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Agronomic Performance of Madre De Agua (*Trichantera Gigantean Nees*) Under Upland Area in Abucay, Bataan

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Abstract

Madre de Agua (*Trichantera gigantean Nees*) is forage and considered a Multiple Purpose Tree Species used for ruminants and poultry animals with a good potential source of protein and contain good amino acid. Few studies were conducted in terms of the agronomic characteristics of the Madre de Agua prior to utilization as feeds and most studies conducted were mainly conducted to feed monogastric animals. The study intends to produce data for the agronomic characteristics of Madre de Agua as planted and produces a shaded portion of the upland area in BPSU Abucay Campus, Abucay, Bataan. The following parameters were gathered; Plant Height, Leaf to Stem Ratio, Herbage Yield, and Dry Matter Yield and Soil Analysis. Moreover, the following baseline data were used: the area with an elevation of 141.1 feet above sea level with an average rainfall of 296.45mm and temperature ranges from 26°C to 30°C during the duration of the study. Fertilizer requirements are based on the result of BSWM soil analysis (30g/tree ammonium phosphate, 169g/tree Urea, and 4kg/tree organic fertilizer) applied during and after transplanting with adequate irrigation. The study was carried out using systematic random sampling for plants. The result of agronomic characteristics in upland conditions showed that the average plant height of Madre De Agua was 110.50 cm, Leaf to Stem Ratio was 65.82%/34.18% per plant, herbage yield was 556.50 grams per plant, dry matter yield (oven dry) was 87.57% per plant. The established area for the production of the Madre de Agua will be utilized to provide a continuous source of feed to small ruminants and other monogastric species for future research in animal production.

Keywords: nutrition, feeding, forages, herbage yield, dry matter

1. Introduction

1.1 Introduce the Problem

Feeding management is one of the most important aspect need to prioritize by growers in order to increase and sustain the productivity of small ruminants. Inadequate supply of roughage and source of planting materials are not locally available especially during dry season from which there is subsequent increase of forage scarce in feeding animals. One of the project directed of Bureau of Animal Industry was to introduce Madre de Agua in feeding animals specifically in pigs. However, there is a need to conduct a research to further support the development and utilization of this roughage as feed stuff for small ruminants.

Madre de Agua (*Trichantera gigantean Nees*) is a fodder tree also known as Nacedero which was introduced in the Philippines some years ago from Latin America (Columbia and Venezuela) and adapts well in local tropical conditions. It is used as fodder for pigs, rabbits and ruminants (Heuze et. al, 2016). The leaves of Madre de Agua are good sources of protein with varying level from 13 to 22% in dry matter form and apparently most of the protein content is considered as true protein and contain good amino acid balance (Rosales, et al.,1999 and Rosales, 1997). Generally, the study aimed to evaluate agronomic performance of Madre De Agua under upland area in Abucay, Bataan. Specifically, it aimed to determine these parameters: Plant Height, Leaf to Stem Ratio, Herbage Yield and Dry Matter Yield, and Soil Analysis for Fertilizer Application.

2. Method

2.1 Propagation of Cuttings

Planting materials of Madre de Agua were purchased from farmer in Arayat, Pampanga. The cuttings measured at 6-8 inches with 3 nodes ideal as planting materials. Cuttings were grown in a plastic bag (10 inches' x 6 inches) and grew for one (1) month prior transplanting in the field to acclimatized from stress incurred during transportation and the heavy rains during its adaptation period.

2.2 Land Preparation and Transplantation

An approximately 2000 square meter of underdeveloped area was cleaned and prepared as an experimental area for production of Madre de Agua. The area was cleaned, plowed and harrowed using a hand tractor for ease management. Three months old seedlings are plated in auger-dug holes with furrow distance of 1.0 meter by 1.0 meter between plants. A total of 2000 planting materials were grown in between furrows to ensure that plants received enough supply of water in the absence of rainfall to keep the soil moisture.

2.3 Experimental Site

The area of production for Madre de Agua were located at the vicinity of Bataan Peninsula State University Abucay Campus, Abucay, Bataan. The area was located at 14°44'N, 120°32'E, in the north-eastern section of the Bataan Peninsula with an agro climatic condition classified as tropical. During most months of the year, there is significant rainfall and a short dry season. The climate is classified as Ante Meridiem (AM) by the Koppen-Geiger system. The temperature average from 27.5 °C and about 2852 mm of precipitation falls annually. Bataan has distinct dry and wet seasons categorized as Type I in the Coronas system. The dry season begins in November and end in April while the rainy season starts in May and ends in October.

