



Current Report

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EASTERN REDCEDAR UPDATE - 1990

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History of Eastern Redcedar

Fire historically prevented eastern redcedar encroachment into rangelands and forestlands of Oklahoma. With the reduced incidence of fire in the last 100 years, eastern redcedar has become a prominent component of Oklahoma rangelands. Eastern redcedar was considered a problem on almost 1.5 million acres of Oklahoma rangeland in 1950, and by 1985 this had increased to over 3.5 million acres. Three main areas of eastern redcedar distribution have been identified. Two of these areas are located along the slopes adjacent to major river drainages in the northwestern and central-north central part of the state. The third area is in the Arbuckle Mountains where they are often growing in association with Ashe juniper. Some scattered pockets of eastern redcedar are located in southeastern Oklahoma. The visible increase of eastern redcedar in pastures which were recently free of brush has many land managers concerned with declining forage production, livestock carrying capacity, and degraded wildlife habitat. The concern has generated a concerted effort in research and extension at Oklahoma State University. These studies are part of an on-going team effort of the Grazing Lands Management Group to learn more about control and management of eastern redcedar and ashe juniper in Oklahoma.

Growth Rate of Trees

Eastern redcedar trees from study areas in eastern, central, and western Oklahoma (McIntosh,

Payne, and Major counties, respectively) were aged by tree ring analysis to determine the relationship of crown height and crown area to tree age. Tree height increased with age at all locations for trees of 5 to 30 years of age. Trees in McIntosh County increased in height at a faster rate, about 1 ft per year versus 0.75 or 0.80 ft per year in Payne or Major County respectively.

In McIntosh and Major County, crown area expanded at a greater rate and trees grew to be considerably larger than in Payne County. The rate of increase in area of crowns of trees 25 years old in Major and McIntosh Counties was 18 ft²/yr and 31 ft²/yr, respectively. However, in Payne County, crown area of trees older than 20 years increased at a slower rate than either McIntosh or Major County where trees up to 30 years of age continued to grow rapidly. Results from this study suggests burning intervals on rangelands subject to eastern redcedar encroachment should be no longer than once every 10 years in eastern Oklahoma and once every 15 years in western Oklahoma.

Effects of Standing and Fallen Cedars on Forage Production

Forage production was measured around individual eastern redcedar trees in Payne County. Some reduction of forage production occurred beyond the dripline of eastern redcedar trees, but the major reduction of forage was beneath the tree crown. This reduction under the tree was similar for trees of all

sizes. A tree with a 6 ft diameter (area of 28 ft²) crown will reduce forage production on shallow prairie range sites by about 6 lbs. Shallow prairie range sites in central Oklahoma produce about 3000 lbs/acre of forage in a favorable year, so 250 trees/acre (one tree about every 13 feet) would reduce forage production by 50 percent.

From data on crown growth related to age, we determined that the area of eastern redcedar is reduced only 30% after mechanical cutting. Although mechanical cutting effectively kills eastern redcedar, the eastern redcedar tree crowns laying on the ground are still occupying about 70% as much area as they did when they were standing. For example, during the first and second growing seasons after cutting, 50% or 1,500 pounds of forage was lost to standing cedar trees, and an additional (70% of 1,500 lb) 1,050 lb was lost to fallen cedar trees. Thus, of 3,000 lb/acre of potential forage production, only 450 lb/acre would be available for livestock for two years. Usually by the third year after cutting, the area that was shaded by the cedar crown is revegetated.

Because cut trees retain the dense foliage in the crown, forage production and utilization will continue to be reduced if the trees are allowed to lay after mechanical cutting. This can be prevented by physically removing the cut trees or burning several weeks after cutting.

Burning Prescriptions for Control

Prescribed fire is the most economical way to control small eastern redcedar. With trees less than five feet tall, more than 85% of the trees can be controlled with fire if 4000 lbs/acre of fine fuel (herbaceous plant material) is available in April. Fine fuel loading is the main factor influencing cedar kill. For example, when fine fuel loading is only 2000 lbs/acre, less than 60% of trees 5 feet tall will be killed. Even distribution and uniformity of the fuel throughout the pasture also greatly enhances cedar kill. The general fire prescription for spring burning is as follows:

Air Temperature (60-80° F)
Relative Humidity (30-50%)
Wind Speed (5-10 mph)
Fine Fuel Loading (minimum
2000 lbs/acre)
Soil Moisture (top 6
inches is moist)

For optimum eastern redcedar control, the fire should be conducted "on the hot side of the prescription" but still within the prescription boundaries. For example, a 'hot' burn would result from a 10 mph wind, 30%

humidity, 75° F temperature, and 4000 lbs/acre or more of fine fuel.

Post-Burning - A Way to Kill Large Trees

A portion of the lower part of large eastern redcedar trees are often scorched from prescribed fire. We have found that these large trees can be completely burned if the lower scorched branches are reignited after they turn brown. Based on our observations of trees with different amounts of browned-out leaves and under different environmental conditions, tree kill will average between 60 and 70% when trees are reignited in late spring and summer (optimum conditions for air temperature should be above 55° F and wind speed less than 5 mph). Trees 8 to 16 feet tall burned as effectively as smaller trees under these conditions. Tree kill under cooler winter conditions (less than 55° F) was not very effective (less than 50% tree kill). Post-burning large trees appears to be an excellent way to kill large trees not controlled by the initial prescribed burn.

