

Fire and Forage in the Wiregrass Type

J. B. HILMON and R. H. HUGHES

Range Scientists, Southeastern Forest Experiment Station, Forest Service, USDA, Fort Myers, Florida, and Tifton, Georgia.

Highlight

Burning increases the availability and usefulness of the early growing wiregrasses during the winter and spring before other species have made substantial growth. A few months after burning, as quality of wiregrasses declines, cattle seek other forage plants. Thus, adaptation to sprout quickly after fire coupled with early decline in quality and palatability operate to maintain or increase the abundance of wiregrasses in the type.

Fire has played a prominent and sometimes violent role in the development and management of southeastern ranges. It was not until the 1930's that we began to recognize the beneficial effects of fire as a management tool. Today the question is not "should we burn" but "how and when can we burn range to the best advantage of all uses." This paper reviews our present knowledge of the effects of fire on major range plants in the pine-wiregrass type and how the use of fire is changing with the times. The work reviewed reflects a variety of burned and grazed conditions on a number of representative sites. Generally, findings apply to open and partially stocked cutover pine forest land.

Responses of Range Plants to Fire

Growth of pineland threeawn (*Aristida stricta*) and curtiss dropseed (*Sporobolus curtissii*), the main wiregrasses and principal herbaceous plants of the type, begins soon after burning. Blades of pineland threeawn appeared 3 days after a February fire on the Caloosa Experimental Range, Charlotte County, Florida (Fig. 1). In three weeks, pineland threeawn comprised 90 percent of the herb weight on an

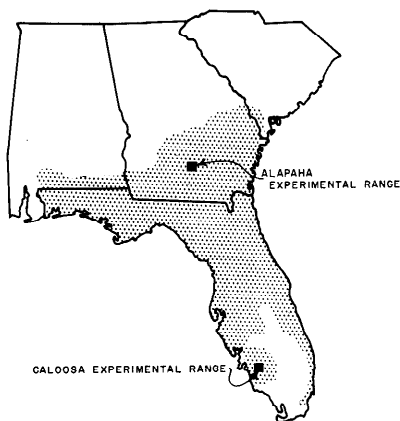


FIGURE 1. Distribution of the pine-wiregrass type and location of the experimental ranges.

ungrazed range (Hilmon and Lewis, 1962). Panic grasses (*Panicum* spp.) and bluestems (*Andropogon* spp.) were widespread, but pineland threeawn comprised half or more of the

herbaceous vegetation throughout a 2-year period after burning.

Forage production varied from 65 lb/acre at 3 weeks, to 1 ton per acre in 1 year, and 1.75 tons per acre after 2 years (Fig. 2).

Quality of forage was highest in new growth. Crude protein was about 13% immediately after fire but declined rapidly to around 5% 3 months after burning (Fig. 3). Levels of phosphorus, and calcium to a lesser extent, were highest soon after fire, but at best were deficient for proper cow nutrition. Chemical analyses of forage from the Alapaha Experimental Range, Berrien County, Georgia, reflect similar trends (Halls et al., 1952). Winter burning increased protein and phosphorus content for the March-through-May period, but forage from burned range had no advantage over unburned forage thereafter.

During the first 2 or 3 months after burning, cattle readily graze the wiregrasses. For example, in mid-March on January burned ranges, pineland threeawn and curtiss dropseed constituted at least two-thirds of the cattle diet (Halls et al., 1952). As

