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Effect of Goat Manure Dosage on Growth and Yield and Proximate Analysis Sweet Sorghum (Sorghum Bicolor L) Bioguma 1 at the Ciganjur Main Seed Hall Garden

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Abstract

This research aims to analyze the growth response and yield of the Bioguma 1 sweet sorghum variety as well as proximate analysis at different doses of goat manure. This research was carried out at the Ciganjur Nursery, Food Security, Maritime and Agricultural Services of Jakarta Province for 5 months starting from July 2023 to December 2023. This research used a single-factor randomized block design with different doses of manure treatment (0 tons/ha, 8 tons/ha, 10 tons/ha and 12 tons/ha). Analysis of variance data using the SPSS application. Significant variance fingerprints were further tested using the Duncan Multiple Range Test (DMRT) at the 5% level. The variables measured were plant height, leaf length, number of leaves, the weight of seeds/panicles/planting, the weight of 1000 seeds, wet weight, dry weight and proximate analysis (water content, ash content, protein content, fat content, carbohydrate content, fibre content crude, total dissolved solids). The research results showed that goat manure treatment at a dose of 12 tons/ha gave the best results for all variables measured. The effect of goat manure on proximate tests gave the best results from several treatments: water content in the 8 ton/ha treatment, ash content in the 8 ton/ha treatment, protein content in the 10 ton/ha treatment, fat content in the 10 ton/ha treatment. , carbohydrate content in the treatment 0 tons/ha, the crude fibre content in the treatment 8 tons/ha, and total dissolved solids in the treatment 12 tons/ha.

Keywords: Goat Manure Dosage, Proximate Analysis, Growth and Yield of Sorghum.

1. INTRODUCTION

Sorghum plants (*Sorghum bicolour L.*) come from an African country. This plant has long been known to humans as a food producer. Sorghum is one of the potential food ingredients for the substitution of wheat and rice. Therefore, sorghum is an alternative carbohydrate substitute; sorghum also contains insoluble fibre or crude fibre and dietary fibre, respectively 6.5% - 7.9% and 1.1% - 1.23%. Plant Sadness (*Sorghum bicolour L. Moench*) is the fifth-ranked cereal crop globally after wheat, corn, rice and barley. The protein content of sorghum is balanced with corn at 10.11%, while maize is 11.02%. Likewise, the starch content in sorghum is 80.42%, while the content in corn is 79.95%. Data from the Directorate of Cereal Cultivation shows that Indonesia's sorghum production in the last 5 years has only increased from 6,114 tons to 7,695 tons. Increasing domestic sorghum production needs special attention because Indonesia has excellent potential for sorghum development (Subagio & Aqil, 2014). Sorghum (*Sorghum bicolour L.*) is one of the food crops cultivated on dry land that has excellent potential to be developed in Indonesia (Sutrisnaet al., 2013). National food needs continue to increase along with increasing population growth. However, food needs still need to be met because production is still low, so efforts are needed to increase production. Broad agro ecological adaptability, drought resistance, high production, requires less input and is more resistant to pests and disease. Compared to other food crops

Sorghum plants can grow in tropical and subtropical areas, can adapt well to various ecological conditions and can still produce even when environmental conditions are unfavourable. In Indonesia, sorghum plants are suitable for planting in lowland areas up to areas with an altitude of 800 meters above sea level with rainfall between 375

- 425 mm, optimal growth temperature for sorghum between 23°C - 30°C and relative humidity 20 - 40 (Siregar, 2021).

The use of goat manure has the benefit of increasing crop production both in quality and quantity, and if applied over a long time, it can improve land quality and reduce environmental pollution. Apart from that, goat manure is also helpful as an energy source for soil microorganisms, increasing their activity. (Yuniarti and Kaya, 2015).

One source of manure comes from goat manure. Goat manure is relatively easy to obtain as the primary source of nutrients in cultivation. Goat manure has a nutrient content of 0.70% N, 0.40% P2O5, 0.25% K2O, C/N 20 - 25, and 31% organic matter. The results of the research showed that the application of goat manure at a dose of 10 tons ha-1 significantly increased the growth characteristics of sorghum plants, namely plant height, number of leaves, harvest age, dry and wet weight per plant, and the yield component in the form of weight of 1000 grains (Sinurayaet al., 2019).

The use of sweet sorghum is generally obtained from stems and seeds as well as waste. Sweet sorghum bioethanol has been widely researched and developed in several countries as an energy source (Dewi, 2017).

The novelty of this research is that the Sorghum varieties tested came from cross-pollination between the varieties 'Bioguma I Agritan', which is a new sweet sorghum with high yields (Lestariet al., 2019). It was further stated that this variety was released by the Center for Research and Development of Biotechnology and Agricultural Genetic Resources in 2019 as an improvement of the Numbu variety through 50 Gy gamma-ray irradiation which was grown using the culture method in vitro, has advantages including reaching 266 cm, biomass weight of 54.30 tons/hectare, sap volume of around 122 ml, potential yield of 9.3 tons/hectare, Brix content of around 15% and resistance to leaf rust and stem rot. The Agricultural Research and Development Agency (Balitbangtan) released a new superior variety (VUB) of sorghum. Bioguma Sorghum has several advantages, including larger stems, higher levels of sweetness or Brix content, as well as higher sap volume and seed production. Gati et al (2021) produced three varieties released, namely Bioguma 1, Bioguma 2, and Bioguma 3.

The objectives of this research are:

1. To analyze the growth and yield of goat manure on the sweet sorghum variety Bioguma. 1.
2. Proximate content analysis of the effect of fertilizing goat pens in the Ciganjur Main Seed Hall Garden.

The hypotheses to be tested from this research are:

1. There is the best dose of goat manure that affects the growth and yield of sweet sorghum plants of the Bioguma 1 variety.

2. The best dose of goat manure was found for the results of the approximate test analysis of sweet sorghum plants of the Bioguma 1 variety.

