



## Kikuyugrass for Forage

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**K**ikuyugrass (*Pennisetum clandestinum* Hochst. ex Chiov.) is a native of the highlands of Kenya in Africa. It was introduced into Hawaii in 1925 and has been introduced and distributed to many subtropical and tropical countries.

### Description

Kikuyugrass is an aggressive and vigorous perennial that spreads by surface and underground stolons. The plant normally forms a dense mat of stolons and stems. The soft stems grow relatively upright and produce a high number of leaves relative to other grasses. The leaves on vegetative stems are long, narrow, and covered with short, fine hairs. The flowering stems are generally on short side shoots, with a compact leaf arrangement. The female structures of the flower precede the male parts and look like fine white bristles.

### Environment

Kikuyugrass is one of the most the important pasture and range grasses in Hawaii. The wide adaptability of the grass, from sea level up to 6000 feet elevation, makes it the predominant pasture grass in the state. It requires an annual rainfall above 35 inches. The aggressive nature of kikuyugrass makes it challenging to incorporate companion forage species in the pasture.

### Cultivars in Hawaii

Several cultivars of kikuyugrass have been either introduced to or developed in Hawaii; they include the "common" type as well as the hybrids 'Kabete' from Kenya (1938), 'Whittet', 'Breakwell', and 'Hosaka'. 'Hosaka' was bred and released by Dr. Ukio Urata, a researcher with the former Hawaii Agricultural Experiment Station, University of Hawaii. An additional 129 unnamed

crosses, developed by Dr. Urata, are maintained at the Mealani Research Station.

### Establishment

The recommended seeding rate for kikuyu is 1–2 lb/acre of pure seed, which should be planted in a well prepared field under favorable conditions of adequate moisture and soil fertility. Seeds can be purchased from wholesale distributors in Hawaii. Importation of seeds from U.S. mainland and foreign sources requires a permit from the United States Department of Agriculture, Animal and Plant Health Inspection Service, because kikuyugrass is listed on the federal noxious weed list.

Vegetative propagation with mature stems and stolons is the most common method of kikuyugrass establishment. Sprigs can be hand planted or scattered and disked into the soil. The field should be well prepared, and growing conditions at the time of sprigging should be favorable.

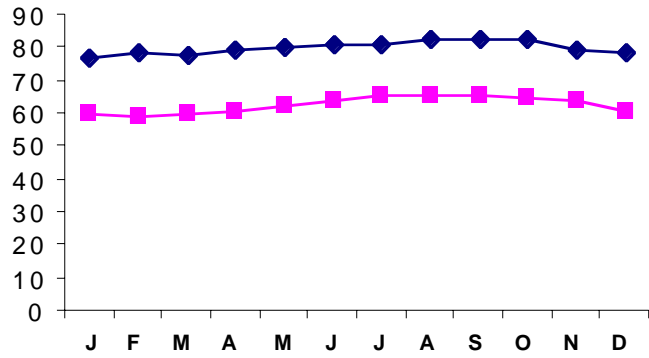
### Management

Kikuyu stands up well to heavy stocking, trampling, and rotations of 30–45 days. Increasing the rotational period is recommended for higher elevation pastures during the cool season.

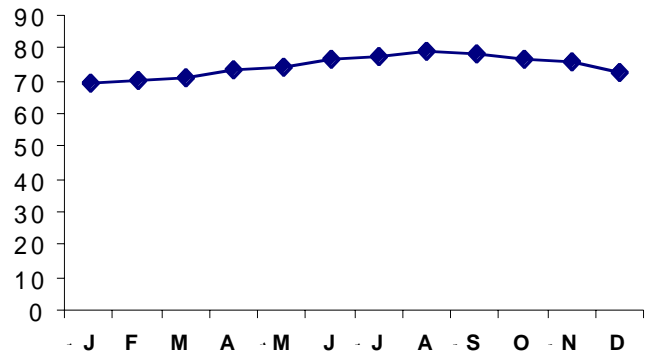
### Fieldwork in Hawaii

Field plots (10 x 100 ft) were established at three CTAHR research stations (Mealani, Waiakea, and Waimanalo). The plots were harvested at regrowth intervals of 4, 8, and 12 weeks at each of the three locations. A "maintenance" level of fertilizer was applied, consisting of 2.25 lb of urea and 2.1 lb of muriate of potash per plot every 3 months (equivalent to 390 lb of urea and 365 lb of muriate of potash per acre per year). Soil analysis before any fertilizer application is strongly recommended.

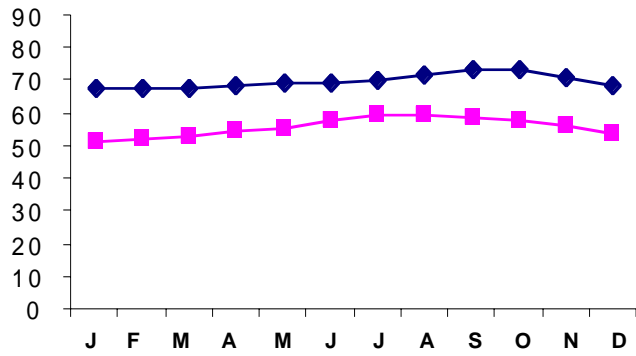
Average maximum and minimum temperatures (°F) at Waikeke Research Station, 1988–1994.