2.4 Fertilizer Application

Fertilizer applied was based from the results obtained from Bureau of Soil and Water Management (BSWM), Philippines after subjecting samples of soils are as follows:4 kg/tree basal application, 30g/tree Ammonium phosphate and 169g/tree Urea mixed and applied one month after transplanting.

2.5 Harvesting

Harvesting was done 6 months after transplanting. The height of the sample plants, weight of the stems and leaves were measured and recorded and pruned 100 cm from the soil surface. The herbage consisting of leaves (including petioles) and edible twigs were harvested from individual plants. The leaves and stems were separated, weighed and recorded. After cutting, the separated leaves and stems were wrapped in old newspapers and air-dried in an oven at 85°C for 48hours. The dried samples were weighed individually and data were recorded. The plants were allowed to re-grow up to the time of next cutting.

2.6 Sampling Procedures

The study was carried out using systematic random sampling for plants. A total of 167 sample plants was identified using Slovin's formula and provided with individual tags for identification.

2.7 Research Design

Descriptive method was used as research design for the study. All the data for agronomic performance were described and presented.

3. Results

3.1 Statistics and Data Analysis

All the data for agronomic performance of Madre de Agua was subjected to descriptive analysis presented in tabular and graphical.

Table 1. Average Leaf to Stem Ration, Average Herbage Yield and Average Dry Matter Yield. The average leaf to stem ratio, average herbage yield and average dry matter yield.

Parameters	Values
Average Plant height (cm)	*.50 cm (6 months from transplanting to harvesting*
Average Leaf to Stem Ratio	65.82%/34.18%
Average Herbage Yield	556.50 grams
Average Dry Matter Yield	87.57%

The average plant height which was 110.50 cm (6 months from transplanting to harvesting) and 164.09 cm (3 months after harvesting), average Leaf to Stem Ratio was 65.82%/ 34.18% per plant and the average herbage yield was 556.50 grams per plant. Chemical Analysis of Madre de Agua leaf meal from study of A.F.Jaya et al., 2008 contained 88.44% dry matter, 18.21% Crude Protein, 12.5% crude fiber, 2.66% crude fat, 21.80% ash, 11.56% moisture, 5% calcium,0.41% total phosphorus and 2, 983 kcal/kg gross energy.

The average dry matter yield (oven dry) was 87.57%, the result of the study conformed to A.F.Jaya et al., 2008 that Madre de Agua leaf meal contained 88.44% dry matter. A total biomass production for both fresh leaves and stems is 1,112 kg harvested for 2,000 square meter of established Madre de Agua production area.

4. Discussion

Average Plant Height

Presented in Figure 1, the average plant height of Madre De Agua plants for six months during wet season. After a month, shoots were approximately 37.6 cm in height, which continuously followed by 44.5 cm, 49.5 cm, 604 cm, 72.2 cm and 110.5 cm was observed during the six months' study period. A slow growth was observed during second to five months with an average increment of 6.9 cm, 5 cm, 10.9 cm and 11.8 cm, respectively and increased at six months with 38.3 cm average height per plant.