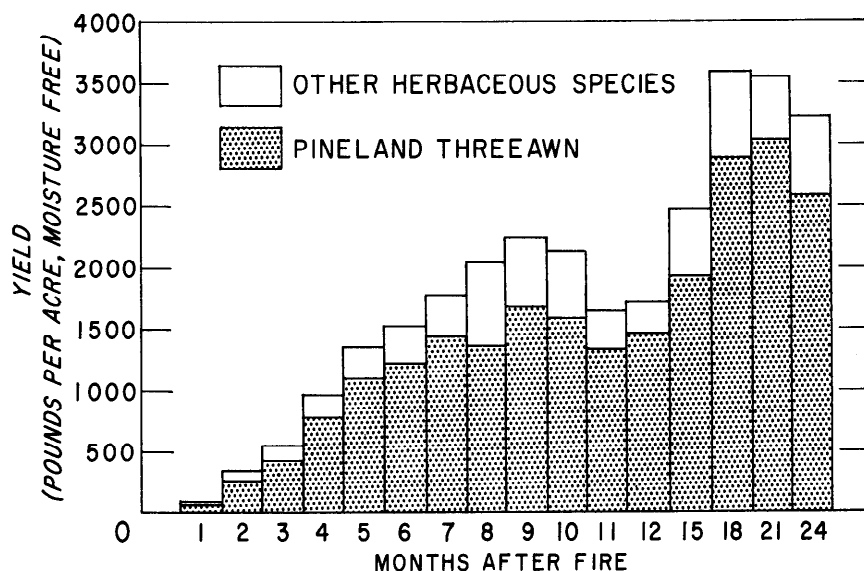


FIGURE 2. Yield of pineland threeawn and other herbaceous species on a south Florida range over a 2-year period following a February 14, 1957, fire.

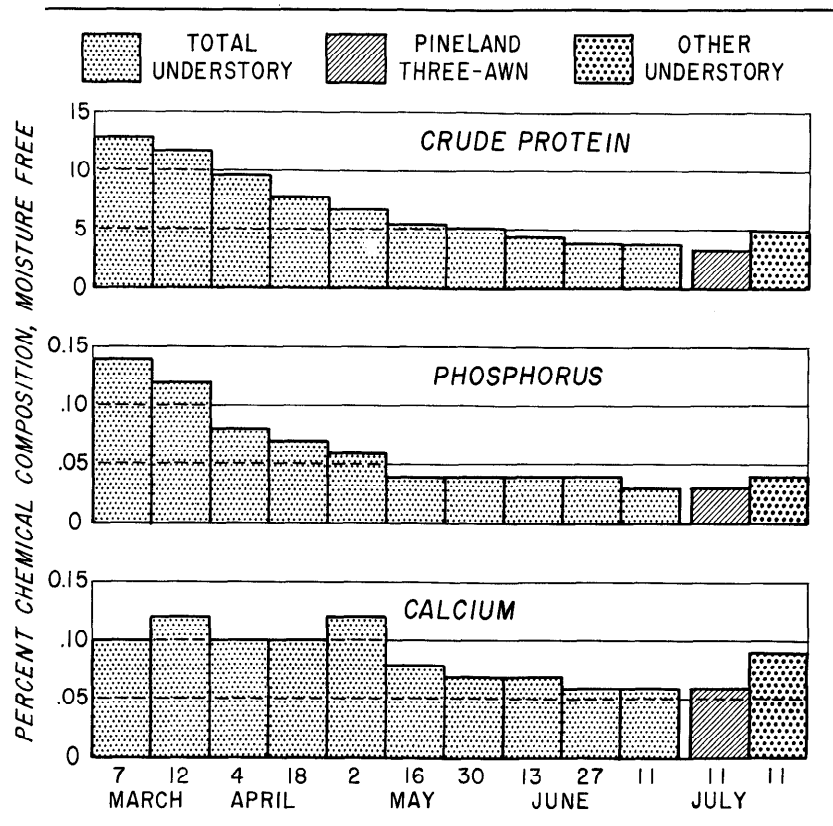


FIGURE 3. Percent chemical composition of herbage for 5 months after burning on February 14, 1957.

quality of pineland threeawn and other wiregrasses declines, cattle seek other forage plants—blue-stems, panics, carpetgrasses (*Arxonopus* spp.), perennial goobergrass (*Ampicarpum muhlenbergianum*) and forbs—neglecting pineland threeawn until the range is burned (Table 1). Thus, adaptation to sprout quickly

after fire and selective grazing, which permits considerable rest, operate to maintain or increase the abundance of pineland threeawn on pine-wiregrass ranges.

