Agronomy Value of Elephant Grass (*Pennisetum purpureum*) With STU Organic Fertilizer for Dairy Cattle Feed in Mentawai Islands

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ABSTRACT

This study aims to determine the effect of Sarana Tani Utama (STU) fertilizer on the growth and production of elephant grass (*Pennisetum purpureum*) cv. Taiwan is grown on a dairy farm in Sipora Jaya, Mentawai Islands. The study used a randomized block design with 5 treatments P0 = 100% fertilizer N, P, and K, P1 = 100% fertilizer N, P, and K + manure, P2 = STU fertilizer + manure, P3 = STU fertilizer, and P4 = STU Fertilizer + Manure + N, P and K Fertilizer and 4 replicates. The results showed that the application of fertilizer doses of N, P, and K + STU gave results that were not significantly different ($P>0.05$) on leaf length, leaf width, stem diameter, and the effect was very significant ($P>0.01$) on plant height, number of tillers, yields production, dry matter production, and Revenue Cost Ratio. Plant height ranged from 150.40 – 200.85 cm, leaf length 82.31 – 94.26 cm, leaf width 2.38 – 2.91 cm, number of tillers 3.53 – 5.93 stems, diameter stems 1.60 – 1.78 cm, yield production 8.54 – 21.22 tons/ha, dry matter production 1.49 – 4.52 tons/ha, and RCR 0.58 – 1.32, respectively. From the study results, it could be concluded that the P3 (STU fertilizer) treatment was proven to reduce the use of N, P, and K fertilizers by up to 50%.

Keywords: *Dairy Cattle, Manure, N, P and K fertilizer, STU fertilizer, Pennisetum purpureum.*

1. INTRODUCTION

One of the efforts that can be done to improve the physical, chemical and biological quality is by applying manure, applying N, P, and K fertilizers and applying Sarana Tani Utama (STU) fertilizer to plants. Manure can neutralize soil pH, neutralize toxins because of heavy metals in the soil, improve soil texture, helps absorb chemical fertilizers, and maintain soil temperature [1]. STU fertilizer is a fertilizer that has complete nutrients. Its microbes can symbiotically with plant roots to have better and more efficient absorption of plant nutrients. STU can improve plant nutrition, protect plants from pathogens, increase plant resistance to heavy metals, be involved in plant biochemical cycles, synergize with other microorganisms, and maintain plant diversity. STU can form a mutually beneficial symbiosis between plant roots and fungi and increase the capacity to absorb nutrients and water whose availability is limited to acid soils and those with high pH [2].

The addition of N, P, and K fertilizers helps meet the nutrients needed by plants. Nitrogen (N) is needed during vegetative growth, such as shoot formation and stem and leaf development, phosphorus (P) is needed during the early growth of plant seeds, such as helping root and shoot growth in plants, and potassium (K) functions in the process of photosynthesis and plant. Plants will thrive if the nutrients needed by plants are available and sufficient, especially macronutrients such as N, P, and K [3,4]. Elephant Grass (*Pennisetum purpureum*) cv. Taiwan has high palatability, many tillers, strong roots, smooth texture, and long stems that are not hard and do not have fine hairs on the leaf surface.

Elephant Grass cv. Taiwan has a high production of 500800 tons/ha/year [5]. Various factors influence plant growth and production such as temperature, humidity, solar radiation, soil, biotic, and nutrient supply [6] There is no research on the use of this STU fertilizer, so[7] conducted a study on the effect of STU on the company's ex-mining reclamation land by giving 25%, 50%, 75%, and 100% of N, P, and K fertilizers with 10 g of STU giving relatively the same production results. Based on the study results, the growth and production of elephant grass cv. Taiwan on Mentawai Island Land produces relatively the same results. Limited information regarding agronomy aspects of *P. purpureum* on the Mentawai island land, Therefore, the research would like to study more regarding the agronomy aspect of *P. purpureum.*

2. MATERIALS AND METHOD

The material used in this research is elephant grass cuttings cv. Taiwan was taken from Padang Mangateh Payakumbuh, STU, obtained from PT. Sarana Tani Utama Facilities, manure, lime, N, P, and K fertilizers, water, and land covered 399.5 m^2 with a length of 23.5 m and a width of 17 m.

The method used in this research is the experimental method of Randomized Block Design with five treatments and four replications (groups). STU was given at a dose of 10 g/clump, and N, P, and K fertilizers were given at a dose of Urea 200 kg/ha/harvest, SP-36 150 kg/ha/harvest, and KCl 100 kg/ha/harvest than the recommended one [8].