The benefits of this research are:

1. To determine the effect of several doses of the best goat manure on the growth and yield of sweet sorghum plants of the Bioguma 1 variety.
2. Increase insight and knowledge for other researchers and farmers regarding the cultivation of the Bioguma 1 sweet sorghum variety by administering several doses of goat manure.
3. The government should expand information for farmers cultivating sweet sorghum because its adaptation is quite broad; for example, it can be cultivated in Bogor, Cibubur and Ciganjur.

2. MATERIALS AND METHODS

2.1. Place and time of research

This research was carried out at the Ciganjur Main Seed Center Garden, South Jakarta and at the Laboratory of the Faculty of Biology and Agriculture at the National University and at the Integrated Laboratory of the Bogor Agricultural Institute. This research was carried out for 6 months starting from July 2023 to December 2023.

2.2. Research Materials and Tools

The materials used in this research were seeds of 1 new superior variety (VUB) Sweet Sorghum Bioguma 1 and goat manure.

5. Tools used include hoes, sickles, raffia rope, rulers, label paper, nameplates, meters, scales, digital cameras, scissors, bamboo, stationery, ovens and refractometers.

2.3. Research methods

This research was carried out using a single Randomized Block Design (RAK), with one factor studied, namely the provision of goat manure consisting of 4 levels, including:

P0 = 0 tons/ha (without applying goat manure)

P1 = 8 ton / ha

P2 = 10 ton / ha

P3 = 12 ton/ha

The linear model assumed for the factorial Randomized Block Design (RAK) is as follows:

$Yij = \mu + Ki + \alpha_{j} + Ij$

Yay = Observations in the ith group and jth treatment

m = General average

To = Effect of treatment in group i (p = 1,2,3,4)

a_j = Effect of p-th fertilizer dose (p = 1,2,3,4)

Ij = Experimental error in the i-th treatment group, p-th fertilizer dose treatment

A total of 4 combinations of treatments were repeated 4 times

VP1 VP0 VP2 VP3

VP2 VP2 VP3 VP1

VP3 VP3 VP1 VP0

VP0 VP1 VP0 VP2

The number of repetitions is made into a block = 4 blocks

Number of experimental units = 16 trials

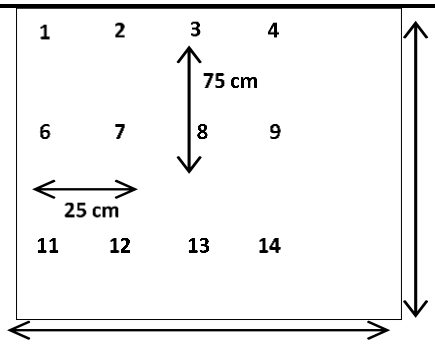
You are welcome = 25 cm x 75 cm

Number of plants in 1 experimental unit = 20 Plants

Sample 1 experimental unit = 5 Plants

Plot Area = 1,5 m x 2,5m

Distance between plots = 50 cm



2.4. Observation Parameters

Observation parameters are carried out by direct measurement and observation using measuring instruments and electronic devices to record results.

1. Plant height (cm)

Plant height observations were carried out using a direct measurement method using a hand meter every seven days. Plant height was measured from the base of the sorghum stem at ground level to the tip of the leaf midrib.

2. Number of leaves (pieces)

Observation of the number of leaves was carried out using the direct observation method every seven days. The number of leaves observed were all leaves that had fully opened except for the flag leaves attached to the flowers of the sorghum plant (Agustian et al.,2021).

3. Leaf length (cm)

Leaf length observations were carried out using a direct measurement method using a meter every seven days. Leaf length is measured from the base of the leaf to the tip of the leaf.

4. Weight of seeds/panicles/planting

Seed weight is determined by weighing the planted seeds that have been shelled and cleaned of dirt at harvest time.

5. Seed weight of 1000 seeds (g)

Weighing is carried out after the entire sorghum plant is harvested, and then 1000 seeds are taken and weighed.

6. Plant wet and dry weight (g)

The wet and dry weight of plant seeds is carried out by weighing all the plant seeds that have been harvested and cleaned of dirt and then dried until the weight is constant.

7. Proximate analysis is carried out after harvest

a. Kadar air, method oven (AOAC, 2005)
b. Ash content, dry ashing method (AOAC, 2005)
c. Until fat, Soxhlet method (AOAC,2005)
d. Carbohydrate levels, method by difference (AOAC, 2005)
e. Up to protein, method micro *kjeldahl* (AOAC, 2005)
f. Crude fibre content, method *kjeldahl* (AOAC, 2005)

8. Measuring the level of sweetness is done by taking two to three drops of the resulting sap and then measuring the TPT value using a manual refractometer. The value obtained is expressed in per cent brix (%Brix).

2.5 Data analysis

The data obtained was tested using IBM SPSS version 27 software. If this occurs between the treatments being tried, it will be tested further using the DMRT test at the 5% level.

3. RESULTS AND DISCUSSION

3.1 General Conditions of the Research Environment

The research was carried out at the Ciganjur Nursery Garden, Center for Seed Development and Plant Protection, DKI Jakarta Provincial Food Security, Maritime and Agricultural Service, located on Jalan Aselih No. 100, Cipedak Village, Jagakarsa District, South Jakarta City. Ciganjur Nursery Garden has a land area of 13.2 Ha.

The climatic conditions at the Ciganjur Nursery have an average temperature ranging from 27.6ºC-29.4ºC with an average humidity level of 76%-80%, and a rainfall level of 106.2-236 mm/month (BMKG, 2023). Based on the results of soil analysis carried out at the BALITTRO Soil, Plant, Fertilizer and Water Laboratory, the soil conditions in the experimental field had a pH content of 6.52, C-Organic 2.01%, N-Total 0.24%, C/N ratio 8.38, P2O5 5.46 ppm, and K 0.16%. The results of the soil analysis are presented in Appendix 2.

The location of the experimental land used in this research is in an open space without shade with coordinates on the map 6°21'07.6"S - 106° 47' 52.9"E, shown in Figure 1.

Figure 1. Sorghum Plant research plot

3.2. Results and Analysis

The research results and analysis are presented in the following subsections, namely plant height, leaf length, number of leaves, plant wet weight, plant dry weight, 1000 seed weight, seed/panicle/planting weight, brix, water content, ash content, protein content, crude fiber content, carbohydrate content and fat content.

