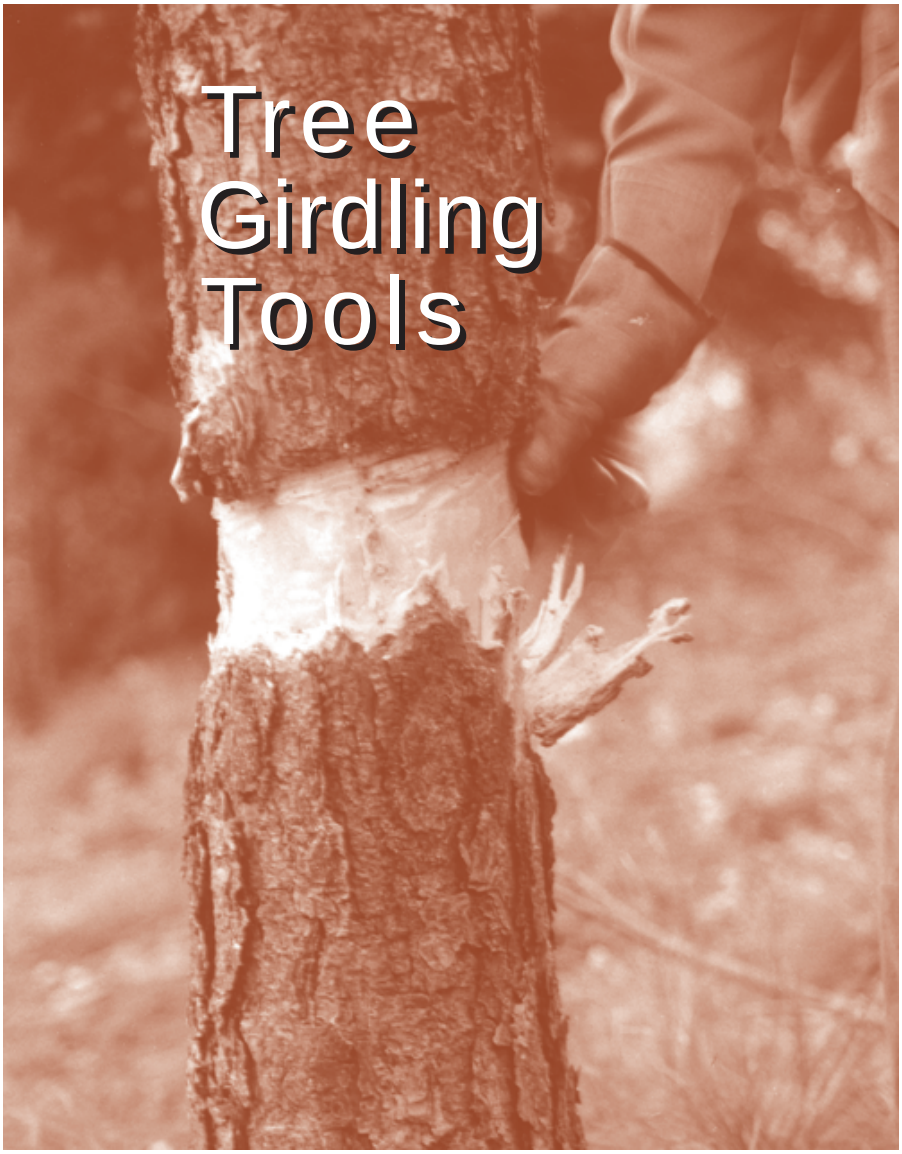
United States
Department of
Agriculture

Forest Service

**Technology &
Development
Program**

2400 Timber
May 1999
9924-2809-MTDC



Tree Girdling Tools

Bill Kilroy
Mechanical Engineering Technician

Keith Windell
Project Leader

USDA Forest Service
Technology and Development Program
Missoula, Montana

5E52E60—Small Area Forestry Equipment

May 1999

The Forest Service, United States Department of Agriculture, has developed this information for the guidance of its employees, its contractors, and its cooperating Federal and State agencies, and is not responsible for the interpretation or use of this information by anyone except its own employees. The use of trade, firm, or corporation names in this publication is for the information and convenience of the reader, and does not constitute an endorsement by the Department of any product or service to the exclusion of others that may be suitable. The United States Department of Agriculture (USDA), prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, and so forth) should phone USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write: USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue SW, Washington, DC 20250-9410, or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