The doses of N, P and K fertilizers and given STU are:

P0 = 100% N, P and K + manure
P1 = Manure + STU
P2 = STU + N, P and K
P3 = STU
P4 = Manure + fertilizer N, P and K + STU

The Randomized Block Design Model is as follows: (Steel and Torrie, 1995)

$$Yij = \mu + i + j + ij$$

Description:
Yij = observational value of fertilizer application in group i and treatment
μ = general mean
i = influence of the i-th group
j = effect of treatment-j
ij = residual effect on the experimental unit that received treatment to (i) and is located in the (i) group i = number of treatments (A, B, C, D, E) j = number of groups (1, 2, 3, 4).

2.1. Observed Variables

Observed variables such as Plant height (cm), b. Leaf length (cm), c. Leaf width (cm), d. The number of tillers (stems/clumps), e. Rod diameter (cm), f. Fresh production (tonnes/ha/harvest), g. Production of dry matter (tons/ha/harvest), h. Revenue Cost Ratio (RCR)

The RCR ratio assessment criteria are as follows [9]:

– RCR ratio > 1, the effort is worth doing.
– RCR ratio = 1, no profit, no loss (break-even).
– RCR ratio < 1, the business is not feasible to develop.

2.2. Research Implementation

2.2.1. Land Preparation And Land Clearing

The land used in this research is in the Mentawai Islands, Tua Pejat. Before tillage, the land is cleared of bushes, reeds, and other plants interfering with plant growth. The research area is 399.5 m^2 (23.5 x 17.0 m).

2.2.2. Preparation Of Grass Cuttings

The elephant grass cuttings cv. Taiwan has as many as 640 cuttings obtained from Padang Mangateh, Payakumbuh.

2.2.3. Cuttings

Planting is done after the soil has been incubated for 15 days, seedlings are planted obliquely, each hole is filled with two cuttings with a spacing of 70 x 60 cm.

The maintenance process is carried out in the following manner:

1) The proportion of urea (N) fertilizer according to the treatment dose of 200 kg/ha with 2 doses, the first treatment at 15 days after planting (DAT) as much as 1/2 dose and second is 30 DAT as much as 1/2 dose.
2) The weeding aims to clear the land from wild plants that can interfere with the growth of elephant grass cv. Taiwan.
3) Land reversal aims to loosen the soil to improve circulating water and air in the soil.
4) Fencing is carried out in the research area.

2.2.4. Harvest

Harvesting is done after the plants are 60 days old.

Table 1. The average of plant height growth of *P. purpureum*

Treatments	Avarage of plant height (cm)
PO	285[a]
P1	296[a]
P2	290.9[a]
P3	313.9[a]
P4	217.2[b]
SE	4.53

Description: The different superskips in the column showed a very significant difference (P<0.01).
SE: Standard error.

Table 2. The average of leaf lenght growth of *P. purpureum*

Treatments	Avarage of leaf lenght (cm)
PO	87.13
P1	91.94
P2	108.69
P3	97.69
P4	73.94
SE	2.69

Description: Between treatments was not significantly different (P>0.05).
SE: Standard error.

3. RESULTS AND DISCUSSIONS

3.1. Effect of Treatment Dose of Fertilizer N, P, And K on The Growth of P. purpueum

The diversity analysis showed that the treatment gave a very significant difference (P<0.01) on the height of *P. Purpureum*. The DMRT test results showed a very significant difference (P<0.01) between the P4 and P3 treatments, P2, P1, and P0. Based on Table 1. The average plant height of P. Purpureum in this study ranged from 217.2 cm (P4) – 313.9 cm (P3). In treatment P0, the plant height reached 285 cm. This size was relatively the same when compared to treatments P1 (296 cm), P2 (290.9 cm), and P3 (313.9 cm). This relatively high yield of plants was due to STU being able to help absorb nutrients contained in the soil become optimal.

