

EFFICACY OF VETIVER IN SOIL EROSION CONTROL ON GUAM

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Abstract

An experiment was laid out in the southern part of Guam wherein the soil was described as very fine, kaolinitic, iso-hyperthermic Oxic Haplustalfs and slopy. The experimental sites were selected on slopes of 20, 25, and 30%. Four rectangular plots of 3 m x 10 m were established on each slope. The 3 m formed the width at the bottom and at the top of the plot and the 10 m the sides. Two of the plots were left with the native grass but mowed. In the other two plots the native grass was removed and the soil was kept barren. Vetiver hedgerows of 3-m length were planted at the bottom of one plot with grass and of another one without grass. The other two plots without the vetiver hedgerows formed the control. In the middle of the hedgerow as well as in the control, a steel rod with a scale was hammered in the soil to measure the build up or loss of soil.

The soil loss in the control plots and the build-up in the hedgerow plots were periodically measured over a three-year period. The results indicated a marked build-up in soil plots above the vetiver hedgerows. Also, hedgerows in plots with bare soil accumulated more soil than the ones with grass.

Introduction

Guam is the southernmost island of the Marianas chain in the western Pacific. It is 2 600 km east of Manila and about the same distance south of Tokyo. The island is about 48 km long and 6 to 19 km wide. The southern part of Guam is mostly volcanic, mountainous and deeply bisected by many rivers. The northern part of the island is coralline, relatively flat and devoid of rivers.

Volcanic and mountainous southern Guam is highly prone for soil erosion. Most eroding soils in southern Guam are classified as Akina Bad Land Complex (Young 1988). Because of the erosion of the soil in the upstream during heavy rains, it is quite common to note reddish freshwater mixing with the seawater at the river mouths. These soils are acidic and mostly covered by an introduced grass, *Miscanthus folridulus*.

Guam receives about 2 200 mm of rain per year and over 75 % of it falls from June to November. Forest fires are frequent during the dry season (December to May) causing bare soil to be exposed to sun and rain, which increase erosion (Khosrowpanah 1991).

The present study was conducted from 1996 to 1998 in the acid soils of southern Guam to evaluate the efficacy of vetiver grass in soil erosion control.

Material and Methods

An experiment was laid out at the Ija Agricultural Experimental Farm of the University of Guam whose soil has been described as very fine, kaolinitic, iso-hyperthermic Oxic Haplustalfs and slopy. This site had slopes of 20, 25 and 30%. Vetiver grass slips were obtained from the Natural Resource Conservation Service of the USDA. Four rectangular plots of 3 m x 10 m were established on each of the slopes. Of the four plots, two were kept with native grass and in the other two the grass was removed and kept barren.

Vetiver hedgerows were planted at the bottom of one plot with grass and of another without grass. The two plots without the vetiver hedges formed the control. In the middle of the hedgerow as well as in the control plots, a steel rod with a scale was hammered in the soil in each plot to measure the build-up or loss of soil.

This experiment was started in June 1995 by planting vetiver slips 12 cm apart. The slips formed into clumps and closed the gaps in six months. Observations on soil build-up or loss were made on 10 February 1996, 20 April 1996, 10 July 1996, 20 October 1996, 15 February 1997, and 2 April 1998.

Results and Discussion

In the 26-month study period, there was more soil loss in the barren plots than in the plots covered with the grass but without vetiver hedges. There was 1 cm loss of soil at the point of placement of the measuring scale in the barren plots but only 0.3 to 0.4 soil losses in the grass-covered plots. There was more soil build up at the vetiver hedge in the barren plots (about 30 cm) than in the plots covered with grass (about 10 cm). In the bare soil plots, about 30 cm soil was built up at the vetiver grass hedgerows and there was a loss of about 1 cm in the plots without hedgerows.

Bare soil without vegetation cover and hedges is prone to severe erosion. Forest fires, which are common in southern Guam, enhance soil erosion by depleting vegetation and exposing the soil to adverse weather factors. The typhoons that visit Guam uproot trees and the associated rains enhance erosion within a short period. Soil erosion is a well recognized phenomenon in southern Guam. Vetiver cultivation in erosion-prone areas would result in curtailing considerable amounts of soil loss. Still use of vetiver is not a common practice on Guam. There is a need to promote vetiver cultivation by demonstration and education.

References

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