

# Controlling Eastern Redcedar on Rangelands and Pastures

Jon Wilson and Thomas Schmidt

A growing problem on many rangelands and pastures is the invasion of eastern redcedar (*Juniperus virginiana*). The encroachment of this coniferous, non-sprouting tree has reduced the amount of available forage on grazing lands and increased livestock handling problems. If a program of eastern redcedar control is not initiated by landowners, the ultimate result could be a significant loss of grazing on these lands.

Using Nebraska as an example, the status of eastern redcedar in Nebraska has been rapidly changing. Recent inventories show an increase in acreage infested by eastern redcedar while other forest types were declining. Total woodland acreages in Nebraska declined about 10% from 1955 to 1983. In 1955, approximately 2% of all woodlands were predominately eastern redcedar (Stone 1961). In 1983, over 15% of all woodlands were occupied by eastern redcedar (Raile 1986). Eastern redcedar expanded from approximately 54,000 acres in 1955 to over 188,000 acres in 1983.

Size class distribution gives another view of what is transpiring with this species. Over 54% of the eastern redcedar trees are currently in the one to five inch diameter breast height (DBH) size class. Over 40% of the trees are in the 5-11 inch DBH size class while only 6% are over eleven inches in DBH (Raile 1986). This indicates a young eastern redcedar population.

Where is this expansion occurring? Most of the increase is occurring in non-commercial forest land, which is typically pasture and rangeland with scattered trees. The following table shows the acreages of eastern redcedar in Nebraska by land class for 1983 (Raile 1986).

**Table 1. Acreages of eastern redcedar by land class in Nebraska, 1983.**

Land Class	Acreages of Eastern Redcedar
Commercial Forest Land	42,200.
Non-commercial Forest Land	112,100.
Windbreaks	21,300
Wooded Strips	13,200.
<b>Total</b>	<b>188,800.</b>

The justifications for controlling eastern redcedar have been to maintain/increase forage availability and reduce livestock management problems. Forage production is reduced or eliminated under an eastern redcedar canopy and is difficult for the livestock to graze. Small trees replace very little grass; however, a large cedar tree may

occupy nearly 500 square feet. This represents a significant loss of forage from the area occupied by each tree. A typical rangeland that is being invaded by eastern redcedar can have hundreds of small trees per acre. If they are allowed to grow, the potential for forage loss is great.

Livestock management problems created by eastern redcedar also contribute to the need for control programs. Livestock are hard to check daily, hard to round-up, and tend to underutilize the available forage in rangelands with significant densities of eastern redcedar. These areas become inaccessible by vehicles, horses, and sometimes man which makes round-up a major task.

## Control

Controlling eastern redcedar requires periodic treatments every 10-20 years. Initially, several different treatment methods may be needed if the existing eastern redcedar stands are composed of a wide range of age classes or sizes. Once the trees are reduced to an even size class, they can be managed effectively by one treatment method. The type of control program is dependent upon many variables including average tree size, density, topography, equipment availability, manpower availability, understory type (warm- or cool-season grasses), amounts of forbs and woody vegetation, and fuel loads for carrying a prescribed fire. All of these variables will have an impact on the cost and effectiveness of the control program.

The successful implementation of a control program may be enhanced by the opportunity to produce saleable wood products from the trees. Potential wood products from eastern redcedar are fence posts, lumber, shavings, cedar shingles, and firewood.

The minimum size necessary for producing a saleable product is based on the minimum specifications for a line post, typically 6.5 feet long with a small end diameter of 3 inches. Trees larger than this can be used for corner posts or, if of sufficient size, for lumber, shavings, or shingles.

## Control Methods

Recognized methods of treating or controlling eastern redcedar are: mechanical, chemical, and prescribed burning. Which control method is selected will depend on the characteristics of each site; equipment, manpower, and financing available; and the average size of the eastern redcedar to be treated.