3.2.1. Plant height

Observation results of the effect of goat manure dosage on sorghum plant height. Below I have attached the results of observations of the effect of goat manure at 10 WAP.

Table 1. Effect of goat manure treatment on plant height of Sweet Sorghum variety Bioguma 1 at 10 WAP

Treatment	Plant height				Amount	Average
	I	II	III	IV		
Control	203.43	206.10	205.77	206.73	822.03	205.51
8 ton/ha	219.67	220.17	219.37	220.07	879.27	219.82
10 ton/ha	274.13	276.97	276.60	276.77	1104.47	276.12
12 ton/ha	310.63	310.57	309.17	309.20	1239.57	309.89

Table 2. Results of Analysis of Variance (ANOVA) of the effect of fertilizing goat pens on the height of Sweet Sorghum plants of the Bioguma 1 variety at the age of 10 WAP

Source Diversity	DB	Amount Square	Square Middle	F Count	Say.	F Table	
						5%	1%
Treatment	3	28510.062	9503.354	9642.467**	.001	3.86	6.99
Group	3	5.110	1.703	1.728tn	.230	3.86	6.99
Error	9	8.870	.986				
Total	16	1051327.582					

Explanation: tn = not real

** = very real effect

Based on table 2, the results of the ANOVA on the growth of the number of sorghum leaves at 10 WAP show very significantly different results, then DMRT analysis was carried out. The results of the DMRT analysis can be seen in table 4 below

Table 3 Results of DMRT analysis of plant height growth at 2, 4, 6, 8, 10 WAP of Sweet Sorghum Bioguma 1 variety

Treatment	Plant Height (cm)				
	Observation Time (MST)				
	2 MST	4 MST	6 MST	8 MST	10 MST
Control	14.27d	24.34d	37.86d	99.09d	205.50d
8 ton/ha	16.34c	26.42c	55.28c	109.58c	219.82c
10 ton/ha	17.41b	29.37b	69.70b	138.83b	276.11b
12 ton/ha	18.65a	32.23a	73.15a	157.46a	309.89a

Note: Numbers followed by different letters in the same column indicate significant differences in the 5% DMRT follow-up test

At 10 WAP it was seen that the 0 ton/ha control treatment produced a plant height of 205.50 cm and in the 8 ton/ha treatment it increased to 219.82 cm. The highest plant height was produced in the 12 ton/ha treatment with a result of 309.89 cm. at 2, 4, 6, and 8 WAP the highest yield was obtained in the 12 ton/ha treatment. This is supported by Zulkarnain et al, (2013) opinion that giving goat manure can add nutrients to the soil, especially N and K, which have low availability. Apart from adding nutrients, manure can also improve the physical properties of the soil. The organic material in manure acts as a binder for soil particles which causes good soil aggregation and increases soil pore space. Stable soil pore space makes it easier for water to flow downwards, so that its water holding capacity increases. This is supported by Samanhudi et al., (2021) that goat manure treatment has a significant effect on plant height sorghum sweet while varieties sorghum has no real effect. Goat manure produces a plant height of 168.27 cm, chicken manure produces a height of 204.73 cm and vermicompost organic fertilizer produces a height of 147 cm. The highest organic fertilizer in Samanhudi et al (2021) is chicken manure followed by goat manure and vermicompost organic fertilizer, the increase in plant height in the Samanhudi treatment compared to the control was 12 cm compared to the use of manure.

This is according to Samanhudi et al., (2021) plant height is a metabolic process in the plant body, plants need nutrients for this metabolic process and the provision of goat manure can increase the nutrients N, P, K in the soil which are needed for plant height growth.

3.2.2 Leaf Length

Observation results of the effect of goat manure dosage on the length of sorghum leaves aged 2, 4, 6, and 8. Can be seen in attachments (27, 28, 29, and 30). Below I have attached the results of observations of the effect of goat manure at 10 WAP.

Table 4. Effect of goat manure treatment on leaf length of sweet sorghum variety Bioguma 1 at 10 WAP

Treatment	Leaf Length				Amount	Average
	I	II	III	IV		
Control	120.26	122.90	119.56	124.00	486.72	121.68
8 ton/ha	130.73	131.46	134.26	130.20	526.65	131.66
10 ton/ha	135.36	137.40	136.83	135.10	544.69	136.17
12 ton/ha	146.76	144.33	145.90	146.36	583.35	145.84

Based on the results Analysis of Variance (ANOVA) for the treatment of the effect of goat organic fertilization at 10 WAP on leaf length can be seen in table 5 below.

Table 5. Results of Analysis of Variance (ANOVA) of the effect of fertilizing goat pens on the number of leaves of Sweet Sorghum of the Bioguma 1 variety at the age of 10 WAP

Source Diversity	DB	Amount Square	Square Middle	F Count	Say.	F Table	
						5%	1%
Treatment	3	1207.951	402.650	126.918**	.001	3.86	6.99
Group	3	1.775	.592	.187tn	.903	3.86	6.99
Error	9	28.553	3.173				
Total	16	287840.578					

Explanation: tn = not real

** = very real effect

Based on table 5, the anova results show the growth in number of leaves of sorghum at 10MST showed very significantly different results, then DMRT analysis was carried out. The results of the DMRT analysis can be seen in table 6 below.

