of oak regeneration techniques.

Although a wide variety of oak species are found on a range of soils and topography,

most high value Iowa oak stands are found on moist, well-drained soils on a mid slope position. The best sites are usually located on north and northeast facing slopes and on moist benches.

Oaks will begin to bear fruit at about 25 years of age with good acorn crops every 2 to 10 years. White oak acorns (white, bur, swamp white, chinkapin and overcup) will germinate in the fall after seed fall while red oak acorns (red, black, northern pin, and shingle) will not germinate until the following spring.

Oak is considered somewhat intolerant of shade. Oak seedlings can persist in shade for 5 to 7 years, but eventually need full sunlight to survive and develop.

Oak Regeneration Techniques

Oak regeneration is obtained by either planting or performing cultural techniques to encourage natural regeneration. Planting is done 2 to 4 years before harvest or immediately after harvest. Planted seedlings must be free from severe overtopping competition for 3 to 5 years or until they are 4 to 6 feet tall. For natural regeneration, harvest techniques and/or pre harvest cultural activities are designed to favor oak reproduction over other less desirable species. Because of

F-360/Revised/December 1998

IOWA STATE UNIVERSITY

University Extension

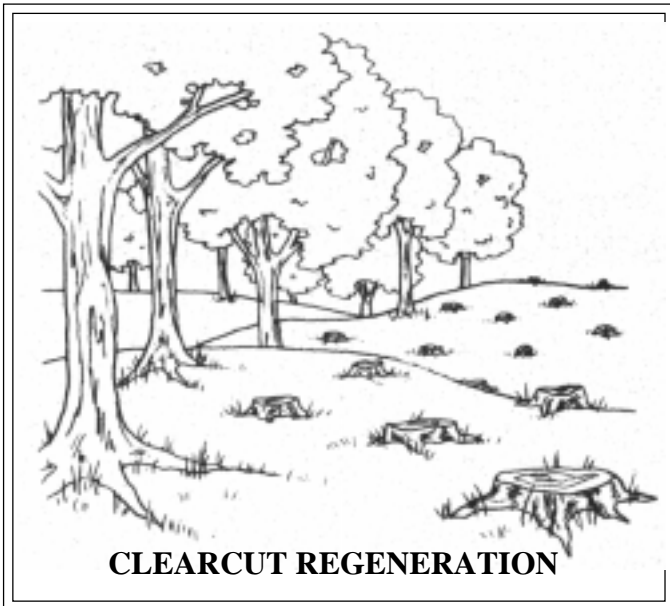
Ames, Iowa

...and justice for all

The Iowa Cooperative Extension Service's programs and policies are consistent with pertinent federal and state laws and regulations on nondiscrimination. Many materials can be made available in alternative formats for ADA clients.

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Stanley R. Johnson, director, Cooperative Extension Service, Iowa State University of Science and Technology, Ames, Iowa.

oak's relatively high requirement sunlight, three regeneration techniques which appear to work best are the **clearcut**, **group selection**, and **shelterwood** methods. To successfully use these methods for natural regeneration, at least 20 mature and well distributed oaks per acre are required. If there are not adequate seed trees, these methods must be used in combination with planted seedlings. The **single tree selection** and **seed tree** regeneration techniques are not appropriate for obtaining oak regeneration because they either do not provide enough sunlight for the seedlings to grow or because the acorns are too heavy to adequately seed between the seed trees.



Clearcutting is the removal of all trees larger than 1 to 2 inches in diameter. Cut unmerchantable oaks as low as possible to facilitate sprouting from near ground level. Use herbicides on undesirable species that produce vigorous stump sprouts. The size of the clearcut will vary depending on where oak regeneration is most likely to be successful. Clearcuts less than 2 acres in size are usually less successful because a significant portion of the opening is shaded by the surrounding stand of trees. The use of

clearcutting as a regeneration procedure is most successful when adequate seedlings are established prior to harvest. This requires approximately 500 seedlings per acre if they are at least four feet tall or 5,000 seedlings per acre if they are from 2 to 4 feet in height. Seedlings less than two feet in height are not competitive enough to become established in the clearcut.