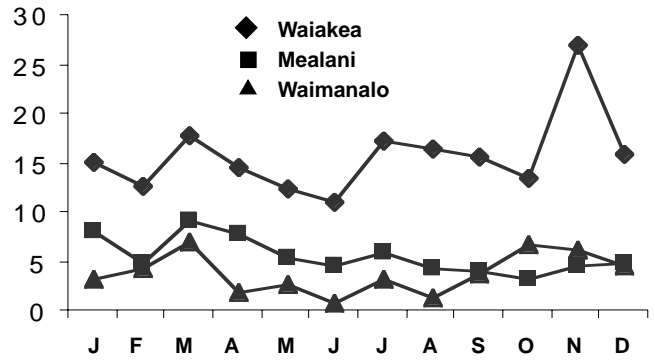
Average temperatures (°F) at Waimanalo Research Station, 1991–1994.



Average maximum and minimum temperatures (°F) at Mealani Research Station, 1988–1994.



Average monthly rainfall at three CTAHR research stations, 1991–1994.



Yield data for the three sites are shown in Table 1. The harvested forages were sent to CTAHR's Agriculture Diagnostic Service Center for tissue analyses, and those data are shown in Table 2.

### Resistance to the yellow sugarcane aphid

More than 250 grasses were screened and scored on a 10-point scale, (0 = no damage, 9 = plant death) to evaluate tolerance to the yellow sugarcane aphid, *Sipha flava* Forbes. The grasses tested included 169 kikuyu cultivars obtained from various collections: 129 cultivars from the Mealani Research Station, 23 from the USDA Southern Regional Plant Introduction Station in Tifton, Georgia, 13 from the collection of the University of California at Riverside, and the remaining were common cultivars from Hawaii. A resistance score was established for each grass tested. In general, the kikuyugrasses were very susceptible to the yellow sugarcane aphid; the most resistant score (mean  $\pm$  standard error) was  $4.20 \pm 0.74$ , most susceptible score was  $7.01 \pm 0.62$  and average across all kikuyu cultivars was  $5.70 \pm 0.42$ .

### Acknowledgments

The authors thank the County of Hawaii Department of Research and Development for providing the funds to develop this publication. The former Governor's Agriculture Coordinating Committee funded research on the yellow sugarcane aphid forage resistance screening. Special thanks to Dr. Stanley Ishizaki, retired forage analyst in the former CTAHR Department of Animal Sciences, for initially establishing the forage plots and the staff of the respective experiment stations maintaining the plots.

### References

- Hosaka, Edward Y. 1958. Kikuyugrass in Hawaii. University of Hawaii Agricultural Extension Service, Circular 389.
- O'Rielly, M.V. (ed). 1975. Better pastures for the tropics. Arthur Yates and Co., Pty., Ltd., Revesby, NSW, Australia.

**Table 1. Yield of kikuyugrass cv. Hosaka (lb/acre) in three locations at three regrowth periods (mean of 36–39 samples  $\pm$  standard error)**

Location	4-week	8-week	12-week
Mealani	741.4 <sup>a</sup> $\pm$ 120.3	1470.6 $\pm$ 194.8	2141.1 $\pm$ 196.6
Waiakea	617.1 <sup>a</sup> $\pm$ 75.0	1693.6 $\pm$ 158.4	2096.4 $\pm$ 179.9
Waimanalo	1032.5 <sup>b</sup> $\pm$ 110.6	1882.3 $\pm$ 158.8	2593.4 $\pm$ 200.9

Means within columns with different superscripts are significantly different ( $P < 0.05$ ).

**Table 2. Nutrient composition (%) of Kikuyugrass, cv. Hosaka at different stages of growth.**

Stage	Dry matter	Crude protein	NDF	ADF	P	K	Ca
<b>Mean <math>\pm</math> standard error</b>							
4 wks	14.1 $\pm$ 0.8	17.1 $\pm$ 1.0	62.6 $\pm$ 1.0	28.6 $\pm$ 0.7	0.29 $\pm$ 0.00	2.90 $\pm$ 0.5	0.39 $\pm$ 0.02
8 wks	19.1 $\pm$ 1.0	10.8 $\pm$ 0.9	70.7 $\pm$ 0.9	33.9 $\pm$ 1.6	0.19 $\pm$ 0.01	2.12 $\pm$ 0.6	0.37 $\pm$ 0.03
12 wks	24.0 $\pm$ 1.7	8.3 $\pm$ 0.8	74.4 $\pm$ 0.6	35.8 $\pm$ 0.4	0.13 $\pm$ 0.01	2.34 $\pm$ 0.1	0.46 $\pm$ 0.02
<b>Maximum-minimum values</b>							
4 wks	12.1–15.8	11.0–22.9	52.3–69.8	22.5–35.6	0.28–0.30	1.65–3.81	0.36–0.44
8 wks	16.9–22.5	6.7–15.2	61.5–75.9	26.8–63.8	0.15–0.24	0.69–3.59	0.30–0.44
12 wks	22.3–27.5	6.1–11.7	68.2–79.6	31.9–40.5	0.12–0.15	2.15–2.50	0.42–0.50

NDF = neutral detergent fiber; ADF = acid detergent fiber; P = phosphorus; K = potassium; Ca = calcium