Table 6. Results of DMRT analysis of leaf number growth at 2, 4, 6, 8, 10 WAP of Sweet Sorghum Bioguma 1 variety

Treatment	Leaf Length (cm)				
	Observation Time (MST)				
	2 MST	4 MST	6 MST	8 MST	10 MST
Control	7.21d	28.32d	64.67d	105.78d	121.68d

8 ton/ha	7.63c	42.41c	71.56c	115.27c	131.66c
10 ton/ha	7.77b	45.50b	87.53b	119.34b	136.17b
12 ton/ha	7.93a	50.18a	97.36a	121.41a	145.83a

Note: Numbers followed by different letters in the same column indicate significant differences in the 5% DMRT follow-up test

In table 6 it can be seen that the control treatment at 2 WAP produced the lowest leaf length, namely 7.21 cm, the highest leaf length was produced in the 12 ton/ha manure treatment at 10 WAP, namely 145.83 cm, there was an additional length of 138 cm. This is supported by the opinion of Tarigan (2013) who states that the more leaves, the higher the photosynthesis that occurs. The results of photosynthesis are then translocated to other plant parts so that the plant produces high biomass. However, a leaf area index that is too high is also not good for plants, because the leaves will overlap so that the sunlight received by the plant will be ineffective. Supported by Samanhudi et al., (2021) research results that the application of goat manure produces higher leaf length compared to those not given manure. It is suspected that goat manure contains more elements (K) than those contained in cow and chicken manure. The potassium element in plants is beneficial, helps the formation of proteins and carbohydrates, strengthens the plant body and increases the plant's resistance to long leaves.

3.2.4 Number of Leaves

Observation results of the effect of goat manure dosage on the number of sorghum leaves aged 2, 4, 6, and 8. Can be seen in attachments (21, 23, 24, and 25). Below I have attached the results of observations of the effect of goat manure at 10 WAP.

Table 7.Influence goat manure treatment on the number of leaves of Sweet Sorghum variety Bioguma 1 at 10 WAP

Treatment	Number of Leaves				Amount	Average
	I	II	III	IV		
Control	14.66	14.66	14.66	14.66	58.64	14.66
8 ton/ha	15.66	15.33	15.00	16.00	61.99	15.50
10 ton/ha	15.66	15.66	15.66	15.66	62.64	15.66
12 ton/ha	15.66	16.00	16.00	15.66	63.32	15.83

Based on the results Analysis of Variance (ANOVA) for the treatment of the effect of goat organic fertilization at 10 WAP on the number of leaves can be seen in table 8 below.

Table 8. Results of Analysis of Variance (ANOVA) of the effect of goat organic fertilization on the number of leaves of Sweet Sorghum of the Bioguma 1 variety at the age of 10 WAP

Source Diversity	DB	Amount Square	Square Middle	F Count	Say.	F Table	
						5%	1%
Treatment	3	3.236	1.079	15.771*	.001	3.86	6.99
Group	3	.054	.018	.265tn	.849	3.86	6.99
Error	9	.616	.068				
Total	16	3804.321					

Explanation: tn = not real

** = very real effect

Based on table 8, the results of the ANOVA on the growth of the number of sorghum leaves at 10 WAP showed significantly different results, then DMRT analysis was carried out. The results of the DMRT analysis can be seen in table 9 below.

Table 9 Results of DMRT analysis of leaf number growth at 2, 4, 6, 8, 10 WAP of Sweet Sorghum Bioguma 1 variety

Treatment	Number of Leaves (pieces)				
	Observation Time (MST)				
	2 MST	4 MST	6 MST	8 MST	10 MST
Control	2.66b	5.66d	8.57d	12.83b	14.66b
8 ton/ha	2.49b	7.33c	10.57c	15.49a	15.49a
10 ton/ha	2.91ab	8.32b	11.49b	15.74a	15.66a
12 ton/ha	3.33a	9.49a	12.74a	15.74a	15.83a

Note: Numbers followed by different letters in the same column indicate significant differences in the 5% DMRT follow-up test

Based on table 9, the control treatment produced the lowest number of leaves of 2.66 at 2 WAP, while the treatment with a dose of goat manure of 12 tons/ha produced the highest number of leaves, namely 15.83. This is in accordance with the statement by Leomo (2012) which states that the number of leaves decreases when it enters the generative phase (12 WAP) because the intake of nutrients and the results of photosynthesis are more directed towards the development of panicles and no longer for the formation of vegetative organs, that plants grow without other plants. Surrounding areas will reduce competition between plants so that they grow better and produce the maximum number of leaves.

This is supported by research by Samanhudi et al., (2021) that the application of manure has an effect on the highest number of leaves.

3.2.5 Seed Weight per Plant

Observation results of the effect of goat manure dosage on the weight of sorghum seeds aged 2, 4, 6 and 8 can be seen in attachment (41). Below I have attached the results of observations of the effect of goat manure on the weight of planted seeds.

Table 10. Effect of goat manure treatment on seed weight per plant of Sweet Sorghum variety Bioguma 1

Treatment	Planting Weight				Amount	Average
	I	II	III	IV		
Control	114.57	114.13	115.03	114.32	458.05	114.51
8 ton/ha	139.18	138.24	138.01	138.01	553.47	138.37
10 ton/ha	149.92	149.91	149.50	149.78	599.11	149.78
12 ton/ha	160.24	159.59	159.62	160.01	639.46	159.87

Based on the results Analysis of Variance (ANOVA) for the treatment of the effect of goat organic fertilization on the weight of planted seeds can be seen in table 11 below.

Table 11. Analysis of Variance (ANOVA) results of the effect of organic goat fertilization on seed weight of Sweet Sorghum varieties planted Bioguma 1

Source Diversity	DB	Amount Square	Square Middle	F Count	Say.	F Table	
						5%	1%
Treatment	3	4563.619	1521.206	12199.403**	.001	3.86	6.99
Group	3	.656	.219	1.753tn	.226	3.86	6.99
Error	9	1.122	.125				
Total	16	320996.960					

Explanation: tn = not real

** = real effect

Based on table 11, the ANOVA results for sorghum seed weights show very significantly different results, then DMRT analysis is carried out. The results of the DMRT analysis can be seen in table 12 below.

Table 12. Effect of Organic Fertilizer Dosage for Sweet Sorghum goat Bioguma 1 variety on Seed Weight per Plant

Treatment	Planting Seed Weight (g)
Control	114.51d
8 ton/ha	138.36c
10 ton/ha	149.77b
12 ton/ha	159.86a

Note: Numbers followed by different letters in the same column indicate significant differences in the 5% DMRT follow-up test

Based on table 12. Effect of Goat Organic Fertilizer Dosage Sweet Sorghum var. Bioguma 1 for Seed Weight per Plant in the control produced the lowest weight of 114.51 g and the 12 ton/ha treatment produced the highest seed weight of 159.86 g. This means that there is an additional weight of 45, meaning it is higher than the description of this variety, namely the weight of 1000 seeds is 32.73 grams.

