3. Discontinuous tris-citrate (Poulik). Electrode: 0.30 M borate, pH 8.2 (=18.55g boric acid and 2.40g sodium hydroxide diluted to 1 liter). Add 10mg NADP to cathodal electrode tray. Gel: 0.076 M citric acid, pH 8.7 (=9.21g tris and 1.05g monohydrate citric acid diluted to 1 liter). Add 10mg NADP to gel solution before aspirating. Potential: 250-300 v until buffer line reaches anodal sponge (ca. 3½ hours).
4. Continuous tris-citrate. Electrode: 0.687 M tris -0.157 M citric acid, pH 8.0 (=83.2g tris and 33.0 monohydrate citric acid diluted to 1 liter; pH adjusted with 1.0 M sodium hydroxide). Gel: 1:29 dilution of electrode buffer. Potential: 130 v for 4½ hours.
5. Tris-maleate. Electrode: 0.10 M tris -0.10 M maleic acid, 0.01 M EDTA -0.01 M magnesium chloride, pH 7.4 (=12.1g tris, 11.6g maleic acid, 3.72g disodium salt of EDTA, and 2.03g magnesium chloride (hexahydrate) diluted to 1 liter; pH adjusted with 2.0 M sodium hydroxide). Add 10mg NADP to cathodal electrode tray. Gel: Same as electrode buffer. Add 10mg NADP to gel solution before aspirating. Potential: 100 v for 5 hours.

NUTRIENT CONTENT AND YIELD OF BURNED OR MOWED JAPANESE HONEYSUCKLE

by

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ABSTRACT

Burning reduced the dense growth between 3-year-old Japanese honeysuckle plants and prevented the resprouting of runners. Mowing removed the dense accumulation of vines, but the severed runners resprouted to create a uniformly dense carpet. Crude protein of foliage was highest on the burned plots, but neither calcium nor phosphorus were significantly affected by the treatments.

Key words: Lonicera japonica, protein, phosphorus, calcium.

INTRODUCTION

Japanese honeysuckle *(Lonicera japonica)* produces an abundance of palatable and nutritious leaf-browse, which is available during the critical late fall and winter months when other nutritious browse is scarce (Segelquist *et al.* 1971, Craft and Haygood 1972). Some southern states rely extensively on honeysuckle for wildlife habitat management. Since little is known about managing honeysuckle on game food plots, this study was conducted to determine how yields and nutrient content are influenced by late winter burning or mowing.

METHODS

The study took place on an abandoned field at the Stephen F. Austin Experimental Forest near Nacogdoches, Texas. The area had not been cultivated, grazed, or burned since the mid-1950's. Soils were of the Kalmia and related Ruston series; they were moderately well-drained and well-drained upland fine sandy loams.

In February 1970 the area was plowed, disked, and planted with rooted honeysuckle cuttings spaced at 10 x 10 feet. One week later, 270 lbs. per acre of ammonium nitrate was spread over the area.

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[1] In cooperation with the School of Forestry, Stephen F. Austin State University.

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Competing vegetation around the young honeysuckle was hoed twice during the first growing season after planting (1970), and the area between the rows was also cultivated. The following summer (1971), competing vegetation was mowed twice between the planted rows with a rotary mower. Thereafter the site was not cultivated or mowed until treatments were installed.

After three years in the field, most of the honeysuckle plants were about 1 foot high; those climbing trees and shrubs were taller. The associated vegetation consisted mainly of blackberry (*Rubus* spp.), bluestems (*Andropogon* spp.), panicums (*Panicum* spp.), composites, and occasional sprouts of sassafras (*Sassafras albidum*), oaks (*Quercus* spp.), and persimmon (*Diospyros virginiana*).

In February 1973, the following treatments were applied to 60 x 60-foot plots, each containing 36 honeysuckle plants: (1) burning with a headfire, (2) mowing with a rotary mower 2 inches above the ground, and (3) untreated control. Each treatment was replicated three times in a randomized block design.

Immediately before the plots were burned or mowed and again in May and November 1973, the current year's growth was collected from eight randomly selected honeysuckle plants per plot for analyses of crude protein, phosphorus, and calcium.

In May 1974—15 months after burning and mowing—a ¼-milacre steelwire frame was placed around each of the eight samples per plot, and the current season's growth was clipped for yield determinations. The same technique was used for measuring yields between the original plants; the frame was placed midway between each sample and a plant adjacent to it. The yield samples were dried to a constant weight at 65°C and separated into leaves and stems.

