



## RESEARCH PAPER

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## Productivity of tiger grass (*Thysanolaena maxima*) as influence by age of bamboo stand in bamboo-based agroforestry

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### Abstract

The study was conducted to analyze the influence of bamboo stand in panicle production performance of tiger grass planted in intercrop. The space between bamboo stand was utilized for panicle production while waiting for the bamboo clumps to be fully grown. The study was conducted at Cagayan State University Gonzaga Campus. This study was aimed to determine the average number of panicles after six months, weight of panicles after six months, average number of tillers after six months, and numbers of productive tillers after six months. The experiment was conducted in a single factor experiment in a Randomized Complete Block Design (RCBD). The treatments used are 3 years bamboo plantation, 5 years bamboo plantation, 7 years bamboo plantation. The result of the study showed significant results excelled by the 3 years bamboo stand intercrop with tiger grass. Results in average weight (g) of panicles T1 showed highly significant among the treatments observed compare to T2 and T3. This means canopy of the bamboos affects the parameters per treatments. T1 has a bamboo grown for three years and T2 are bamboos grown for 5 years and lastly T3, are bamboos grown for 7 years. The experimental area with three years bamboo stand were still on progress of panicle collection for broom making.

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## Introduction

Tiger grass (*Thysanolaena maxima*) or broom grass is locally known as boi-boi (Ilokano) and tambo (Tagalog). It has a great ecological and economic importance, and many uses. It serves as hedge grow, which controls erosion and good in rehabilitating degraded areas as it helps retain ground moisture and promotes soil fertility. It is also grown as viable livelihood venture because of its potential in generating cash income from the harvested panicles of the plant when proper management is employed.

*T. maxima* can thrive at low to medium elevation but can grow faster in higher elevation and could reach up to 10 years' life span. It normally grows in areas particularly in logged-over areas mountain slopes. It is being propagated by upland farmers in some parts of Benguet Province. Likewise, it grows abundantly in the highland areas of Ifugao and Mt. Province. It can be grown in many types of soil such as clay, sandy clay, loam and sandy loam.

Bamboo when planted as a single crop particularly at its early stage of growth has a wide space between them. Such space can be devoted to agricultural crops production and productivity can be increased when the spaces in between the plants will be planted to crops particularly those that can thrive under partially shaded conditions without much reduction in the production of the component crop.

Such space could be devoted to agricultural crop production while waiting for the bamboo clumps to close out besides, the component crop can also help address erosion problem particularly in the sloping area.

## Materials and methods

### Research design

The experiment was conducted in single factor experiment in a Randomized Complete Block Design (RCBD). The treatments used are the following:

T1- 3 years bamboo plantation

T2- 5 years bamboo plantation

T3- 7 years bamboo plantation

### Locale of the study

The study was conducted at the different age bamboo plantation of Cagayan State University Gonzaga, Philippines.

### Soil analysis

Soil sample was collected on flat and sloping areas at Cagayan State University-Gonzaga where the research was conducted. Prepared soil sample was submitted at DA-CVIAL for analysis of organic matter (OM), phosphorus (P) and potassium (K).

### Land preparation

The land was prepared by strip brushing one meter wide in between the rows of bamboo plants. All debris were removed so that there was no obstruction during the subsequent activities to be undertaken. The strip was made across the level of the slope to minimize soil erosion and further prevent it upon establishment of the tiger grass.

### Staking and Hole digging

Staking was done one row between two rows of bamboo prior to digging of holes to attain proper distancing of plants and to provide proper markings before holes are dug. The distance between hills was two meters.

Digging of holes was done when the soil is wet so that it is loose. Holes were dug 25cm in diameter and 30 cm deep. When digging, the top-soil was separated from the sub soil and to be used first in covering the base of the plant.

### Preparation of planting materials

Clumps of the tiger grass was supplied by a farmer. The clumps were divided into parts with four tillers each. The tillers that are more than two feet were discarded because they do not recover easily, and have a greater chance of mortality as compared to smaller tillers. The prepared tillers were propagated in a polyethylene bags.

### Planting

The propagated tillers were planted to a depth of 20 centimeters. The bedding's is a mixture of topsoil and organic fertilizer based on the soil analysis.

The sub soil was used to fill up around the plant. Watering was done immediately after planting to allow the soil to settle so that it will get in contact with the roots of the plant for faster regeneration.

#### *Mulching*

Mulching was done after planting to minimize the evaporation of moisture and to suppress the growth of weeds. Besides when the mulch decomposed, it will also serve as additional source of nutrients for the growing tiger grass.

#### *Care and management*

Tiger grass can survive in natural stand; however, best result can be achieved with proper management. It can be thrived in many types of soil such as clay, clay loam, and sandy loam. However, fertilization can be done in areas where soil nutrients are deficient to enhance the growth and flower development of the plants. Fertilizer was applied 10cm away from the base of the plant and a depth of two inches. The success of the tiger grass plantation is dependent on the cultural management schemes to be employed to minimize competition of soil nutrients, space, light, and moisture. Weeding should be during the rainy season where there is abundant growth of competing vegetation. Plantation was also be protected from stray animals and wild fires.