The results of this research are in line with research by Salisbury and Ross (1995) which states that the formation and filling of seeds is largely determined by the genetic ability of the plant which is related to the source of assimilate and the place where it accumulates on the plant, where a fertilizer dose of 12 tons/ha gives the largest average yield compared to control dose, 8 tons/ha and 10 tons/ha. Decreased photosynthetic activity will reduce the amount of photosynthate supply resulting in a decrease in the number of seeds and seed weight per plant. In accordance with Ferdian et al., (2015) statement, plant productivity is very dependent on the plant's ability to carry out photosynthesis and distribute most of the results of photosynthesis to plant parts such as seeds. The filling of photosynthate into seeds is based on the photosynthesis process which takes place in the leaf organs (Anggita, 2020).

3.2.6 Weight of 1000 seeds

The results of observations of the effect of organic fertilizer dosage on the weight of 1000 seeds of sweet sorghum plants of the Bioguma 1 variety can be seen in Table 13.

Table 13. Effect of Organic Fertilizer Dosage for Sweet Sorghum goat Bioguma 1 variety on the weight of 1000 seeds.

Treatment	Weight of 100 Seeds				Amount	Average
	I	II	III	IV		
Control	22.82	22.32	23.15	23.59	91.88	22.97
8 ton/ha	38.58	38.41	38.63	38.13	153.75	38.44
10 ton/ha	47.28	46.91	46.90	46.78	187.87	46.97
12 ton/ha	53.74	54.46	54.48	54.81	217.49	54.37

Based on the results Analysis of Variance (ANOVA) for the treatment of the effect of goat organic fertilization on the weight of 1000 seeds can be seen in table 14 below.

Table 14. Analysis of Variance (ANOVA) results of the effect of fertilizing the goat pen on the weight of 1000 sweet sorghum seeds of the Bioguma 1 variety.

Source Religiousness	DB	Amount Square	Square Middle	F Count	Say.	F Table	
						5%	1%
Treatment	3	2182.760	727.587	4329.280**	.001	3.86	6.99
Group	3	.253	.084	.502tn	.690	3.86	6.99
Error	9	1.513	.168				
Total	16	28671.274					

Explanation: tn = not real

** = very real effect

Based on table 14, the ANOVA results for sorghum seed weights show significantly different results, then DMRT analysis is carried out. The results of the DMRT analysis can be seen in table 15 below.

Table 15. Effect of Organic Fertilizer Dosage for Sweet Sorghum goats of the Bioguma 1 variety on the weight of 1000 seeds

Treatment	Weight of 1000 seeds
Control	22.97d
8 ton/ha	38.43c
10 ton/ha	46.96b
12 ton/ha	54.37a

Description: Numbers followed by different letters in the same column showed a significant difference in the 5% DMRT follow-up test

Based on the data in Table 16, it can be seen that the organic fertilizer dose treatment of 12 tons/ha had the largest average weight, namely 54.37 g, while the smallest average weight of 1000 seeds was had by the control fertilizer dose treatment, namely 22.97 g. This shows that sorghum seeds have an almost uniform size, so that the weight of the seeds is not significantly different. In accordance with Yusuf's et al.,(2022) statement, that the weight of 1000 seeds is a genetic characteristic of the plant and is not influenced by environmental factors.

The weight of 1000 seeds is one of the parameters related to the production results of a plant. If the number of seeds per plant is the same but the weight of 1000 seeds is higher, the results obtained will be greater (Muryani, 1999). According to Anggita (2020), the weight of 1000 seeds is more influenced by the shape and size of the seeds. It is further stated that the height and weight of a seed is influenced by the amount of dry matter contained in the seed, and the shape of the seed and the size of the seed are influenced by the genes of the plant.

According to Rina Kurniasariet al., (2023) providing organic fertilizer has an effect on increasing seed weight by 10.21%, the highest weight of 1000 grains, namely the treatment with the highest dose of organic fertilizer.

4.2.6. Plant Wet and Dry Weight

The results of observations of the effect of organic fertilizer dosage on the weight of 1000 seeds of sweet sorghum plants of the Bioguma 1 variety can be seen in Tables 16 and 17.

Table 16. Effect of Bioguma 1 variety Sweet Sorghum goat manure dosage on plant wet and dry weight

Treatment	Dry Weight				Amount	Average
	I	II	III	IV		
Control	130.00	175.00	180.00	101.66	586.66	146.67
8 ton/ha	221.66	271.66	253.33	248.33	994.98	248.75
10 ton/ha	265.00	428.33	346.66	308.33	1348.32	337.08
12 ton/ha	365.33	546.66	465.00	480.00	1859.99	465.00

Table 17. Effect of Bioguma 1 variety sweet sorghum goat manure dosage on plant wet and dry weight

Treatment	Wet Weight				Amount	Average
	I	II	III	IV		
Control	550.00	486.66	556.66	583.33	2176.65	544.16
8 ton/ha	660.00	680.00	666.66	720.00	2726.66	681.67
10 ton/ha	891.66	868.33	905.00	841.66	3506.65	876.66
12 ton/ha	1130.00	1166.66	1045.00	1093.33	4434.99	1108.75

Based on the results Analysis of Variance (ANOVA) for the treatment of the effect of goat organic fertilization on the wet and dry weight of plants can be seen in table 18 below.

Table 18. Analysis of Variance (ANOVA) results of the effect of fertilizing goat pens on plant dry weight

Source Diversity	DB	Amount Square	Square Middle	F Count	Say.	F Table	
						5%	1%

Treatment	3	218944.882	72981.627	60.339**	.001	3.86	6.99
Group	3	25290.324	8430.108	6.970*	.010	3.96	6.99
Error	9	10885.704	1209.523				
Total	16	1689097.223					

Explanation: tn = not real

** = real effect

Table 19. Analysis of Variance (ANOVA) results of the effect of goat pen fertilization on plant wet weight

Source Religiousness	DB	Amount Square	Square Middle	F Count	Say.	F Table	
						5%	1%
Treatment	3	722506.344	240835.448	127.823**	.001	3.86	6.99
Group	3	670.049	223.350	.119tn	.947	3.86	6.99
Error	9	16957.266	1884.136				
Total	16	11052179.90					

Explanation: tn = not real

** = real effect

Based on table 19, the results of the wet and dry weight Anova of sorghum plants show very significantly different results, then DMRT analysis is carried out. The results of the DMRT analysis can be seen in table 20 below.