Differences in nutrient contents between seasons and treatments, and in yield between treatments were tested by analysis of variance, by paired t-tests, and by Duncan's multiple range test. All testing was at the 0.05 level of significance.

RESULTS AND DISCUSSION

Growth and Yield

In May 1973, three months after treatment, the mowed plots were uniformly and densely covered by honeysuckle. The original plants and the severed runners had formed sprouts that had spread over the 10-foot intervals between the plants. The plots resembled a sheared rug about 4 inches deep. One year later the mowed plots still had the same uniform appearance, but the depth had increased to about 1 foot. A few hardwood sprouts extended over the honeysuckle canopy.

On the burned plots, none of the original plants were killed, but the fire consumed their above-ground portions including the runners that had spread between the plants. About one year after burning, the original plants were still discernable, and only a few runners were visible between the plants, as were some hardwood sprouts.

By May 1974, the control plots supported a dense, contiguous mat of honeysuckle, ranging from 2 to 5 feet deep. Oak, persimmon, and sassafras had sprouted prolifically; the honeysuckle had climbed the sprouts and expanded its mass vertically.

In May 1974, the yield of new growth from the original plants on control plots was not significantly different from that growing on the quadrats midway between the plants (Table 1); on the burned plots, however, the total yield measured between the plants was significantly less than that of the original plants, whose growth was not significantly reduced by burning. Thus, although burning may decrease yields by killing runners between plants, this treatment provides access to forage and confines honeysuckle to the food plots.

Table 1. Average dry-matter yield of honeysuckle plants and of runners between plants 15 months after burning and mowing.

Treatment	*Average yield*	
	Original plants	*Between plants*
	--------------lbs/acre--------------	
Control	962	826
Burned[1]	734	462
Mowed	991	945

[1] Yield of original plants significantly different (0.05 level) from yield between plants.

Table 2. Average dry-matter yield of the current season's leaf and stem growth 15 months after burning and mowing.

Treatment	*Average yield*			*Ratio of*
	Leaf	*Stem*	*Total*	*stems to leaves*
	-------------lbs/acre-------------			
Control	504	390	894	0.77
Burned	346	252	598	0.73
Mowed	422	546	968	1.29

Honeysuckle yields on mowed plots were not significantly higher than on the burned ones or the controls, despite the vigorous and uniform sprouting of severed runners over the entire plot. Segelquist *et al.* (1971) showed that honeysuckle leaves are more nutritious than stems. In this study the ratio of stems to leaves on the burned plots was about the same as on the controls (Table 2). On the mowed plots, however, the ratio of leaves was lowest, a possible result of the growth pattern after mowing, when the sprouts spread over the entire plot.

Nutrient Content

Immediately before the treatments in February 1973, crude protein content on all plots was above the 6 to 7 percent maintenance level required by deer (French *et al.* 1955) (Table 3). Three months after treatment (May), the protein content had increased on the control and burned plots but not on the mowed ones. The increase on the controls may have been due to season, since the succulent spring tissue of many browse plants contains more protein than late summer or winter tissue (Blair and Halls 1968, Blair and Epps 1969). The crude protein content of burned plots was significantly higher than that of the other treatments, possibly because of the nitrogen made available by burning. We were unable to account for the May decrease in the crude protein content of honeysuckle on mowed plots.

Table 3. Nutrient content of leaves before (February) and after treatment (May and November).

Treatment	1973	*Nutrient Content*		
		Protein	*P*	*Ca*
		-------------percent-------------		
	Feb.	9.69	0.845	1.02
Control	May	11.73	0.889	1.01
	Nov.	10.19	0.865	0.93
	Feb.	11.35	0.864	1.04
Burned	May	13.12	0.888	1.04
	Nov.	12.66	0.909	1.01
	Feb.	11.99	0.818	0.90
Mowed	May	10.97	0.820	0.95
	Nov.	9.66	0.856	0.92

As was expected, the protein levels for all treatments decreased by November because of season, but on burned plots, the protein level was significantly higher than on the mowed ones or the controls. The November protein levels for all treatments remained sufficient for deer maintenance.

Phosphorus levels between treatments were not significantly different; however, the May and November samplings showed a significant increase in P from February. Calcium levels were high but were not significantly different between treatments or seasons.

CONCLUSIONS

Mowing seemed to produce the highest total forage yields, but this apparent advantage was offset by high stem to leaf ratios. Although total yields were lowest on the burned plots, this treatment is preferable to mowing because of higher yields of protein-rich leaves. Burned plots appeared more accessible to deer, and runners on these plots are less likely to spread into adjacent areas than are those on the mowed or the controls.

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