#### *Harvesting of panicles*

When the panicles reach a length of about 70 cm and more, or when the panicles are fully extended, they can already be harvested. The panicles were cut with a sharp sickle or bolo when they are still green and soft. This could ease the cleaning and removal of seeds. Mature ones are hard and rough and could result to low quality brooms. When the panicles have been harvested, cut about 90% of the aerial part of the plants so that more tillers/shoot will be developed during the next rainy season. Harvested panicles must be dried under direct sunlight for 2-3 days. During and after the drying period, the seeds must be removed by shaking or patting them lightly against a big stone or a concrete pavement.

#### *Data gathered*

##### *Average number of panicles*

This was taken from all sample plants by counting the tillers per hill after six months: and the average was computed.

##### *Weight of panicles*

This was taken by counting the panicles individually from each sample plant after six months:

##### *Average number of tillers*

This was taken from all sample plants by counting the tillers per hill after six months;

##### *Numbers of productive tillers*

This was be taken from two sites after six months using the standard formula.

##### *Percentage of productive suckers*

This was done by counting the total number tillers and the average was taken after which the productive tillers was computed using the equation:

$$\text{Productive Sucker (\%)} = \frac{\text{(Number of productive tillers)}}{\text{(Total number of tillers)}} \times 100$$

##### *Analysis of the data*

RCBD was used to analyze the data, it was computed manually and when the result showed as significant results LSD was used.

## **Results and discussion**

### *General observations*

Planting was done on September 16, 2021 at the on-set of rainy-season when enough moisture is sufficient to warrant the survival of the propagated tiger grass. After planting there was a frequent rainfall until the month January 2022. The plants in all treatments have not produced tillers as around 1 month as expected due to transplanting shock and recovery period of the plant. On February 2022 the tillers were observed to rapidly elongated and emerged. A week after, panicles were observed to develop.

Plants in T1 that were planted in the 3-year-old bamboo plantation seem to perform better as compared to those that were planted in T2 and T3 plants that were planted in area with 5-year-old and 7-year-old bamboo plantation almost closed of vegetation.

##### *Average number of panicles after six months*

It is shown in the table that T<sub>1</sub> tiger grass planted in 3 year-old bamboo plantation has a mean of 17.41 which

was found significant when compared to T<sub>2</sub> and T<sub>3</sub>. T<sub>2</sub> tiger grass planted in a 5-year-old bamboo plantation follows with a mean of 5.74 while T<sub>3</sub> has the least number of panicles with a mean of 5.04.

This was planted in a 7-year-old bamboo plantation. According to the statistical result T<sub>1</sub> was found significant over T<sub>2</sub> and T<sub>3</sub>. Where T<sub>2</sub> and T<sub>3</sub> are comparable with each other (Table 1).

**Table 1.** Parameters obtained by tiger grass after six (6) months

Treatments	Average Number of Panicles After Six Months	Average weight (g) of Panicles per Hill After Six Months	Average Number of Tillers Per Hill After Six Months	Average Number of productive Tillers Per Hill After Six Months.
T <sub>1</sub>	17.41a	699.21 a	56.77a	39.04 a
T <sub>2</sub>	5.74b	232.41 b	11.11b	5.38 b
T <sub>3</sub>	5.04b	0.498 b	11.41b	6.38 b
ANOVA RESULTS	*	**	**	**
C.V. (%)	16.58	26.26	15.03	23.14

In a column means of the same letter superscript are not significantly different at 0.6, 0.5, LSD.

The result could be due to the presence of thick vegetation in the area that does not permit the penetration of sunlight freely. The plants only received partial sunlight in the afternoon. Light intensity influences the manufacture of plant food, stem length, leaf color and flowering (Aggie Horticulture). Grass is included as C<sub>4</sub> plants that was adapted to high light or sun-loving plants. The more sunlight it receives the more production it gives.

#### *Average weight of panicles after six months*

On the average weight (g) of panicles as presented, result revealed highly significant among the treatments observed with a mean of 699.21g followed by T<sub>2</sub>, 232.42g and lastly T<sub>3</sub>, 0.498g. This means canopy of the bamboos also affect the parameters per treatments. T<sub>1</sub> has a bamboo grown for three years and T<sub>2</sub> are bamboos grown for 5 years and lastly T<sub>3</sub>, are bamboos grown for 7 years. The mean result of the study (Table 1).

#### *Average number of tillers after six months*

On the average number of tiller, result revealed that there is not significant variation among the difference treatments used with the mean value of ranging from t<sub>1</sub>-56.76666667 to t<sub>2</sub>-11.11 respectively. Result portrayed that the number of tillers with a mean value of t<sub>3</sub>- 11.41.

#### *Average number of productive tillers*

On the average number of productive tillers as presented, result revealed that they are highly significantly different among treatments.

The mean result t<sub>1</sub>-39.04 to t<sub>2</sub>-5.38 and the mean of t<sub>3</sub>- 6.38 respectively (Table 1).

### **Conclusion**

The incorporation of 800 hills of tiger grass during the early years (1.5-4yrs) of bamboo plantation establishment will contribute an annual average of 13,200pcs tiger grass panicles or 112 brooms. It has a total value of Php67,200.00 for four years. This will surely an additional annual income for established bamboo plantations in North-eastern Cagayan.

### **Recommendations**

It is recommended to utilized the bamboo spaces from the 1.5 years up to 4 years as a component to bamboo-based agroforestry.

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