

OAK REGENERATION PRACTICES: SOIL SCARIFICATION

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Annual acorn crops to regenerate oaks are erratic. In some years, few, if any, acorns are produced and in other years, bumper amounts of acorns are generated. Bumper acorn crops, also called mast crops or mast years, are considered those where the number of acorns produced exceeds the amount consumed by predators or affected by insects. The remainder of sound acorns are available to germinate into oak seedlings. Since bumper crops of white oak acorns only occur on average every four to six years or more, oak regeneration through seedling advance reproduction should capitalize on these infrequent acorn crops with abundant acorns. When stands do not have oak advance reproduction, a bumper acorn crop is often the opportunity to begin the oak regeneration process.

Soil scarification enhances acorn germination and seedling establishment following a bumper acorn crop by establishing greater acorn to soil contact after seed dissemination. The method is most effective when there are ample, viable acorns on the ground following a bumper acorn crop.

Scarification reduces acorn exposure on the soil surface to predators and protects acorns from desiccation during extreme temperatures (drying or freezing). Protection also is provided by the shedding of leaves in the fall to cover the acorns and scarified soil.

After dissemination in the fall, acorns are incorporated into the forest duff and ground by mechanized equipment such as a disk pulled by a farm tractor or a root rake on a dozer. Depth should be no more than four inches to ensure that the hypocotyls (stem of germinating acorn) can emerge from the soil. Using this equipment in forested settings has many obstacles with resident trees and other vegetation, dead stems and woody debris on the ground, as well as topographic features such as exposed rocks and steeper slopes. Do not expect to scarify 100 percent of the soil surface on a treated area. In the woods, safely meander equipment where numerous acorns are present. Operate carefully in more open and accessible areas with limited midstories and other ground vegetation or land obstacles. Be sure not to injure valuable, mature trees. Some acorn damage is expected in using scarifying equipment, but the excessive amount of acorns from bumper crops should compensate for the limited acorn damage.



A bumper white oak acorn crop. Photo Credit: Wayne K. Clatterbuck



A small dozer with a toothed blade or a small farm tractor with a disc can scarify the ground to improve acorn-ground contact after a bumper acorn crop. Photo Credit: Wayne K. Clatterbuck

WHEN TO IMPLEMENT SOIL SCARIFICATION TO ESTABLISH OAK GERMINANTS: A NARROW WINDOW

Little oak advance reproduction present, wait until bumper acorn crop (could be several years)



Apply soil scarification as soon as possible after acorns fall from the trees to minimize the number of acorns consumed by wildlife



Scarification should be completed before leaf shedding in the fall, about 2 or 3 weeks after

Soil scarification has been proven in numerous studies to enhance the number of germinating oak seedlings. However, scarifying the soil and obtaining successful germination is just the first step. These oak germinants are cultured to a sufficient size and number of advance reproduction to eventually become a component of the overstory. Partial light conditions should be provided that promote shade-intermediate oaks and discourage growth of shade-tolerant and intolerant species. Practices such as midstory removal or shelterwood will continue oak growth and development.

BENEFITS

- A greater number of oak germinants are available to culture advance reproduction to a size and number required to successfully regenerate oak.
- Germination and establishment of new oak seedlings are enhanced following a bumper acorn year.
- Scarification can protect acorns from predators and desiccation and improve seedling survival.

WEAKNESSES

- Soil scarification should follow a bumper acorn year which occurs infrequently. Otherwise, the cost of the practice does not justify the number of seedlings promoted.
- Once acorns have germinated, other treatments to promote and develop oak seedlings are necessary. Competing vegetation in the understory should be addressed. Providing sunlight to the ground for shade-intermediate oaks through various practices is necessary to promote growth and development of seedlings.
- Soil scarification is a cost without accompanying revenue. However, if adequate oak advance reproduction is not present, and oaks are desired in the next generation, soil scarification following a bumper acorn crop will quickly establish new seedlings initiating the oak regeneration process.

FURTHER READING

Lhotka, J., Stringer, J. 2013. Soil scarification to enhance oak seedling establishment. Kentucky Woodlands Magazine 8(3): 8-11. (https://kywoodlandsmagazine.ca.uky.edu/sites/kywoodlandsmagazine.ca.uky.edu/files/soil_scarificationpg8.pdf).