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The Effect of Sheep Dung on the Growth of Odot Grass (*Pennisetum purpureum* cv. Mott)

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ABSTRACT

Forage plays a vital role because it contains substances needed by livestock that can be used for energy metabolism and to support reproduction. Odot grass is very potent and is one of the varieties of elephant grass that grows not too high so that it can be used as shepherd grass. This study aims to see the effect of sheep dung fertilizer application on plant height, number of leaves and leaf area of Odot grass. This study was an experimental trial designed based on a completely randomized design (CRD), with five treatments and four replications: P0 (without sheep dung), P1 (125 gr/hole), P2 (250 gr/hole), P3 (375 gr/hole), and P4 (500 gr/hole). The results showed that the number of sheep dung did not have a significant effect on all research parameters (height, leaves, and leaf area on Odot grass plants); this was most likely caused by the nutrient conditions of the soil where the research was still relatively extensive and met the needs for the growth of Odot grass, so it was not seen the effect of sheep dung on the growth phase of Odot grass (age 0-60 days).

Keywords: forage, fertilizer, Odot grass, sheep dung

INTRODUCTION

Increasing livestock output, particularly ruminant production, will be productive if forage as feed is available in sufficient and sustainable quality and quantity. The availability of sufficient, sustainable, and high-quality fodder is required to support high livestock output. Forage is the primary source of fodder for livestock. Forages, especially grasses (*graminae*), have been widely cultivated, one of which was Odot grass, which has high production and nutritional content to meet livestock needs. The advantages of Odot grass include being drought resistant, only being propagated through vegetative methods, being relatively high in nutrients and having high palatability for ruminants (Lasamadi et al*.,* 2013). The output of livestock must be matched with the quality of feed.

Sarwanto and Tuswati (2018) list the benefits of Odot grass over other grasses as the stems are comparably short and soft, the growth is relatively quick, the leaves are soft and hairless, it can adapt to different types of soil, it doesn't need special care, there are 50–80 stems in a clump, and it is very well-liked by ruminants. Pratama et al. (2022) stated that Odot grass contained 12.45% CP, 27.09% CF and 2.06% CL. For the growth of Odot grass to be maintained, it is necessary to maintain the soil's nutrients. One method that farmers can use is providing organic fertilizer. According to Herdiyantoro and Setiawan (2015), using inorganic fertilizers in excessive amounts and intensive tillage can damage land quality. Frequent inorganic fertilizer use can harm the ecosystem, including declining soil organic matter content, increased soil permeability, decreased soil microbial populations, and other issues (Sulaiman et al*.,* 2018).

Several studies on the use of organic fertilizer to increase grass productivity have been carried out (Pratama et al*.,* 2022; Araujo et al*.,* 2019; Banjarnahor et al*.,* 2017; Lima and Joris, 2019; Putra and Ningsi, 2019) but there is still very little information regarding the use of sheep dung as organic fertilizer. Fertilizer derived from sheep dung can be used as an organic fertilizer. Using sheep dung as fertilizer is still less popular than other livestock dungs. Sheep dung contains organic material that can provide plant nutrients through decomposition. This process occurs gradually by releasing simple organic materials for plant growth. Sheep dung contains 65.7% OM, 0.4% P, 1.9% N and 1.2% K (Tagar et al*.,* 2016). Based on the description above, it is necessary to carry out research to determine the effect of sheep dung fertilizer on plant height, number of leaves and leaf area of Odot Grass (*Pennisetum purpureum* cv. Mott).

MATERIALS AND METHODS

Research material

This dung was obtained from a sheep farm owned by the community in Urong Kala Hamlet, Seuneubok Village, Aceh, Peusangan District, Bireuen Regency. The dung is taken randomly without determining its age. The tools used in this research were hoes, forks, machetes, buckets, ropes, buckets, gembors, meters, pens, books, cameras, labels, and scales. The materials used in this research include planting materials, media, and other supporting materials. The plant material used is Odot grass. The media materials used are soil as a planting medium of water.