Table 20. Results of the effect of goat manure dosage on the wet and dry weight of plants

Treatment	Plant Wet Weight (g)	Plant Dry Weight (g)
Control	544.16d	146.66d
8 ton/ha	681.66c	248.74c
10 ton/ha	876.66b	337.08b
12 ton/ha	1108.74a	464.99a

Note: Numbers followed by different letters in the same column indicate significant differences in the 5% DMRT follow-up test

Based on the data in Table 20, the control manure dose treatment produced the lowest wet weight of 544.16 g, while the organic fertilizer dose of 12 tons/ha produced 1108.74 g, an increase of 564 g.

The control manure dose treatment on plant dry weight produced the lowest weight of 146.66 g, the highest weight was produced by the 12 ton/ha manure dose treatment of 464.99 g, there was an additional weight of 318 g.

Supported by Samanhudi et al., (2021) research that differences in plant wet weight results are caused by differences in growing environments which make the water content between plants different, where using wider plant spacing will optimize water absorption into the plants. Physiologically, wet weight consists of two contents,

namely water and carbohydrates. Water is the main element in green plants which constitutes 70%-90% of the fresh weight

This is in accordance with Yusuf's statementet al.,(2017), that the dry weight of plants has a relationship with the rate of photosynthesis, where the higher the rate of photosynthesis, the higher the assimilate produced will also be, which in the end will increase the dry weight of the plant

3.3 PROXIMATE CONTENT ANALYSIS

3.1 Water content Analysis

Data from laboratory tests on the effect of organic fertilizer doses on sorghum water content analysis can be seen in Appendix 3. The results of the effect of manure doses on water content analysis in sweet sorghum plants of the Bioguma 1 variety are presented in Figure 2.

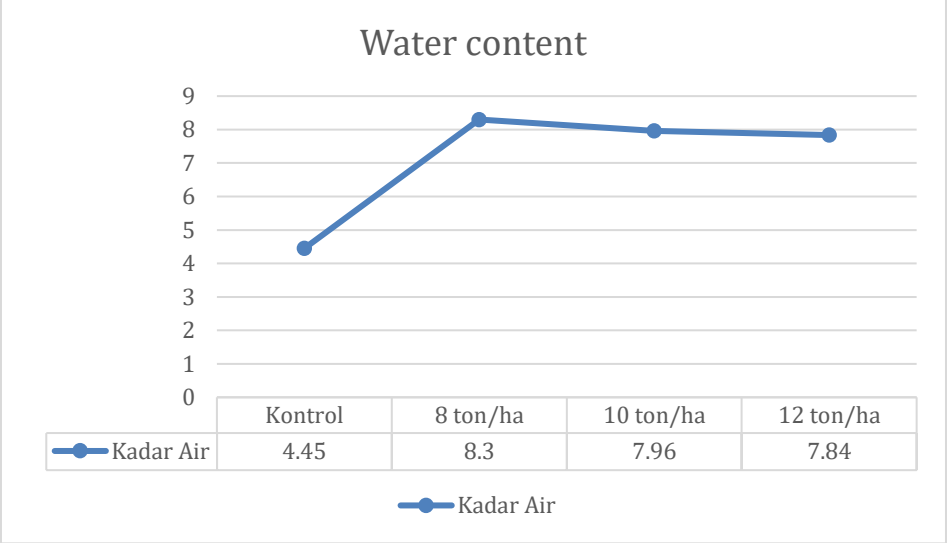


Figure 2. Graphic of Water Level Analysis Results

Based on the data in Figure 2. It is known that the treatment with a dose of goat manure of 8 tons/ha had the largest water content results, namely 8.30%, while the smallest water content results were obtained by the control organic fertilizer dose treatment, namely 4.45%.

According to Mashud (2013), organic fertilizer, one of which is organic fertilizer, is useful for increasing crop production, reducing environmental pollution and improving sustainable quality. Organic fertilizer is very important for plants, increases water resistance and contains many microorganisms.

3.2 Analysis of ash content

Data from laboratory tests on the influence of goat manure doses on the analysis of sorghum ash content can be seen in Appendix 3. The results of the influence of goat manure doses on the analysis of ash content in sweet sorghum plants of the Bioguma 1 variety are presented in Figure 3.

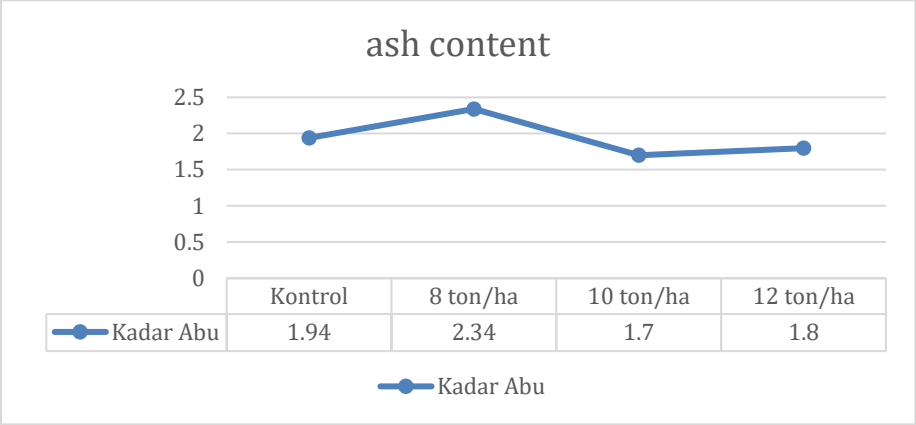


Figure 3. Graph of Ash Content Analysis Results

Based on the data in Figure 3 it is known that the organic fertilizer dose treatment of 8 tons/ha had the largest ash content results, namely 2.34%, while the smallest ash content results were obtained by the treatment dose of 10 tons/ha organic fertilizer, namely 1.70%.

