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Effect of Pruning on Vetiver at the HARC Kunia Experiment Station

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Summary

A replicated trial was conducted to determine the effects of pruning on vetiver growth, health and tillering. The number of tillers was hypothesized to be directly correlated to the time taken to form a solid vegetative barrier to prevent soil erosion. Pruning was not shown to significantly increase the rate of tillering or enhance the growth of vetiver. The health was based on visual appearance, and was shown only to induce new leaves on the five-month old plants. Future measurements and observations will be taken by pruning more mature plantings; improved visual health is expected.

Introduction

Sunshine, a noninvasive sterile variety of vetiver, is used in Hawaii as a vegetative barrier that controls runoff, prevents soil erosion, as well as stabilizes slopes. This grass has grown to a height of 6 ft and a width of about 4 ft after four years at the HARC Kunia Experiment Station in Waipahu, Hawaii. Once established, it can survive with rainfall as low as 25 inches annually without irrigation based on HARC's irrigation trials at Waipahu, Mililani and Waimanalo in 2009 and 2010. In eroded and infertile soils, fertilizer and amendments can aid in the rapid establishment of vetiver. Pruning was studied to observe its effect on the rate of tillering and close-in between adjacent plants in a row to form a barrier that prevents soil erosion. A plant with more tillers is expected to establish an erosion barrier in a shorter time period. The effect of pruning on overall plant health was also determined.

In fertile soils, vetiver only needs water for establishment, especially if planted during the summer, and can survive in areas of low rainfall with little irrigation after establishment. Under dry conditions with no irrigation, the hedge will still serve its purpose as a barrier but will have many dry leaves, and can be a potential fire hazard. Pruning may reduce this hazard. The photo below demonstrates the visual health effect on pruned vetiver alongside unpruned vetiver.

Pruned (left) and unpruned (right) vetiver

Methods

The pruning trial was conducted in a 140-ft strip of vetiver at the HARC Kunia Experiment Substation in Waipahu. The soil series at this leeward site, which has an average annual rainfall of 22.7 inches, is the Molokai silty clay loam. The vetiver was planted 8 inches apart on May 15, 2009, and the first pruning treatment was on September 28, 2009. The trial was irrigated at 85% of USDA Class-A pan evaporation and fertilized with 16-16-16 at planting at a rate of 275 lb per acre.

The plot layout was a randomized complete block design with six replications. For replicate 1 the plot length was 19 ft, replicates 2 and 3 were 5 ft, and replicates 4, 5 and 6 were 10 ft. The four pruning treatments consisted of: unpruned (0), pruned at a six-month interval or twice per year (2), a three-month interval or four times per year (4), and a two-month interval or six times per year (6). Data collection and pruning occurred on the same day on the dates shown below for the respective treatments.

Treatment	Pruning Dates				
0	none	none	none	none	none
2	9/25/09	none	none	3/31/10	none
4	9/25/09	none	1/7/10	none	4/12/10
6	9/25/09	11/18/09	1/7/10	3/16/10	4/12/10

Plants were pruned to a height of 19 inches at each pruning date. The measurements consisted of tiller counts and heights, supplemented with photographs. Tillers and height were measured for each plant within a plot. The heights were measured from the soil surface to the top of the leaf canopy. Photos were taken after each pruning of each replicate.

Results and Discussions

The tillering data was expressed as the average number of tillers per plant and statistically analyzed to determine differences in tillering due to pruning. Pruning showed to neither promote nor inhibit tillering (Table 1). The differences between tillering in each treatment were not statistically significant for any treatment, with no apparent trends.

Table 1. Average number of tillers per plant for pruning frequency treatments (Trt).

Trt	09/28/09	11/18/09	01/07/10	03/16/10	03/31/10	04/12/10
0	19.0 a	27.3 a	32.2 a	33.5 a	33.0 a	39.1 a
2	18.3 a	30.5 a	29.6 a	33.0 a	34.2 a	39.4 a
4	16.7 a	28.1 a	28.1 a	29.9 a	30.6 a	35.4 a
6	21.3 a	30.6 a	33.8 a	32.3 a	32.2 a	37.7 a

Means with the same letters are not significantly different at the 0.05 level of probability using least square difference (LSD) method.

Height measurements taken on the same schedule as tiller counts were also statistically analyzed for differences. This data proved to be somewhat irrelevant as pruning was the cause of statistical differences in the height measurements (Table 2).

Table 2. Average heights (cm) for pruning frequency (Trt).

Trt	09/28/09	11/18/09	01/07/10	03/16/10	03/31/10	04/12/10
0	73.5 a	138.0 a	134.1 a	141.3 a	138.2 a	131.0 a
2	69.8 a	105.1 b	107.1 b	131.3 ab	140.3 a	81.0 d
4	69.3 a	102.4 b	95.2 b	112.8 bc	96.8 ab	104.1 b
6	66.7 a	98.6 b	106.6 b	106.6 d	87.4 b	89.0 bc

Means with the same letters are not significantly different at the 0.05 level using the LSD method.

Unpruned (left) and pruned 6 times per year (right)

Conclusions and Recommendations

Tiller data suggest that pruning will not increase the rate of tillering, hence it will not promote faster close-in of the vetiver strip or reduce the time necessary to form a barrier against runoff and soil erosion. As expected, pruning young plants did not appear to have any health benefits based on observational data taken with photos. Further studies may look at the effect of pruning on health of older plantings with less irrigation. Older plantings that can sustain themselves without irrigation can become very dry in areas of low rainfall and can be a potential fire hazard. In this scenario, pruning to stimulate new healthy green leaf growth may reduce this hazard.