Planting methods

Land processing generally involves loosening and making beds. The land to be loosened must be cleared of rocks, grass, bushes, or growing trees and accessible from shaded areas because Odot grass plants like direct sunlight, while the depth of the soil to be ploughed is 20 cm deep. They were making beds on land measuring 3 m x 3 m with a soil distance of 50 cm x 50 cm. Forage cuttings are taken from healthy stems, not too young or old, and contain at least 2 or 3 nodes. The cuttings are cut at an angle of around 45˚, so they are easy to plant. The cuttings are planted at an angle of around 30˚ to the east, the length of the cuttings is 20 cm with a depth of approximately 10 cm from the ground surface, or two nodes are immersed in the ground, and two nodes are above the ground surface. Sheep dung fertilizer is given by inserting it into the planting hole at a dose according to the specified treatment. Sheep dung is applied one week before planting. Maintenance activities include watering activities every morning and evening except when it rains. Other activities that need to be carried out are weeding and drying, which are carried out together, namely cleaning the plants from weeds and loosening the soil carefully so as not to damage the plant's root system and fertilizing.

Research design

This experimental study is designed based on a Completely Randomized Design (CRD), with five treatments and four replications. Dosage determination was carried out based on research by Putra and Ningsi (2019). Each treatment was divided into four replications with 20 experimental units. The land area used is 3 m x 3 m with a planting distance of 50cm x 50cm. The treatment for applying sheep dung fertilizer is carried out as follows:

P0: Without the use of sheep dung;
P1: 125 gr/hole;
P2: 250 gr/hole;
P3: 375 gr/hole;
P4: 500 gr/hole;

Research variable and data analysis

The parameters observed in this study were plant height, number of leaves, and leaf area (cm). Calculation of leaf area can use the formula conducted by Sitompul and Guritno (1995) :

Leaf Area = L X L X Coefficient 0.75

Where:

P = Leaf Length
L = Leaf Width
Coefficient = 0.75

The data obtained were analyzed statistically, using analysis of variance. If there were differences between treatments, it was continued with the Duncan Multiple Range Test (DMRT) at a significance level of 5% (Steel and Torrie, 1960).

RESULTS AND DISCUSSION

Plant height

Based on Table 1, the highest growth of plant height on Odot grass was at P4 with a dose of sheep dung fertilizer of 500 gr/hole, followed by P3, sheep dung fertilizer 375 gr/hole, P2 sheep dung fertilizer 250 gr/hole, P1 sheep dung fertilizer 125g/hole. In contrast, the lowest plant height was shown at P0 without using sheep dung fertilizer.

Based on the analysis of variance, the average length of odot grass plants shows no real influence on the treatment. It is suspected that the influence of sheep dung with different concentration levels has the same effect on the growth of Odot grass. It is also thought to be because the soil nutrient conditions are already promising. So, adding sheep dung fertilizer shows no real effect on the growth and development of Odot grass plant height (*Pennisetum purpureum* cv. Mott). The results of this study are higher than the studies reported by Daryatmo et al. (2019), Qohar et al. (2021), and Ressie et al. (2018), respectively, i.e. 53.49 cm, 80.27 cm, and 64.27 cm and lower than the report by Lasamadi et al., (2013), i.e. 108.2-125.4 cm.

Table 1. The average height value of Odot grass

Variable	Treatment				
	P0	P1	P2	P3	P4
Height (cm)	86±2.61	91±3.48	94.75±3.96	92.25±3.52	96.75±2.78

PO, without sheep dung; P1, sheep dung fertilizer 125g/hole; P2, sheep dung fertilizer 250 gr/hole; P3, sheep dung fertilizer 375 gr/hole; P4, sheep dung fertilizer of 500 gr/hole

Another thing that is thought not to affect the treatment of sheep dung in each treatment is that sheep dung has a hard texture, so it will increase the time it takes for decomposition by microbes in the soil. The process of composting sheep dung is carried out by microbes that use organic materials as an energy source (Hidayati et al*.,* 2021). Metabolic processes greatly influence plant height in the plant body itself. To carry out metabolic activities, plants need nutrients that can be obtained from fertilization. An increase in plant height is an indicator of plant growth and development that determines the productivity of a plant.