Chaining for Control

Some of the state's rangeland has eastern redcedar trees that are too large and has inadequate fine fuel for good control with a prescribed fire. Chaining is an alternative to dozing, grubbing, sawing, or cutting large trees. Chaining is accomplished by dragging a heavy anchor chain in a U-shaped, half circle, or J-shape behind two dozers traveling in a parallel direction. Chains with links weighing more than 70 pounds stay on the ground better and are more effective on young flexible trees. The chain must be dragged at a speed to maintain maximum ground contact. The narrow U-shape provides better pull-up of small trees and gives more windrowing effect. The half-circle shape increases swath-width, but decreases effectiveness in the center section. The chain-length to swath-width ratio of 2:1 to 3:1 is recommended. For example, when a 300-foot chain is used, a swath of 100 to 175 feet in width is common and generally gives good control. Higher traveling speed also gives more whip action and higher kill. A follow-up prescribed fire is recommended to reduce the debris on the area after chaining. Burning dead eastern redcedar requires extreme caution because dead trees are volatile and can create spot fires several hundred yards away.

In Pittsburg County 530 acres were chained during the fall of 1987 using two D6 dozers and a borrowed chain at an estimated cost of \$16/acre. There are also contractors who do commercial chaining. Cost will vary by terrain and the size and density of eastern redcedars, but most would be from

\$20 to \$30/acre. There also are some acre limitations used by chaining contractors. For example, some contractors require 1,000 acres of brush clearing before they can justify moving their equipment to do the job. The chaining during the fall of 1987 in Pittsburg County was followed with a prescribed burn in the spring of 1988 to control small eastern redcedars at an estimated cost of \$2.50/acre. Native grasses have regained dominance on the site, but another prescribed fire in April is needed to burn dead tree debris, to kill remaining trees, and to improve forage quality.

Dozing for Control

Individual eastern redcedar trees were also bulldozed on 48 acres in Pittsburg County in 1987-88 with a D5 and D6 dozer. After dozing, the trees were piled and burned. Estimated cost of clearing was \$97/acre. In addition, the land was prepared for planting an introduced grass at a cost of \$26/acre. Cost to remove eastern redcedar by individual dozing and conversion to an introduced grass totaled \$123/acre.

Cut Plus Burning

Some preliminary results by SCS personnel indicate that cutting branches from large cedar trees and cutting down small cedar trees may be another way to obtain adequate fuel for prescribed burning for cedar control. Cutting in winter before spring burning resulted in excellent tree kill on a site that had essentially no fine fuel. Cutting can be done with a chain saw, clipper, or rotary saw. Additional demonstrations are planned for this year. Estimated costs and effectiveness of cutting and burning will be available by next year.

Update on Chemical Control

Velpar and Grazon PC are currently labeled for eastern redcedar control. Results continue to be variable with both hexazinone (Velpar) and picloram (Grazon 10K and Grazon PC). Control with both herbicides has varied from fair to excellent depending on rainfall after application. Grazon 10K is no longer available, so Grazon PC, applied as a spot treatment is the current formulation of picloram to use. At comparable rates, Grazon PC usually was more effective than the Grazon 10K formulation.

The rate of both of these herbicides is dependent on the size of the tree measured as either diameter or tree height. For practical purposes, trees 3 feet tall have a 1 inch stem diameter. Current recommendations are to use 2 cc of either herbicide per 3 ft. of tree height.

It is obvious from past results that both herbicides can produce good results with adequate rainfall after application. However, too little or too much rainfall will significantly decrease effectiveness. We currently are favoring May and early June applications, and if possible, applying on dry soil just preceding a 1 or 2 inch rain.

Chemical cost of treating a 3 ft tree (1 inch stem diameter) with 2 cc of product would be about 3 cents for either Velpar or Grazon PC. Kill on small trees (less than 6 ft tall) with both herbicides has been consistent enough and the cost is low enough to consider chemical control of small trees as an effective treatment option on small acreages.

Some combinations of herbicides and burning have also looked promising as a means of increased kill with prescribed fire. Foliage treatments of paraquat on eastern redcedar have resulted in significant reduction in leaf water and resulted in improved burn-up during prescribed fire. Paraquat is a contact foliage herbicide with the greatest activity resulting from applications during July and August. Additional trials are planned to determine if a combination of paraquat and fire can be used for control of solid stands of cedar trees.

Grazing Management After Treatment

Proper grazing management is critical after a fire, herbicide, or mechanical brush control practice to insure that the grass stand is maintained or improved. If only part of a pasture is treated, livestock will concentrate there and overgraze the area. Therefore, the entire pasture should be burned to even-up grazing distribution. Stocking rate should also be adjusted to reflect how much forage is available for livestock to graze. Stocking rate guidelines are available from your local USDA-Soil Conservation Service Office.

Wildlife Use of Eastern Redcedar

Eradication of eastern redcedar is not only unrealistic but also undesirable. Eastern redcedar is valuable as a windbreak for both domestic and wild animals and for homes. Current research on the Cross Timbers Experimental Range west of Stillwater indicates that several species of wildlife eat the foliage of eastern redcedar. For example, during the winter, eastern redcedar made up 10% of the diet of white-tailed deer, 20% of the diet of cottontail rabbits, and 100% of the diet of wood rats. Further research is planned on wildlife uses of eastern redcedar.

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