### Mechanical Control Methods

#### A) - Hand Control

Traditionally, the most common control method has been hand removal. This method is effective but only small tracts of land can be treated at any one time. Hand removal of eastern redcedar is labor intensive. Hand re-

The authors are: District Forester, Nebraska Forest Service, North Platte; and Vegetation Management Forester, Nebraska Forest Service, Lincoln.

moval has often been directed toward removing larger trees for fence posts. Limiting factors are the benefit-to-cost ratio and the time and labor available. An advantage of hand removal is that it may be done during the owner's, or hired man's, off-season, which allows for more uniform utilization of time. Hand removal often misses small plants because they are hidden in the grass.

#### *B) - Machine Control*

Machine removal has been underutilized due to the lack of adaptable equipment and terrain restrictions. This method can be used to effectively treat more trees per time period than by hand. Most of the equipment described below is available for contracting.

1) *Tractor-mounted buzz saw.* The buzz saw mounts horizontally to the three-point hitch and is operated with the power take-off. Contact with the tree is made by backing the tractor into the tree, extending the saw blade, and severing the tree at ground level. Disadvantages include: slowness of operation due to continual backing, high hourly cost, relatively low production rate, blades dull rapidly from soil contact, and use is limited by topography.

2) *Tree-shears.* This equipment consists of a pair of hydraulically operated blades mounted on front-end loader arms or three-point hitch that is operated hydraulically to shear trees at ground level. Advantages include: relatively fast to operate, moderate hourly cost rate, and can be home built with small initial investment. Disadvantages include that it is only effective on trees between 1 and 8 inches in base diameter, very small trees can easily be missed, and it is limited to areas accessible to farm-type tractors.

3) *Plow-blade.* This equipment has a solid metal blade with either a hardened steel edge or twin rows of hardened steel teeth that attach to a dozer blade or front-end loader. The plow-blade cuts trees by knifing through the stem. Advantages include: it can be used on almost any size tree, a small initial investment to produce or purchase the blade, and less labor intensive than hand removal. Disadvantages include: it requires a large horsepower tractor, it often takes more



*Eastern redcedar encroaching rangeland in Nebraska.*



*Example of lost forage production under eastern redcedar canopy.*

time than some other mechanical methods because it usually requires 2-3 approaches to complete shearing of the tree, and it is limited to equipment accessible areas.

#### **Chemical Control Methods**

Chemical control methods involve hand or aerial application of selected herbicides. Hand application is normally on a tree-by-tree basis while aerial application is generally used for an entire area. The most effective application procedure is to treat individual trees or groups of trees by

hand. Hand chemical application can be accomplished by basal injection, backpack sprayers, or hand spreading granular materials. A number of herbicides are available that have proven effective for controlling eastern redcedar (Smith 1986, Wilson 1984, and Engle 1987).

Advantages of chemical control include: it can be effective on all sizes of trees, it is not limited by topography, it can be cost effective, aerial application can treat large areas at one time and is not labor intensive, and hand application allows for selection of individuals to treat. The disadvantages of chemical control include: initial expense of the chemical and application equipment, application may be difficult, desirable plants may be killed, time of application may be limited, and environmental concerns.

#### *Prescribed Burning Control Methods*

The use of fire to control woody vegetation on rangelands has been a highly successful and inexpensive method. It is relatively low cost and holds potential for controlling eastern redcedar. The problems with this method are: 1) inadequate quantity and continuity of fuel; 2) burning under optimum and correct environmental conditions; 3) non-uniformity in size of trees; and 4) anti-burning ethic of local landowners.