The principal shrubs, gallberry (*Ilex glabra*) and saw-palmetto (*Serenoa repens*), also produce vigorous new growth after burning. Gallberry sprouts from un-

derground rootstalks; saw-palmetto, from partially to completely underground stems. Saw-palmettoes that are burned in November on the Caloosa Range produce one fully expanded leaf by January. At the Alapaha Range, sprouts from gallberry plants burned in January appear in late February, grow most rapidly between mid-April and mid-May, and by November average about 2 feet in height. New leaves attain half size in April and full size in May. Sprouts of both species immediately after fire exceed the number of stems present prior to burning. A number of sprouts die the second year, but crown coverage per stem increases gradually with protection from fire. After 2 or 3 years, numbers of stems and crown coverage return to about the same levels as before the fire.

Frequency of Fire

In the northern part of the pine-wiregrass type, where grasses are dormant and cured by frequent winter frosts, ranges can be burned annually. In central and southern Florida, however, where some growth occurs year-round, herbage stays green through the first winter after a fire; and sufficient rough to carry another fire accumulates only after two years. Pineland threeawn and curtiss dropseed decreased slightly in ground cover when Alapaha ranges were burned annually and grazed heavily (Halls et al., 1952). Less frequent burning allowed sufficient time for these plants to maintain or increase vigor. Coverage of pineland threeawn did not change on south Florida ranges burned biennially and grazed heavily over a 6-year period.

What are the trends in herbaceous vegetation when protection from fire is extended beyond 2 or 3 years? At Alapaha, pineland threeawn and curtiss

Table 1. Estimated species composition in percent in the cattle diet on winter burned and unburned range, 1959-1963, Alapaha, Georgia.¹

Species	Burned			Not burned		
	Apr	Jul	Sep	Apr	Jul	Sep
Pineland threeawn	17	2	1	2	1	1
Curtiss dropseed	8	5	6	4	3	4
Bluestems	30	49	37	22	55	54
Other grasses	23	24	42	46	23	29
Grasslikes	4	3	2	5	5	2
Forbs	4	8	4	6	5	4
Browse	14	9	8	15	8	6
TOTAL	100	100	100	100	100	100

¹The separate groups of cattle had free access to 0.6 acre of improved pasture per cow.

dropseed, the principal herbs, persisted on unburned range through an 8-year period (Lemon, 1949). Percentages of ground covered by plants on adjacent ungrazed areas with different fire histories were:

	Number of growing seasons since the last fire			
	1	2	3	8
Principal herbs	18.8	20.2	27.3	15.6
Secondary herbs	2.7	1.8	2.4	3.5
"Fire followers"	20.4	17.6	18.3	8.6
TOTAL	41.9	39.6	48.0	27.7

Secondary herbs — toothache-grass (*Ctenium aromaticum*), Florida dropseed (*Sporobolus floridanus*), cutover muhly (*Muhlenbergia expansa*) — increased only slightly over the 8-year period in terms of ground cover, but doubled their relative abundance. "Fire followers" — the bluestems, panics, and love-grasses (*Eragrostis* spp.) — were most abundant during the first few years following fire. In subsequent studies on the same area over a 12-year period Halls et al., (1952, 1956) observed general decreases in ground cover furnished by the grasses on unburned areas whether grazed or not. In south Florida, decline in herbaceous ground cover — and decadence of pineland threeawn — on ungrazed range becomes conspicuous after 6 or 7 years' protection from fire. While total herbaceous cover and production decline with 6 to 8 years' fire protection, the principal wire-grasses maintain their relative abundance on the range. In the Alapaha study, pineland threeawn and curtiss dropseed composed about 56% of the total cover after 3 years and 8 years. Further study is needed to determine trends with more extended fire protection.

In young pine plantations, fire protection and canopy effects are confounded. Young slash pine must be protected from fire until trees are at least 8 to 12 feet in height. The protection period may extend 8 to 10 years in south Florida, where tree growth is relatively slow. Data from recent surveys of tree-forage relations suggest that natural decadence of herbs with protection from fire — and not increasing tree canopy — is the primary factor in declining forage values in plantations less than 5 to 8 years old (Fig. 4). Beyond these ages, tree canopy exerts increasing influence, but considerable herbage is produced in planta-

tions 13 to 17 years old (Table 2).