According to Zubaidah (2013), the longer the age of the plant, the thicker the plant cell walls, so the higher the ash content in the plant. Providing organic cow fertilizer and NPK Mutiara fertilizer will reduce plant ash content. Based on the results of research by Zubaidah (2013), the decrease in elephant grass ash content was due to an increase in the element 16 N from goat feces in the soil.

3.3 Protein Content Analysis

Data from laboratory tests on the influence of goat manure doses on the analysis of sorghum protein content can be seen in Appendix 3. The results of the influence of goat manure doses on the analysis of protein levels in sweet sorghum plants of the Bioguma 1 variety are presented in Figure 4.

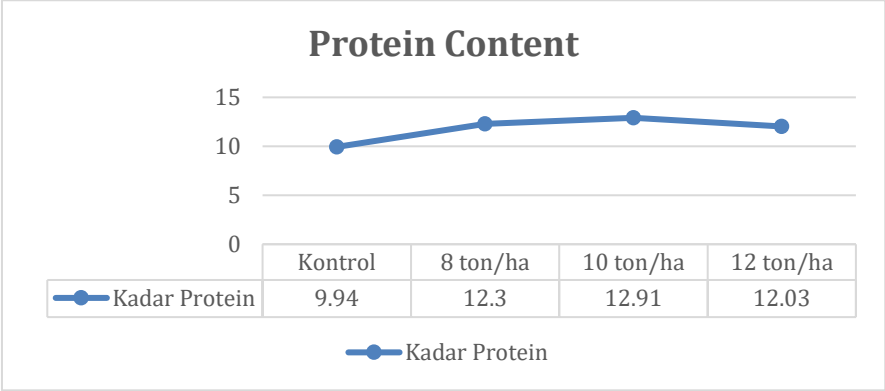


Figure 4. Graph of protein content analysis results

Based on the data in Figure 4, it is known that the treatment with a dose of goat manure of 10 tons/ha had the highest protein content, namely 12.91%, while the smallest water content was obtained by the control organic fertilizer dose, namely 9.94%.

According to Hartono (2011) explained that the nitrogen found in goat manure can be reformed into amino acids and assimilated into ammonium when it has been broken down first. The level of crude plant protein is highly dependent on the availability of nitrogen in the soil (Marliani, 2010).

According to Sutejo (2008) the nitrogen and potassium contained in goat manure will be utilized by plants to increase plant protein formation thereby increasing plant crude protein levels.

3.4 Fat Content Analysis

Data from laboratory tests on the influence of goat manure doses on the analysis of sorghum fat content can be seen in Appendix 3. The results of the influence of goat manure doses on the analysis of fat content in sweet sorghum plants of the Bioguma 1 variety are presented in Figure 5.

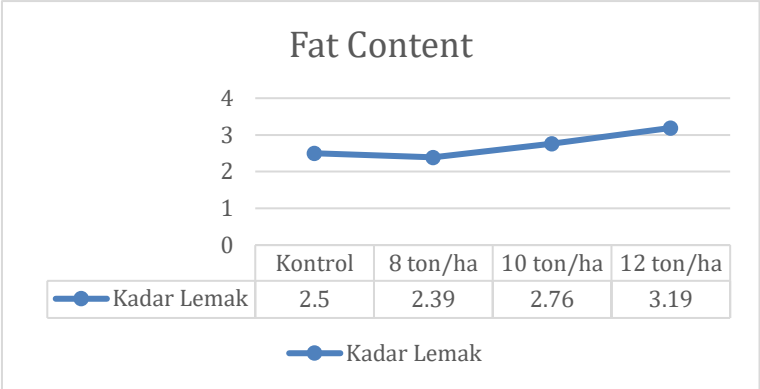


Figure 5. Graphic Results of Analysis of Fat Content

Based on the data in Figure 5, it is known that the goat manure dose treatment of 12 tons/ha had the largest fat content results, namely 3.19%, while the smallest water content results were obtained by the goat manure dose treatment of 8 tons/ha, namely 2.39%.

The combination treatment of providing goat manure with watering once every three days gave the highest fat content of 1.29%. According to (Kresnatitaet al. 2013), good soil conditions will create a suitable growing environment for plant growth. Providing goat manure increases the availability of nutrients needed for seed formation.

3.5 Carbohydrate Content Analysis

Data from laboratory tests on the influence of goat manure doses on the analysis of sorghum carbohydrate content can be seen in Appendix 3. The results of the influence of goat manure doses on the analysis of carbohydrate levels in sweet sorghum plants of the Bioguma 1 variety are presented in Figure 6.

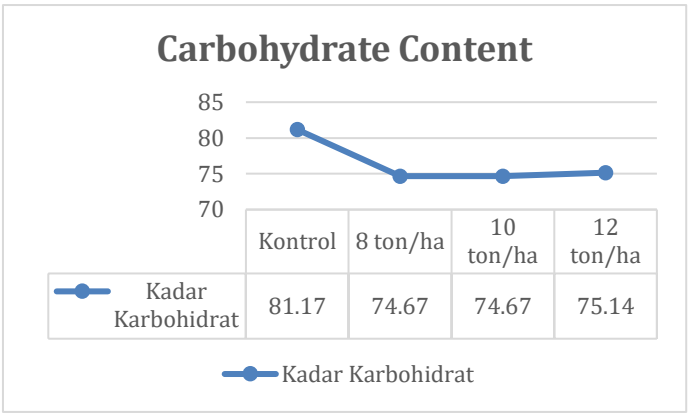


Figure 6. Graphic of Results of Analysis of Carbohydrate Content

Based on the data in figure 6, it is known that the control goat manure dose treatment had the largest protein content results, namely 81.17%, while the smallest water content results were obtained by the goat manure dose treatment of 8 tons/ha and 10 tons/ha with the same results, namely 74.67%. .