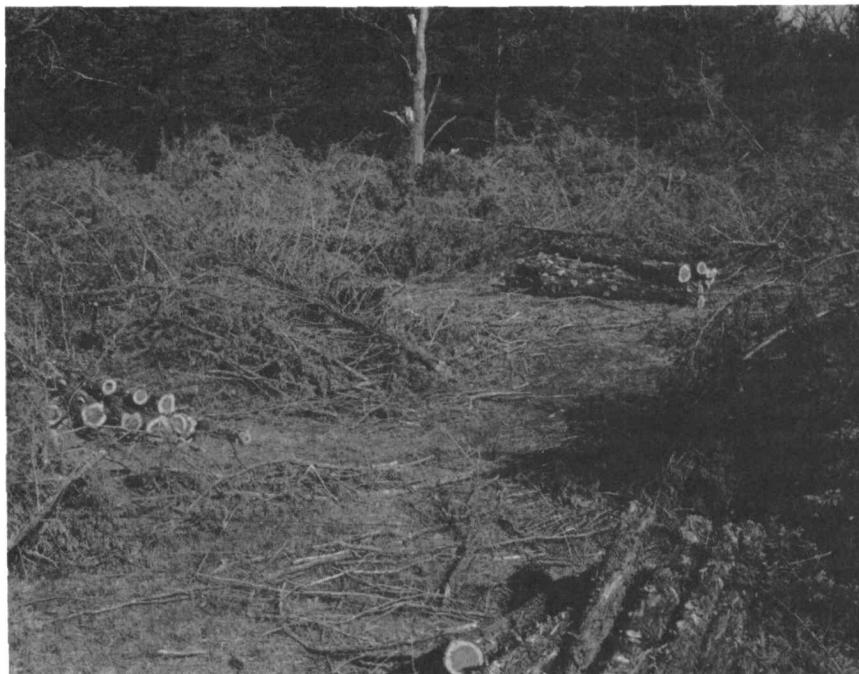
Prescribed burning has had limited impact due to size restrictions on how many areas can be treated by a prescribed fire. Where implemented, burning has been a very effective method of control for smaller sized trees. Once the trees reach a height where complete crown kill due to heat or flames is not probable, the effectiveness of burning diminishes.

The single most limiting factor in obtaining a successful burn is the scattered nature of the cedar trees and inadequate fuel loads. Without proper fine fuels, it is difficult for the fire to spread over the area and the result is a sporadic control pattern.

Burning may not kill large trees. Burning is most effective at controlling trees less than three feet in height. Small trees are those that are typically missed during a mechanical control operation, thus fire provides an excellent method of controlling small eastern redcedar. A cost-effective control plan could include burning first and then follow-up with a mechanical control method. By burning first, the need for mechanical removal is lowered, which is important because the cost per tree for burning is less than that for mechanical removal. Prescribed burning has advantages over other methods because it is not limited by topography, it can be inexpensive, and it is one of the best methods to maintain cedar-free rangeland.

#### **Summary**

Many ranchers are faced with an invasion of eastern



*Eastern redcedar post harvest to convert invaded pasture back to open rangeland.*

redcedar on rangeland which is reducing the available forage for livestock and creating problems in handling livestock. A major increase in the acreage infested by eastern redcedar has occurred during the last 20-30 years. There is currently a wide variation in tree sizes. This disparity in size makes initial control very difficult. A recommended approach to eastern redcedar control is the initiation of a program that relies on several control methods.

The questions of whether or not to undertake control of eastern redcedar on rangelands will depend on the value placed on range forage and livestock management. The longer a landowner waits to address an existing eastern redcedar problem, the greater the cost will be to accomplish control. However, with larger sized trees, there is a potential for a commercial harvest. New equipment, lower costs of herbicides, or a higher value placed on forage will make treatment more cost effective. The opportunity to realize an income from harvested eastern redcedar trees will improve the cost effectiveness of eastern redcedar control.

#### **Literature Cited**

- Engle, D.M., J.F. Stritzke, and P.L. Claypool. 1987. Effect of Paraquat Plus Prescribed Burning on Eastern Redcedar (*Juniperus virginiana*). Oklahoma Agriculture Experiment Station. Contribution No. 5016. 3pp.
- Ralle, G.K. 1986. Nebraska's Second Forest Inventory. USDA Forest Service Resource Bulletin NC-96. St. Paul, MN. 87pp.
- Smith, D.S. 1986. Ecology and Control of Eastern Redcedar. Ph.D. Dissertation, University of Nebraska-Lincoln. 188pp.
- Stone, R.N., W.T. Bagley. 1961. The Forest Resource of Nebraska. USDA Forest Service Forest Survey Release No. 4. Fort Collins, CO. 45pp.
- Wilson, R.G., Martin A., and Furrer, J. 1984. Brush and Woody Plant Control. Nebguide G84-704, Cooperative Extension Service, University of Nebraska-Lincoln. 4pp.