The trend is away from annual burning and toward rotational burning of less frequency. Rotational burning on a 2 or 3 year schedule among small units permits better control of the burned acreage and more effective planning of animal use.

Season of Burning

The month ranges are burned exerts a marked influence on pattern of plant development. This influence is greatest in south Florida, where some herbage growth occurs every month of the year. Some ranges are burned as soon as water from the



FIGURE 4. Forage production the second year after burning in this 8-year old slash pine plantation was 2270 pounds per acre.

Table 2. Herbage production (lb/acre oven dry) in the pine-wiregrass type in relation to age of plantation and age of rough.¹

Age of trees Years	North Florida and South Georgia			South Florida
	Unburned	1-year rough	2-3 year rough	Unburned
13-17	1220 (1)	995 (2)	1315 (2)	680 (3)
8-12	1900 (2)	490 (1)	1960 (5)	1448 (5)
3-7	3147 (3)	470 (1)	—	1977 (4)

¹Number of plantations sampled shown in parenthesis; based primarily on plantations in north Georgia-south Florida area.

rainy season diminishes, usually in October. Additional burns are made progressively through the winter until as late as May, to extend the period when nutritious forage is available. Pineland threeawn sprouts rapidly following fall or winter burns, and growth continues throughout the winter. This growth is readily available to cattle. On unburned ranges, new blades of pineland threeawn are surrounded by other unpalatable herbage; therefore, much of the forage produced is inaccessible to grazing animals.

Early results from a study started in October 1962 on the Caloosa Range show that late winter or spring burns are more productive than fall or early winter burns (Lewis, 1964). Ranges burned in March or May produced twice and four times as much herbage, respectively, as ranges burned in October or November (Figure 5). The data also document effects of month of burning on plant development. Pineland threeawn on ranges burned in May seeded profusely the next fall. This plant produced little or no seed on ranges burned in other months. The data, though preliminary, emphasize the importance of sea-

son of fire in altering stocking capacity of the range.

In other parts of the southeast burning is usually started during the winter, but many ranges are burned during the early spring. Appreciable herbage growth does not begin in south Georgia, for example, until March.

Although fire will not eliminate gallberry and saw-palmetto, burning may be important in achieving control of these undesirable shrubs by other means such as chemicals or grazing management. Studies at Alapaha show that annual summer burning is more effective in retarding top growth of gallberry than burns made at other seasons of the year (Hughes and Knox, 1964). However, recovery of carbohydrates occurred within one year regardless of time of year burned or whether plants were killed back to the ground once or in two consecutive years.

Burned Range and Improved Pasture

The trend is away from year-round grazing of forest range and toward primary dependence on range during the winter and spring and improved pasture during the summer and fall. However, burned range continues to provide valuable accessory grazing during the summer. Data from the Alapaha show that cattle with access to improved pasture (0.6 acre per cow) spend 31 to 52% of their total grazing time on nearby forest range. When the range was burned, cows and calves gained 87 and 37 pounds more, respectively, than their counterparts which had access to unburned range.

The Future of Fire

Thirty years of practical experience and research have demonstrated the value of fire in improving quality and productivity of wiregrass forage, aiding distribution of cattle, stimulating native grasses to produce seed, and checking growth of undesirable shrubs. Increasing dependence on improved pastures and other range forage improvement techniques will not lessen the value of fire. These developments, coupled with greater knowledge of fire behavior and expanding prescribed burning services by state agencies, will facilitate wiser use of fire as a management tool. Fire is the cheapest method of improving forage on wiregrass ranges and will continue to play a primary role in range management for years to come.

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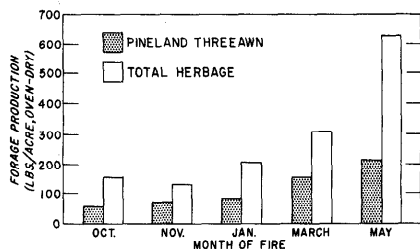


FIGURE 5. Production of pineland threeawn and total herbage on south Florida ranges 2 months after burning.