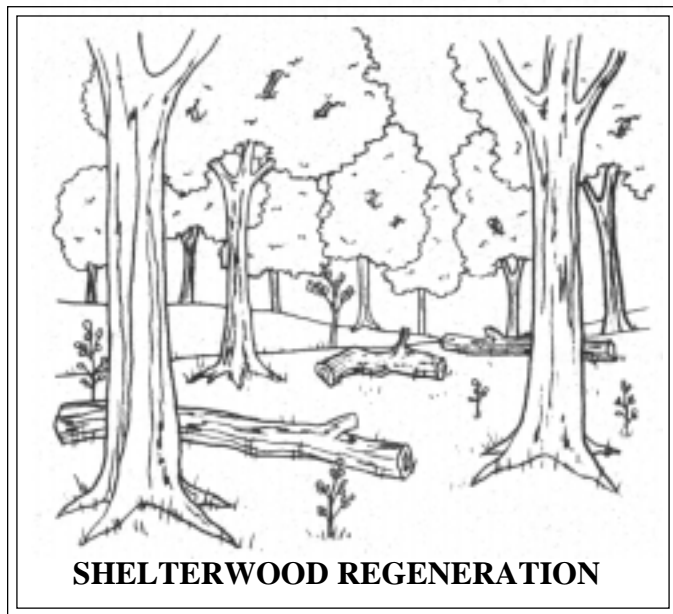
Recent field trials in Iowa are, however, showing that harvesting timed with a good acorn crop and accompanied with extensive soil disturbance may provide adequate seedling establishment. This technique must be timed to occur after the acorns have fallen. Harvesting should be delayed if an abundant seed crop is not available. Most success has been obtained with whole tree harvest accompanied by use of a dozer equipped with a toothed blade. This type of soil disturbance enhances acorn germination by placing the acorns in soil contact or covering with a thin layer of soil. In addition many of the less woody desirable species sprout less or are killed in the raking process.

When using a clearcutting technique, oak reproduction must be established prior to harvest or immediately after harvest or less desirable species will occupy the site. If natural regeneration is not successful, oak seedlings can be planted the following year but will require competition control for success.

Group Selection is similar to clearcutting except that it involves cutting small groupings of trees within a larger area. Generally this technique will result in less oak regeneration because openings created are not large enough to reduce the shade effects from adjacent stands. This technique has had limited success in Iowa. If necessary, control understory vegetation before or during the harvest.

In the **shelterwood** system, a new stand is established under the shelter of a portion of the older overstory trees. A shelterwood is really a 2 or 3 stage clearcut. First the understory is removed; if natural regeneration is desired, this should be done with some soil disturbance and timed with a good acorn crop. If the stand is still too shady, some of the large overstory trees can also be removed. Once the reproduction is adequate, the remaining overstory trees can be harvested. If the shelterwood cuttings do not result in adequate seedling establishment, the underplanting of nursery seedlings may be necessary to insure adequate numbers of seedlings.

With all methods of oak regeneration, it is



important to monitor the understory vegetation. It may be necessary to control competing vegetation (including grasses, shrubs, and other woody plants) as the seedlings develop. However, if the oak seedlings become established before other species occupy the site, they can usually outgrow them.