Based on the study results, the best treatment was found in P3, namely by giving 50% of N, P, and K fertilizers plus 10 g of STU, and P4 treatment gave poor results. The difference was due to STU working optimally at P3 because the dose needed by plants was helped by the STU to meet the plant's nutrient needs, while at P4, the dose of fertilizer given was only 25%. This was very influential because the nutrient content was insufficient for the needs. Growth and plant energy, so that only enough nutrients are absorbed to meet the needs of plants, and STU, which requires energy from plants, does not get enough energy to grow. The addition of STU in plants will produce very fine hyphae around the roots, penetrate micropores that plants cannot reach, and increase soil nutrient absorption to increase growth, photosynthesis, and dry matter [10]. The growth of P0, when compared with the treatment of P4, gave poor results. Namely, the resulting growth was only 217.2 cm. In the P4 treatment, the available nutrients are insufficient for plant growth. STU only helps absorb nutrients in the soil, but if the nutrients available for plants are few, then plant growth will also be disturbed and not optimal [11].

The dose of 10 g per plant affects plant growth due to increased nutrient uptake through expansion of the absorption surface, nutrient uptake, and the development of mycorrhizal fungi [12]. The STU has not worked optimally because STU forms an intensive external hyphal network after 65 days of infected host plant roots [13]. In contrast, water and nutrient absorption can be expanded with external hyphae.

The root infection forms arbuscular and vesicular in the root tissue takes one week [14]. After 2-3 weeks, the external hyphae will grow very widely. STU can play a role in stimulating hormone formation growth hormone (phytohormones), namely cytokinin and auxin hormones. Cytokinins and auxins play a role in cell division and elongation, causing an increase in plant [15]. The plant height in this study was higher than the results of with an average of 146.29 cm - 164.56 cm [8]. The higher yield in this study may be due to the availability of sufficient nutrients in the soil to help plant height growth so that plant height can grow more optimally.

3.2. Effect Of Treatment Dose Of Fertilizer N, P, And K Of P. purpueum Of Leaf Lenght

The diversity analysis showed that the treatment of giving several doses of N, P, and K fertilizers with STU inoculation gave no significant effect (P>0.05) on the leaf length of *P. purpureum*. Based on Table 2, it can be seen that the average leaf length of *P. purpureum* containing STU and given several doses of N, P, and K fertilizers ranged from 73.94 cm (P4) - 97.69 cm (P3), Table 6 shows that P0 treatment resulted in leaf length of 87.13 cm. When compared with treatments P1 (91.94 cm), P2 (108.69 cm), P3 (97.69 cm) and P4 (73.94 cm) the results were not significantly different (P>0.05). No difference in leaf length growth of *P. purpureum* is caused by STU helping the absorption of nutrients available in the soil through *Mycorrhizal hyphae* that blend with plant roots so that plant roots can help absorb nutrients and water are useful for the growth of plant organs [18]. The development of this leaf is probably due to the temperature and light intensity contained in the same research area. This same temperature causes plant cell division to be the same so that the length of the leaves is relatively the same. Photosynthesis in plants will produce carbohydrates needed by plants, and these carbohydrates are very influential on leaf development [10]

The P3 treatment became the treatment with the best growth compared to other treatments and produced high production only using 50% N, P, and K fertilizers and the application of 10 g of STU. The STU associations allow plants to obtain water and nutrients in dry and nutrient-poor environmental conditions. The hyphae network of mycorrhizae will expand the area of water and nutrient uptake. The size of the hyphae finer than root hairs allows the hyphae to enter the smallest soil pores (micro) to absorb shallow groundwater [14]. The results obtained in this study are lower than 94.72 cm - 104.16 cm [8].

3.3. Effect of N, P, and K Fertilizer Dosage Treatment on Leaf Width of P.purpureum

Table 3. Avarage of leaf width of *P.purpureum* (cm)

Treatments	Avarage of leaf width (cm)
PO	2.79
P1	2.89
P2	2.95
P3	2.37
P4	2.12
SE	0.13

Description: Between treatments was not significantly different (P>0.05).
SE: Standard error.

Table 4. Avarage of *P. purpureum* of tillers number (Stem)

Treatments	Avarage of tillers number (Stem)
PO	15.18^a
P1	17.70^a
P2	15.85^a
P3	23.58^a
P4	19.23^b
SE	0.33

Description: The different superskips in the column showed a very significant difference (P<0.01).
SE: Standard error.

The diversity analysis showed that the treatment of several doses of N, P, and K fertilizers with STU inoculation gave no significant effect (P>0.05) on the leaf width of *P. purpureum*. Table 3 shows that the average leaf width of elephant grass cv. Taiwan ranged from 2.12 cm (P4) – 2.37 cm (P3). From the results, the average leaf width treatments at P0 (2.79 cm) were relatively the same when compared to treatments P1 (2.89 cm), P2 (2.95 cm), P3 (2.37 cm), and P4 (2.12 cm). However, the leaf width that gave the best results was found in P3 treatment and saved up to 50% of N, P, and K fertilizers. P4 treatment gave relatively the same results as P0 but with 25% N, P, and K fertilizers by inoculation The resulting STU leaf width was smaller than the other treatments.