Apart from producing energy, carbohydrates also function to provide a sweet taste to food, save protein, regulate fat metabolism and help excrete feces (Chenet al., 2021).carbohydrate metabolism, is associated with biomarkers and transcription levels of genes related to glycolysis and the tricarboxylic acid cycle (Qianet al., 2019)

3.6 Crude Fiber Analysis

Data from laboratory tests on the effect of goat manure doses on the analysis of sorghum crude fiber can be seen in Appendix 3. The results of the influence of goat manure doses on the analysis of carbohydrate content in sweet sorghum plants of the Bioguma 1 variety are presented in Figure 6. Bioguma 1 is presented in Figure 7.

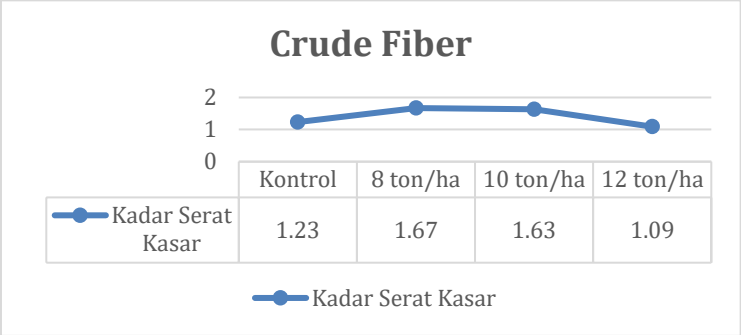


Figure 7. Graphic of Results of Analysis of Gross Fiber Content

Based on the data in Figure 7. The highest crude fiber content was found in the 8 ton/ha treatment around 1.67%, then the 10 ton/ha treatment around 1.63%. The variety with the lowest crude fiber treatment was 12 tons/ha, around 1.09%. It is suspected that the 8 ton/ha treatment has a high proportion of stems and is also influenced by planting age. This is supported by the statement of Wahyuni & Kamaliyah (2012) that a high proportion of stems affects crude fiber content, increasing plant cell wall components will increase crude fiber content. The increase in crude fiber coincides with the increase in the age of a plant.

In line with research by Hartono (2011), supplementation of organic fertilizer from sheep manure at various doses was not able to increase the crude fiber content of setaria grass, because the grass was still in the vegetative growth period. Plants in the vegetative phase still have high nutritional quality and low crude fiber levels, whereas in the generative phase the nutritional quality of plants will decrease and crude fiber levels will increase.

3.7 Total Dissolved Solids (TPT)

Data from the test results using a manual refractometer on the effect of goat manure doses on the analysis of total dissolved solids of sorghum can be seen in Appendices 32 and 33. The results of the influence of goat manure doses on Brix analysis on sweet sorghum plants of the Bioguma 1 variety are presented in Figure 8.

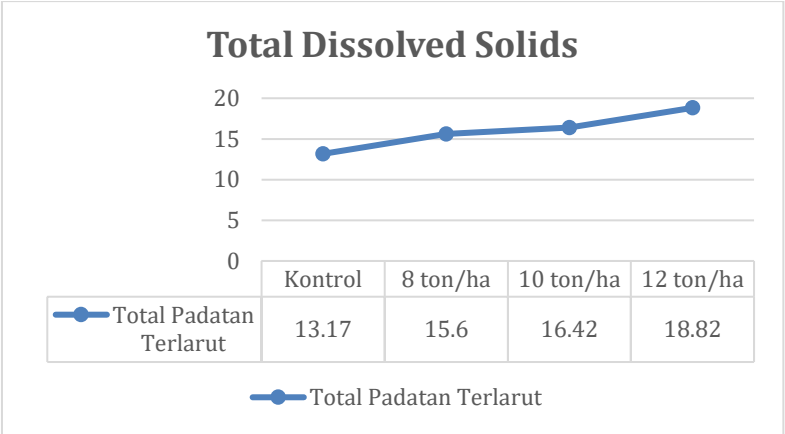


Figure 8. Graph of Total Dissolved Solids Analysis Results

Based on the data in Figure 8, it is known that the treatment with a dose of goat manure of 12 tons/ha had the largest average TPT, namely 18.82 g, while the smallest average Brix was had by the control dose of goat manure, namely 13.17 g.

The effect of giving goat manure on the TPT levels of sorghum plants did not have a significant effect at 101 HST. This is because at the age of 101 HST the TPT levels have reached the maximum level in all treatments, this is when the maximum TPT levels occur. In line with the results of Oyier's et al., (2017) research which shows that plants aged 101-117 HST can produce high TPT content values. Furthermore, the provision of silicate fertilizer and goat manure had a significant effect on TPT levels at the ages of 77 DAP, 91 DAP, 107 DAP, and 128 DAP. Providing 200 kg/ha of silicate fertilizer and 10 tons/ha of goat manure resulted in the highest TPT content values compared to the control (without silicate fertilizer and organic fertilizer).

The sugar content in sweet sorghum stems is determined by several genes with the influence of time and inheritance. (FAOCorporate Document Repository, 2013).

4. CONCLUSION

Based on the results and discussion that have been described, the following conclusions can be drawn from this research:

1. Goat manure treatment at a dose of 12 tons/ha gave the best results in the parameters of plant height (309.89 cm), leaf length (145.83 cm), number of leaves (15.83 pieces), seed weight per planting (159, 86 g), weight of 1000 seeds (54.37 g), wet weight (1108.74 g), dry weight (464.99 g).

2. The goat manure treatment in the proximate test gave the best results from several treatments, the water content in the goat pen treatment was 8 tons/ha (8.30%), the ash content in the goat pen treatment was 8 tons/ha (2.34%), the protein in the goat pen treatment was 10 tons/ha (12.91%), fat content in the goat pen treatment was 10 tons/ha in the treatment (2.76%), carbohydrate content in the goat pen treatment was 0 ton/ha (81.17%) , crude fiber content in the goat pen treatment was 8 tons/ha (1.67 %), total dissolved solids in the goat pen treatment was 12 tons/ha (18.82 %).

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