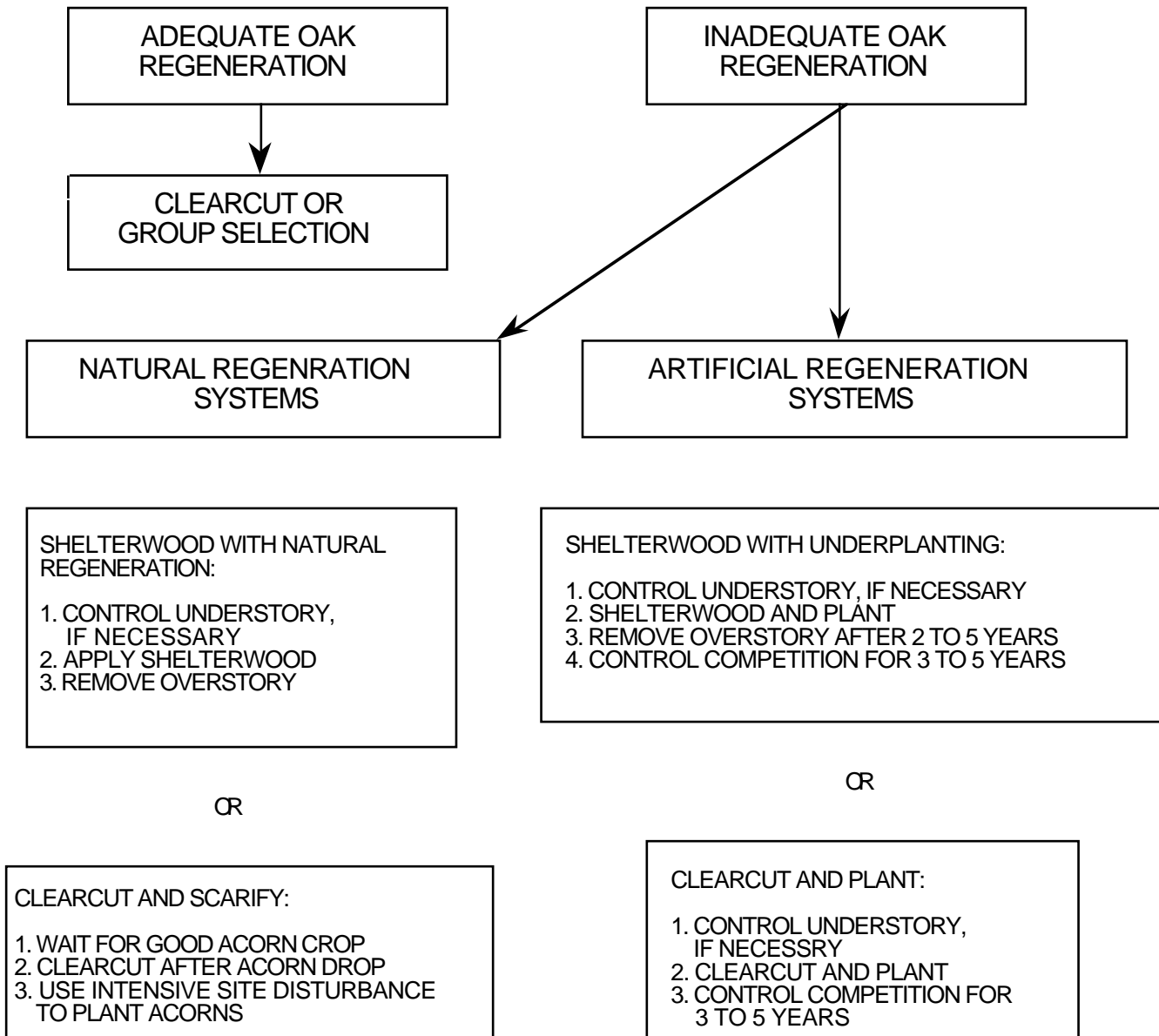
The best method for regenerating oak in Iowa varies from site to site and should be tailored for the individual's woodlot land management goals. When applying any

regeneration method it is important to maintain the diversity of your woodland. By varying the timing, intensity, and size of the regeneration cuts, you can maintain a variety of tree species and size classes of trees. This approach to woodland management will result in diversity of all plant species, improve the visual quality, and sustain a varied wildlife population on your woodland. In addition, as the regenerated forest matures at staggered rates, a sustained income will be available from periodic harvesting.

Last but not least, remember that your woodland is a complex ecosystem involving hundreds of different plants. Very few individuals can successfully regenerate oak by themselves. **Consult your Department of Natural Resources district forester for advice and assistance in regeneration of**

Prepared by Paul H. Wray, Extension Forester

REGENERATION OF OAK FORESTS



CHOOSING A MANAGEMENT STRATEGY FOR OAK REGENERATION