The size of the leaf width is relatively the same due to the intensity of light and temperature at the same research location so that the size of the leaves that develop are relatively the same. This is due to photosynthesis in the leaves producing carbohydrates useful for the growth and development of leaves in plants [10]. The STU helps absorb plant roots by expanding the uptake surface carried out by the hyphae found on plant roots. The presence of hyphae on plant roots makes nutrient absorption by plant roots optimal. Hyphae that infect roots have a high ability to increase the absorption capacity of phosphate, nitrogen, sulfur, zinc, and other essential nutrients [8]. Adequacy of plant nutrients will affect leaf development, especially nitrogen elements [8]. If the plant lacks nitrogen, the plant will grow stunted and pale yellow [17].

The diversity analysis showed that the treatment gave a very significant difference (P<0.01) on the number of tillers of *P. purpureum*. Based on Table 4, it can be seen that the average number of *P. purpureum* tillers cv. Taiwan in this study ranged from 19.23 (P4) – 23.58 (P3). In the DMRT follow-up, it can be seen that the treatment that gives a very significant difference (P<0.01) occurs in the P1 treatment (5.06 rods) with P4 which only produced 19.23 rods, then at P2 (15.85 rods) with P4, and treatment of P3 (23.58 rods) with P4. A significantly different effect (P<0.05) occurred in treatment P0 (15.18 rods) with P4 (19.23 rods).

The results were very significantly different (P<0.01) and significantly different (P<0.05) in the P4 treatment with P0, P1, P2, and P3 treatments because the nutrients absorbed by the P4 treatment plants were minimal because they were only given 25% fertilizer. N, P, and K. The available nutrients are only absorbed for plants, but the amount is still insufficient so STU which requires energy from plants, does not get enough energy to grow and develop and affects the growth of P4 plants. Plant growth also depends on the water content of the soil. *Mycorrhizae* will not develop well if the soil conditions are too dry. This is because if growth is disturbed, the growth of *mycorrhizae* is also disrupted because mycorrhizae only get a little energy from plants.

The small number of tillers that growth is due to land conditions containing elements of Fe, Zn and Mn which are toxic to plants, thus affecting plant growth and development. This research also affects the development of STU in plant roots. Giving lime to plants inoculated with STU will suppress STU development in plant roots[18]. The number of tillers in the study was less when compared the other study, namely the number of tillers ranged from 6.74 to 9.12 stems [8]. The low number of tillers was due to the soil conditions having only a small amount of nutrients to meet the plant's needs. Different land locations also affected elephant grass production. This was due to the less nutrient content available in the research soil, thus affecting plant growth.

3.5. Effect Of Treatment Dose Of Fertilizer N, P, And K Of P. purpureum Of Stem Diameter

Table 5. Avarage of *P. purpureum* of stem diameter

Treatments	Avarage of stem diameter (cm)
PO	1.55
P1	1.49
P2	1.67
P3	1.69
P4	1.43
SE	0.06

Description: Between treatments was not significantly different (P>0.05).
SE: Standard error.

Table 6. Avarage of P. *purpureum* of yield production (ton/ha/harvest)

Treatments	Avarage of yield production (ton/ha/harvest)
PO	14.27[a]
P1	15.20[a]
P2	12.88[a]
P3	17.79[a]
P4	7.03[b]
SE	0.84

Description: Between treatments was not significantly different (P>0.05).
SE: Standard error.

Stem diameter is an indicator of plant growth. The diversity analysis showed that the treatment had a non-significantly different effect (P>0.05) on the stem diameter of *P. purpureum*. In this study, the average diameter of P. purpureum was (P4) 1.43 cm -(P3) 1.69 cm. From the study results, it can be seen that the results of P0 were relatively the same with several treatments of N, P, and K fertilizer doses. P0 treatment had a diameter of 1.55 cm. This diameter is almost the same as P1 (1.49 cm), P2 (1.67cm), P3 (1.69 cm) and P4 (1.43 cm). With the presence of STU in plant roots, plant roots' absorption was better than plants that did not have STU inoculation.

