# EFFECT OF TWO CUTTING TREATMENTS ON ASPEN IN PRAIRIE

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*Abstract.* Two cutting treatments were tested for aspen control in two southern Wisconsin prairies: Pasque Flower Hill (PFH), a steep hillside remnant, and Greene Prairie (GP), a restored prairie on sandy soil. The treatments, applied 25-26 June 1984, were: (1) A single cut at the base of the stem and (2) A cut that removed about one-third of the stem, followed 20-24 hours later by a basal cut. In 1986, both sites were burned in early spring, the usual management procedure for these prairies. At GP, aspen stem densities at the end of the experiment were similar in the control and both cut plots and were about 145% higher than at the start. Density increases at PFH were 171% in the plot cut once and 188% in the plot cut twice. In the PFH control plot, stem density at the end was 85% that at the start, but the stems had grown large enough to prevent top kill by the prescribed burn and to shade the prairie species. It was concluded that cutting aspen in June is not worthwhile in prairies managed with dormant season prescribed burns, except to remove any stems not top killed by the burns.

*Key Words.* aspen, *Populus tremuloides,* control, management, sucker, Wisconsin

## INTRODUCTION

Trembling aspen (*Populus tremuloides*) is a troublesome invader of prairies in the tallgrass prairie region. Dormant season (spring or fall) burning, the usual management procedure to maintain prairies in this region, top kills aspen but stimulates root suckering. Suckering is favored by a high cytokinin/auxin ratio; top killing reduces auxin production because auxins are produced in the leaves, while the levels of cytokinins, produced in the roots, are increased because of increased soil temperature after the burn (Svedarsky *et al.* 1986).

Observations after a trial burn 23 June 1972, in an aspen-infested portion of a restored tallgrass prairie in the Arboretum, suggested that summer burning produces fewer suckers. Suppression of the aspen in the area burned in June was still apparent ten years later after several routine early spring burns. However, June burns produce thick smoke that is troublesome to burn crews, and it is sometimes difficult to obtain a burn permit at that time of year because of fire hazard.

Cutting aspen in June is a possible alternative to burning. In this experiment two June cutting techniques tested were: (1) each aspen shoot was cut off at the base and (2) about one-third of each shoot was cut off first and the remainder cut off at the base 20 hours later, a technique found by Stoeckeler (1947) to inhibit resprouting in aspen.

## STUDY SITES

Two prairie sites having extensive aspen clones were selected. The first, Pasque Flower Hill (PFH), is a small, dry, natural prairie with dolomite close to the surface. Dominant grasses are little bluestem (*Andropogon scoparius* Michx.), prairie dropseed (*Sporobolus heterolepis* A. Gray), needle grass (*Stipa spartea* Trin.), and several small species of panic grass (*Panicum* L.). It had last been burned in 1981. The second, Greene Prairie (GP), is a 45-year-old restored prairie planted on sandy level soil. Dominant grasses include little bluestem, big bluestem (*Andropogon gerardii* Vitman), and prairie dropseed. It had last been burned in 1983.

## METHODS

At each site three contiguous plots (7 x 12 m) plots were delineated in an area of dense aspen shoots. Three treatments were randomly dispersed: control (no cutting), cut once (1x), and cut twice (2x). The cutting was done on June 24 and 25, 1984. All plots were burned in early spring 1986.

Data were recorded in 1984, before treatment, and in 1985 and 1986 at the end of the growing season. Fifteen quadrats, each 0.5m², were located in each plot, using a stratified random technique. The number of stems in each of two size classes, height <1 m and >1 m, was recorded for each quadrat.

## RESULTS

In Greene Prairie, aspen densities at the end of the experiment were similar for the three treatments (Table 1), and were approximately 145% higher than at the start (Table 2). At Pasque Flower Hill, the final density of the control was substantially lower than that of the two cut plots (Table 1). This was the only plot in the experiment in which density decreased. Density of stems in the cut plots increased more in PFH than in GP (Table 2).

**Table 1. *Populus tremuloides* stems per 0.5 m².**

| | *PFH* | | | *GP* | | |
|---|---|---|---|---|---|---|
| *Treatment* | *1984* | *1985* | *1986* | *1984* | *1985* | *1986* |
| Control | 9.1 | 4.1 | 7.8 | 8.9 | 6.5 | 12.7 |
| Cut 1x | 8.9 | 14.6 | 15.3 | 9.3 | 12.9 | 13.6 |
| Cut 2x | 6.9 | 7.9 | 12.9 | 9.4 | 10.5 | 13.7 |

**Table 2. Density of stems of *Populus tremuloides* in 1986 as percent of density of stems in 1984, by size class.**

| | *Total* | | *Ht.* > 1 m | |
|---|---|---|---|---|
| Treatment | PFH | GP | PFH | GP |
| | % | | | |
| Control | 85 | 143 | 33 | 78 |
| Cut 1x | 171 | 147 | 32 | 84 |
| Cut 2x | 188 | 146 | 30 | 74 |

Density of tall stems decreased in all plots, but especially in those at PFH where there were only 30-33% as many tall stems at the end of the experiment as at the start (Table 2). At both sites, fewer sprouts were produced the first year after cutting (1985 data, Table 1) in the plots cut twice than in those cut once; the difference was greatest at PFH. After the 1986 burn, no difference occurred between the two cutting treatments at GP, but a small difference persisted at PFH.

## DISCUSSION

At GP clearly no advantage was gained by the extra labor of cutting. The 1986 burn was a clean burn that top killed all aspen stems in all three plots. This was also true of prescribed burns in 1987 and 1988.

The decrease in density of aspen in the PFH control was associated with an increase in the size of a few of the large stems. By 1986, 5 years after the last burn, some of these large stems were producing enough shade to discourage growth of grasses; fuel was insufficient to sustain a hot fire, and the larger stems were not set back by the fire that year. The 1987 and 1988 prescribed burns also failed to top kill the larger aspen, which were 2-3 cm dbh. Other woody species including black cherry (*Prunus serotina* Ehrh.) were coming into the plot, and prairie species were declining. In contrast, both the cut plots had sufficient fuel to carry the fire in all three burns.

Both the early spring burn and the single cut tended to produce densities of 25-30 stems/m$^2$, 250,000-300,000 per hectare, on both sites while the double cut resulted in densities of 16-21 stems/m$^2$. It is possible that double cutting 2 or 3 consecutive years would result in densities low enough that the difference between cut and uncut areas would persist after the next early spring burn. Densities after both treatments were ten times those reported by Svedarsky *et al.* (1986) and Buckman and Blankenship (1965).

In terms of practical management it appears that if dormant season burns can be applied frequently enough to obtain a top kill each time, there is no advantage to supplementing the burns with cutting. However, it is important after each burn to cut any stems that are not top killed. In that situation, or where burning is not appropriate, cutting is an alternative for aspen control. Double cutting may cause less suckering than single cutting.

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