According to Wijaksono et al*.* (2016), plant growth and production will be high if there are balanced nutrients in the soil, and the growth rate will decrease if the necessary nutrients are unavailable. Likewise, according to (2010), plants will grow well if the nutrients provided are balanced and according to the plant's needs. The dynamics of the height growth of Odot grass plants during weekly observations from the 1st week to the 8th week after being planted with sheep dung fertilizer treatment are presented in Figure 1 below.

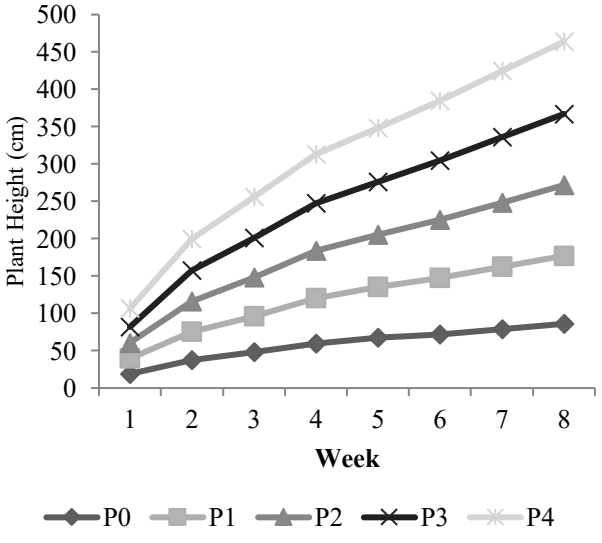

Figure 1. Height graph of Odot grass plants (*Pennisetum purpureum* cv. Mott) aged 0–8 weeks.

Figure 1 above shows that each treatment providing sheep dung increases plant height weekly. Plants do not grow significantly at 1-5 weeks after planting because the nutrients are the same. In the 6-8th week after planting, there was an increase in plant height, which tended to be unequal, which was seen in treatments P0 and P1, which tended to be low, whereas, in treatments P2 and P3, the increase in plant height appeared to be the same, thought to be due to the sheep dung fertilizer given in treatments P3, P3. It tends to be sufficient. In P4, there was a significant increase from weeks 6 to 8. It is thought to be because the nutrients in the P4 treatment were available and sufficient, so there was a good increase in plant height each week, and the plants produced the highest height compared to the others. The difference in the number of doses is also thought to influence the significant increase in P4.

Number of Leaves

Based on Figure 2, the highest growth in the number of leaves on odot grass (*Pennisetum purpureum* cv Mott) is in P4 sheep dung fertilizer dosage of 500 gr/hole, while the lowest number of leaves is shown in P0 sheep dung fertilizer 0 gr/hole.

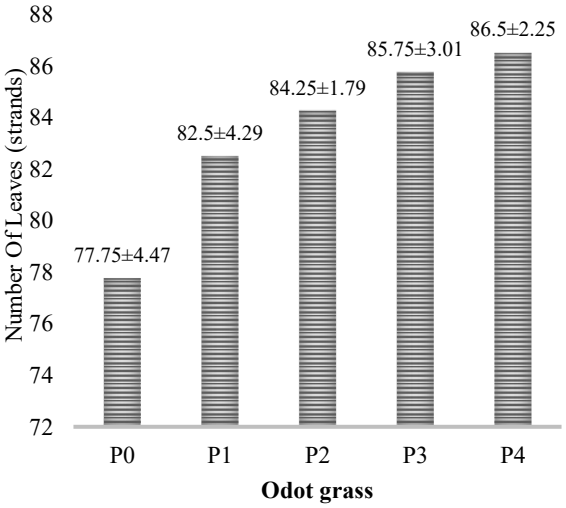

Figure 2. Graph the average number of Odot grass leaves for each treatment (strands).

The use of sheep dung needs to be considered in the context of research. Sheep dung needs to be added to the soil because decomposed sheep dung can enrich soil nutrients and also play a role in improving the physical properties of the soil, soil air space, increasing the soil's binding capacity for nutrients so that they are not easily dissolved by rainwater and increase the aggregate capacity of the soil. Apart from that, organic matter can also improve the biological properties of soil (Sumarni et al., 2010). Even though the application of sheep dung fertilizer had no statistical effect (P>0.5), the number of leaves produced in the P4 treatment tended to be greater than in other treatments; this shows that the P4 treatment is a treatment that is thought to provide balanced nutrients. This research's results are higher than those reported by Riyanto et al. (2022) and (Laksono et al., 2022), i.e. 27 and 58 strands, respectively.