The intensity of light received by the plant can be said to be the same so that it affects the size of the diameter of the plant stem. The increase in growth in plants when compared to plants without STU *mycorrhizae* was lower due to the presence of *mycorrhizae* that fused with plant roots helping to maximize the absorption of available nutrients. Root metabolism of plants with *mycorrhizae* was 2 to 4 times higher than that of plants without *mycorrhizal* infection The reason is that *mycorrhizal* plant roots can increase the absorption of mineral salts by increasing the supply of exchangeable hydrogen ions [19]. STU helps the growth of plants, if the plant is taller, the diameter of the stem will also increase. Generally, the farther from the shoot, the larger the diameter of the stem and the difference in diameter will affect the ability of the cuttings to form roots and shoots because there are differences in the type and variability of carbohydrates and other stored materials [20]. with the STU inoculation which helps the absorption of nutrients, so that plant growth can run optimally. The availability of N absorbed by plants also affects the size of the stem diameter in plants.

3.6. Effect Of Treatment Dose Of Fertilizer N, P, And K of P. purpureum Of Yield Production

The diversity analysis showed that the treatment of fertilizer doses of N, P, and K plus STU gave a very significant difference (P<0.01) on the yield production of *P. purpureum*. The results of the DMRT showed a very significant difference in the effect of P4 treatment with P0, P1, P2, and P3 treatments. Based on Table 6. the average yield production of P. purpureum in the study ranged from 8.52 tons/ha – 21.20 tons/ha/harvest. In the P0 treatment, the fresh production was 14.27 tons/ha, when compared to P1 (15.20 tons/ha/harvest) and P2 (12.88 tons/ha/harvest), these results were relatively the same, and in the P3 treatment gave a reasonably high yield compared to other treatments, which resulted in a fresh production of 17.79 tons/ha/harvest. The use of STU has been efficient in applying N, P, and K fertilizers up to 50%.

However, with P4 treatment with 25% N, P, and K fertilizers plus 10 g of STU could affect crop production, and resulted in low production, fresh production produced was only 8.54 tons/ha/harvest. This decrease is due to the lack of nutrients absorbed by plants, so that the absorbed nutrients are only used for plant growth and development and STU only gets a little energy from plants. This results in the development of STU being an optimal gap. This causes the vegetative growth of plants to be disrupted and disrupts plant growth and low fresh production produced by plants [21]. The research land contains elements of Mn, Zn, and Fe so that the P available in the soil is reduced.

The availability of P in the soil is reduced because the pH of the soil is acidic <7 and the presence of iron ions Mn, Al, and Fe causes these elements to affect plant growth because toxic to plants [8]. The yield production of *P. purpureum* is influenced by climatic factors, soil fertility factors, and processing and management factors. The amount of rainfall affects the availability of water used by plants for growth and development. The rainfall data obtained during the study were 1600 mm/year, and the temperature was 24 - 27° C.

The rainfall and temperature data were relatively good to meet the water needs of the elephant grass cv

Taiwan during the study. The *P. purpureum* grows with a temperature of 25-40o C and rainfall of 1500 mm/year [22]. Liming that is done during soil tillage can affect the development of STU which causes the development of STU. Improvement of soil pH by liming has a detrimental effect on the development of STU that live in the soil so that STU formation decreases. The water content in the soil can affect the growth of plants that have been inoculated with STU. STU is related to the growth of the host plant. *Mycorrhizae* that are resistant to extreme environments will not work well if the growth of the host plant is not able to grow well on the land [18] In the P1 to P3 treatments, STU improved and increased the absorption of nutrients in plant roots, so the use of STU was beneficial in reducing N, P, and K fertilizers). The results of this study were 22.11 – 37.43 tons/ha/harvest. This lower fresh production is due to insufficient nutrients available in the soil to meet the nutritional needs of plants.

3.7. Effect Of Treatment Dose Of Fertilizer N, P, And K Of P. purpureum Of Dry Matter Production

The analysis of variance showed that the treatment of fertilizer doses of N, P and K plus STU hasa different effect ($P<0.01$) on dry matter production of *P. purpureum*. The results of the DMRT showed that there was a very significant difference in the treatment of P0, P1, P2, and P3 with P4. Based on Table 7. the average dry matter production of *P. purpureum* ranged from 1.47 to 3.74 tons/ha/harvest. In the P0 treatment the average dry matter production was 3.67 tons/ha/harvest, when compared to P1, P2 and P3 these results were relatively the same, but if P0 compared to P4 there was a difference, namely P0 was able to produce 3, 86 tons/ha/harvest while P4 only produced 1.47 tons/ha/harvest. The treatment dose given to P4 was 25% of N, P, and K fertilizers plus 10 g of STU caused low dry matter production. This was due to underdeveloped STU, this was because STU received only a small amount of energy from plants, this caused a higher number of infections occurs in plant roots becomes less and the amount of absorption carried out by STU is also not optimal, the least amount of nutrients absorbed by plants affects growth and production.