Table of Contents

Part 1 of 3

Introduction ____ 3

Part 2 of 3

Girdling Tool Evaluation ____ 5

Tools Evaluated ____ 6

Miscellaneous Operating Notes ____ 7

Evaluation Data ____ 7

Part 3 of 3

Operator Comments ____ 9

Discussion Points ____ 10

Conclusions ____ 10

Commercially Available Girdling Tools ____ 11

Girdling Tools That Are not Commercially Available ____ 13

Hand Tools Used for Girdling ____ 14

Introduction

Silvicultural operations, especially those involved in molding young stands, sometimes require killing unwanted trees. Also at times, trees are killed and left standing to enhance wildlife habitat. Girdling is the traditional method of killing trees without felling them. Girdling severs the bark, cambium, and sometimes the sapwood in a ring extending entirely around the trunk of the tree (Figure 1). If this ring is wide enough and deep enough, it will keep the cambium layer from growing back together.

Figure 1—Girdling severs a ring of the bark and cambium layer encircling the tree.

When the phloem layer is completely cut, the tree can no longer transport carbohydrates produced in the needles or leaves to the roots. The roots die when the carbohydrates in them have been exhausted, a process that may take several years. Severing the sapwood hastens the death of the crown (by reducing the flow of water, stored substances, and inorganic nutrients to it), but may also encourage sprouting because water and nutrients that can no longer be used by the foliage are available for sprouting.

Cutting deep into the heartwood can also create a hazard tree.

Any leafing branches on the trunk below the girdling ring must be cut off to completely kill the tree. An efficient girdling tool must be capable of cutting the girdling ring and removing limbs.

Few tools on the market are designed specifically for girdling operations, but many can be used as girdling tools. This evaluation compared four girdlers. Two tools were specifically designed for girdling, while two were commonly used for other forestry operations. A market search was conducted to determine suitable tools that were commercially available.

Chain saws, axes, or many other cutting devices are used to girdle a tree. With either a chain saw or hand saw, the proper girdling technique is to cut parallel, horizontal grooves through the bark several inches apart (Figure 2). Afterward, the bark and cambium layers between the cuts can be peeled away. A sharp, chisel-type tool is needed to completely remove the bark and cambium (Figure 3).

Figure 2—When a chain saw is used for girdling, parallel groves are cut through the bark several inches apart.

Figure 3—A sharp chisel-type tool is needed to remove the bark between the chain saw cuts.

The most effective method of girdling with an ax involves hacking a line around the tree with a series of downward blows, then hacking a second line 3 inches above the first. This procedure is called *double hacking* (Figure 4). The material between the two lines must be pried out with the ax blade.

Figure 4—Double hacking is the most effective method of girdling a tree with an ax.

Applying herbicide after a single line of ax cuts has been made around a tree is also effective. This technique is called *frilling*. A single line of narrow cuts seldom works without herbicide.

Notching involves cutting a deep ring through the bark and a half-inch or more into the sapwood, completely encircling a tree. This method will halt the flow of nutrients and water from the roots to the crown of the tree and will kill the tree quickly. However, notching encourages sprouting.

The time of year is a factor in determining the effectiveness of girdling. The plant is most vulnerable early in the growing season just after rapid tissue growth has depleted carbohydrate reserves. Also, the bark is “loose” in spring and early summer when the cambium is active, making the bark easier to peel. Later in the year, the cambium is more difficult to remove, especially in larger trees.

The time and cost of girdling depend on the tree species and the average stem diameter. Additional considerations include tree density, bark thickness, the amount of limbing necessary (Figure 5), and terrain factors that affect a crew’s ability to get around. These may include such things as the slope of the terrain, the amount of down timber in the area, and the density of the underbrush.

Figure 5—The number and size of limbs, terrain, and other factors affect the time that’s needed for girdling and the cost of girdling.