The increase in the number of leaves is also related to the increase in stem diameter due to the presence of hormones that trigger growth (*Auxin, Gibberellin* and *Cytoconin*), which are active during the photosynthesis process so that it is easier for the roots to absorb food to increase the diameter of the stem. The growth of leaf shoots will follow this. (2022) stated that the number of leaves will influence the amount of solar energy the leaves and the amount of photosynthate absorbed will absorb.

Plant growth, including the number of leaves, is greatly influenced by nutrients, especially nitrogen. According to Sirenden et al. (2016), nitrogen plays a role in growth as a constituent of protoplasm, where growing plants increase the number and size of cells. The increase in N elements in the soil is associated with the formation of chlorophyll in the leaves, thus increasing the photosynthesis process, which stimulates the growth of plant leaves. The role of P as an essential component of ADP and ATP, which together play an important role in photosynthesis and ion absorption, is thought to be able to increase the number of leaves. The longer the plant elements last, the more opportunity the plant will grow, so the number of leaves that will form will be more significant.

Leaf Area

Figure 3 shows that P4 sheep dung fertilizer, 500 gr/hole, has the highest growth in leaf area compared to other treatments and the control. At P1, sheep dung fertilizer at 125 gr/hole had the lowest leaf area among the other treatments.

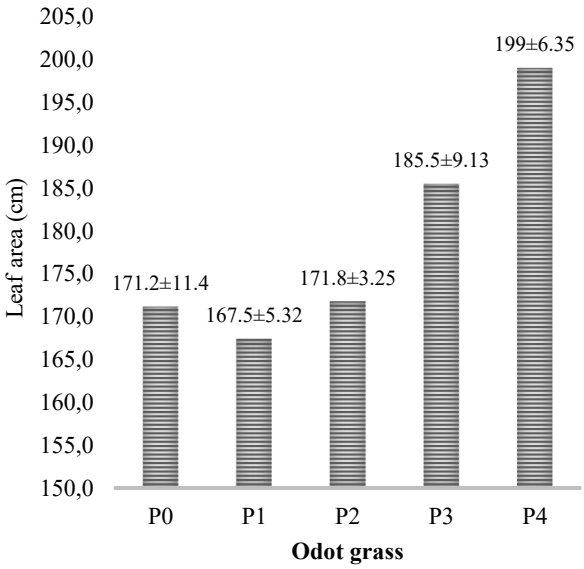

Figure 3. Graph the average Odot grass leaf area for each treatment (cm).

A yellowish color on the leaves characterizes plants that do not have enough nutrients as they grow. Likewise, treatment P1 was given sheep dung fertilizer at 125 gr/hole. Symptoms in the form of narrow leaves and yellowish and reddish colors on the leaves characterize the production of less fertile leaves. This symptom is caused by the soil containing insufficient nutrients for plants. According to (2017), plants lacking the element N would undergo delayed development, dwarfism, green leaves turning yellowish, narrowing, and old leaves yelling and dying. Harvest is essential for plant growth and development, including leaf and stem growth. Genotype, environmental conditions, and other harvest or organic material aspects control the number and size of the leaves.

The results of this study are higher than the research reported by Saripudin et al. (2021) and Churriyah et al. (2023), i.e. 134.79 cm and 98.40 cm, respectively. The leaf area is related to the sunlight received by the plant and genetic factors. It aligns with (2013), who state that plant leaf area is influenced by biotic and abiotic factors. According to (Shi et al., 2019), leaf size is influenced by leaf number (figure 2) and has a substantial relationship to leaf breadth.

CONCLUSION

There are differences in growth and productivity in odot grass plants (*Pennisetum*

purpureum cv. Mott) from sheep dung treatment with several different doses (although not statistically different), which is thought to be due to different decomposition levels between treatments. Treatment P4 (500 gr/hole) is the highest provision of sheep dung. The more sheep dung you give, the better the growth rate.

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