The absorbed nutrients are high, the dry matter production will also increase [23]. An overview of the nutritional content of plants can be seen in the dry matter content of plants. Dry matter production will be good if STU and fertilizer application are balanced [24]. Giving *mycorrhizae* is not a substitute for nutrients but only helps absorb nutrients [25].

The results showed that several treatments gave the best results with a dose of 50% fertilizer N, P, and K plus 10 g STU (P3), and 25% fertilizer N, P, and K plus 10 g STU (P4) gave the production of raw materials. low dry. The results of this study are lower when compared to the results of the other research [7], which yields 6.80 – 11.13 tons/ha/harvest. This possibility is due to the lack of nutrients absorbed by plants, causing low production of dry matter produced by plants because dry matter is related to the nutritional content of plants.

3.8. Effect Of Treatment Dose Of Fertilizer N, P, and K of P.purpureum Of Revenue Cost Ratio (RCR)

Based on the results of the analysis of *P. purpureum* cultivation business income with the treatment of several doses of fertilizer is needed to determine whether the grass cultivation business is profitable. The analysis of diversity showed that the treatment gave a very significant difference ($P<0.01$) on the RCR of *P. purpureum.*

The results of the DMRT showed that significantly different treatments ($P<0.05$) occurred in the P3 and P2 treatments. Very significantly different treatments ($P<0.01$) occurred in P3 with P0, P1, P4, then in treatment P2 with P4, in treatment P0 with P4, and in treatment P1 with P4. Based on Table 8 shows that the average RCR of Elephant grass cv. Taiwan ranged from 1.38 (P4) – 1.38 (P3). From the results of the RCR, treatment P0, P1, P2, and P3 which had RCR>1 indicated that the business of planting elephant grass cv. Taiwan is already worth doing. However, in the P4 treatment the RCR obtained <1, this was due to the low fresh production affecting the RCR obtained. [26] states that if the ratio gives a number <1, the effort made does not generate profits from the activities carried out.

The difference in price for each treatment causes the amount of expenditure (cost) and revenue (revenue) to be found to vary. In terms of business, RCR can be said to be the ratio between the receipts received and the business capital of the money spent in the business.[27] It can be concluded that the business of planting elephant grass cv. Taiwan which was carried out on treatment P0, P1, P2, and P3 gave good results because it produced RCR>1 and in treatment P4 gave poor results because the RCR was <1.

Table 7. Avarage of *P. purpureum* of dry matter production (ton/ha/harvest)

Treatments	Avarage of dry matter production (ton/ha/harvest)
PO	3.67[a]
P1	2.86[a]
P2	2.57[a]
P3	3.74[a]
P4	1.47[b]
SE	0.19

Description: The different superskips in the column showed a very significant difference (P<0.01).
SE: Standard error.

Table 8. Avarage of P. purpureum of RCR

Treatments	Avarage of RCR
PO	1.28[b]
P1	1.39[b]
P2	1.45[b]
P3	2.38[a]
P4	1.38[c]
SE	0.03

Description: Between treatments was not significantly different (P>0.05).
SE: Standard error.

4. CONCLUSIONS

P. purpureum planted in Mentawai gave the best performance on the application of organic fertilizer STU resulted in the best growth, production and RCR, namely plant height 313.9 cm, leaf length 108.69 cm, leaf width 2.95 cm, number of tillers 23.58 stems, trunk diameter 1.69 cm, fresh production 17.79ton/ha/harvest, dry matter production 3.74 ton/ha/harvest and RCR 2.38. The results given the P3 treatment were proven to be able to reduce the use of N, P, and K fertilizers by up to 50%.

ACKNOWLEDGMENTS

The author is indebted to Directorate of Reserach and Community Service, Directorate General for Higher Education of the Ministry of Education and Culture of Indonesia, for the full financial support of our research in Development Research with the contract number is **266/E4.1/AK.PT/2021.**

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