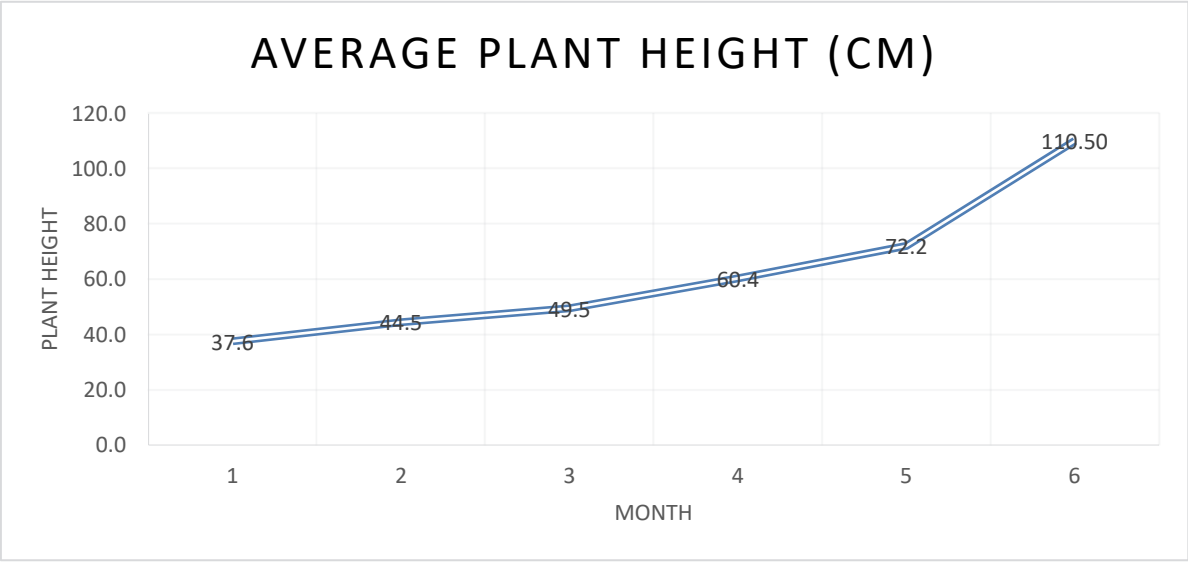

Figure 1. Average Plant Height (cm) of Madre De Agua

According to CIPAV (1996), the ideal height at cutting of Madre de Agua is 1.0 m at the age of 8 to 10 months. The result of the average plant height in the study of 110.50 cm or 1.105 m conforms with the standard cutting height considering the Madre de Agua was harvested in 6 months of age after transplanting. Plant Height (PH) derived during the wet season supported the importance of moisture on agronomic characteristics and the location of the production was shaded which greatly influence as this forage species perform well at the shaded area.

Leaf to Stem Ratio

Based from the above table, the leaf and stem ratio of Madre de Agua is 65.82%/ 34.18% which a good indication of good quality source of feed for animals. Leaf to stem ratio is considered as an important parameter in determining agronomic characteristics. Leaf to stem ratio describes the quality, diet selection and forage intake. Leaf to stem ratio in legumes is valuable because the leaves are metabolic organs while the quality of stems are largely affected by their structural function (Tarigan and Ginting, 2012). Relative increase in leaf area over time is importantly described as the leaves are the part where the protein content of leguminous trees is concentrated and the leaf to stem ratio reflects a maximized nutrient content (Waters et al., 2010).

Herbage Yield

As shown in Table 1, herbage yield of Madre de Agua composed of fresh and stem was 556.50 grams and equivalent to 1,112 kg biomass harvested from 2,000 square meter of land under upland condition. The locale was

the Madre de Agua was planted was surrounded by old trees that serves and provides a source of shade to multiple tree species were they are considered as shade loving tree and most productive under shade than in full-light does better for instance under leucaena or banana shade (Cook et al., 2005; Rosales, 1997).

Herbage yield depends primarily on leaf and stem formation which were both affected by cell division and elongation. The herbage yield was mainly dependent on the factors that promote cell division and elongation zones as sites of high metabolic activity to sustain high herbage production and biomass accumulation (Abdullah and Suharlina, 2010).

Dry Matter Yield

As presented in Table 1 was the dry matter yield of the Madre de Agua which value is 87.57% that may provide a measure of the amount required to supply the amount of nutrients needed by the animals for the maintenance, growth, development and reproduction.

Dry matter is an important indicator to measure the amount of nutrients that are available to the animal in a particular feed. Dry matter yield is a parameter required for agronomic characterization in a particular crop, forage or roughage. Environmental and weather conditions greatly affect the amount of moisture content in feeds which directly upset the dry matter content of forage or roughage.

Based on findings, the study limits to gather data in comparison of performance of Madre de Agua for wet and dry season. The production of Madre de Agua under upland condition produced agronomic characteristics as start-up for production as fodder in feeding goats, other ruminants and poultry species.

It is recommended to conduct further study for agronomic performance to evaluate the production in wet and dry season, fertilizer application, cutting intervals to measure the growth during harvest period sufficient and available to feed the animals.

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