International Journal of Innovation and Thinking

Journal Website: ij-it.com
E-ISSN: 3066-4047

RESEARCH ARTICLE

Comparison of Nutritional Content Elephant Grass (Pennisetum Purpureum) on Different Plains Through Proximate Test

Seblum Indey[1], Ance Degey[2], Emanuel Dogomo[3] Ferdinan Dogomo[4]
Program Studi Peternakan, Fakultas Pertanian dan Peternakan, Universitas Satya Wiyata Mandala Nabire
[1,2,3,4]

*Corresponding Author: indeyseblum@gmail.com

ARTICLE INFO

Keywords
Nutritional content, Elephant grass, Proximate test.

ABSTRACT

This study was conducted to determine the nutritional content of elephant grass (Pennisetum purpureum) that grows in the highlands and lowlands. This study used a descriptive method with a comparison of different plains quantitatively and qualitatively. The results showed that the highest water content (10.12%) in the lowlands compared to the highlands only (10.00%), the highest ash content (8.55%) in the highlands, while in the lowlands the ash content was only (6.74%), the highest fat content was in the highlands of (4.65%) while in the lowlands (2.77%), the highest protein content in the highlands of (8.62%) while in the lowlands (7.27%), and the carbohydrate content of elephant grass in the highlands was (20.57%) and in the lowlands was (20.54%). Based on the results of this study, it can be concluded that the nutritional content of elephant grass that grows in the highlands and lowlands does not have a significant difference in nutritional value as seen in the protein content in the highlands of 8.62% and in the lowlands of 7.27%. This is influenced by the nutrients absorbed by elephant grass plants. Therefore, further research is needed by taking soil samples from two different plains.

INTRODUCTION

Elephant grass (Pennisetum purpureum), this plant was introduced in Indonesia in 1962, and grows naturally throughout the Southeast Asian plains. Elephant grass is the main green fodder plant for livestock that plays a very important role, because this green contains almost all the substances needed by animals (Mihrani, 2008).

The advantages of elephant grass include being able to adapt to various types of soil, being a perennial plant, high production, high nutritional value and high growth

rate. The nutritional content of elephant grass consists of dry matter (DM) 19.9%, crude protein (CP) 10.2%, crude fat (KL) 1.6%, crude fiber (CF) 34.2%, ash 11.7% and non-nitrogen extract (BETN 42.3% (Rukmana, 2005). The high DM content in elephant grass is thought to be due to differences in planting location, time and climate from planting to harvest. In addition, it can also be caused by the flower formation process that is too early due to the rainy season and weather changes, so that at the harvest age of 45 days the plant has reached the generative phase(Seseray et al., 2013).

The biological value of a forage is determined by the nutrient content of the forage and its digestibility in the rumen. The quality of forage varies greatly depending on the type, harvest age, growth phase and cultivation management.Currently, Indonesia already has a standard forage forage used as a reference in selecting quality forage for livestock, namely the Decree of the Minister of Agriculture 430/Kpts/KN.200/M/7/2019 concerning the Determination of Minimum Technical Requirements for the Quality and Safety of Feed and/or Feed Ingredients. This quality standard is made based on the results of proximate analysis, Calcium (Ca), Phosphorus (P) which are carried out several times with various conditions and different types of forage.

The quality of elephant grass (Pennisetum purpureum) forage differs in growth type as shown by the results of the study showing that the dry matter content of short-type elephant grass is higher compared to the dry matter content of tall-type elephant grass (23% vs 20%), while the fiber fractions such as crude fiber, NDF and ADF in short-type elephant grass forage are lower than the fiber fraction of tall-type elephant grass forage respectively (32% vs 29%, 70% vs 65%, 43% vs 39%) so that the forage quality value (RFQ) of short-type elephant grass forage is higher compared to the RFQ value of tall-type elephant grass forage (68 vs 57).(Dumadi et al., 2021).

Therefore, to find out the nutritional content of elephant grass (Pennisetum purpureum) that grows in the highlands and lowlands, a study was conducted through proximate analysis in order to compare the nutritional content of elephant grass from the two plains. The results of this study are very important information for farmers who will use elephant grass as a source of feed and related agencies that develop livestock programs, especially in the field of ruminant livestock.

METHODOLOGY

Place and Time

This research was conducted at two points, namely the lowlands (Nabire Regency) and the highlands (Dogiyai Regency) of Central Papua Province. Meanwhile, proximate testing was carried out at the Ambon Industrial Laboratory. This research was conducted for one month, namely February 2025.

Research methods

This study was conducted using a descriptive method with a comparison of different plains quantitatively and qualitatively. The research materials used were elephant grass

in the lowlands and highlands and materials in the proximate examination of the elephant grass. The tools used in this study were meters, sickles, sitting scales, slice boards, zinc, cameras, medium envelope folders, markers, ballpoint pens and label work. The variables observed in this study were water content (%), ash content (%), fat content (%), protein content (%), and carbohydrate content (%).

Data analysis

Data is collected primarily from the results of sampling and then analyzed proximately in the laboratory, then tabulated and presented in tabular form.

RESULT AND DISCUSSION

Elephant Grass Nutrition Test On Different Plains

The results of the water content, ash content, fat, protein and carbohydrate content of elephant grass on different plains can be seen in the table below.

Table 4. Nutrient Content of Elephant Grass on Different Plains

No	Parameters tested	Test Results	
		Plateau (%)	Lowland (%)
1	Water content	10.00	10.12
2	Ash Content	8.55	6.74
3	Dry Weight	90.00	89.88
4	Fat Content	4.65	2.77
5	Protein Content	8.62	7.27
6	Carbohydrate	20.57	20.54

Source: Ambon Industrial Standardization and Service Center, 2025

Water content

Based on the results of the proximate analysis above, it shows that the highest water content (10.12%) is in the lowlands compared to the highlands only (10.00%). The high water content is caused by the dry matter contained in the green fodder, this can be seen in the table above that in the highlands the water content is

(10.00%) and it can be seen that the dry weight content in the highlands (90.00%) the results of this study are in line with the statement from Tirano, (2006) where if the dry

weight increases it will decrease the water content or vice versa if the dry weight decreases it will increase the water content.

The water content of a livestock feed material is one of the indicators of the quality of a feed material, where feed materials containing higher water content will be more susceptible to infection by microorganisms such as fungi that can reduce the power of a feed material. The greater the water content in livestock feed plants will have the availability of free air that can be used for the metabolism of microorganisms. Water content is also a proportion of the water content of a material that can be expressed based on wet weight or dry weight. Water content based on wet weight is the ratio between the weight of water in a material and the total material, while water content based on dry weight is the ratio between the weight of water in a material and the dry weight of the material(Syarif and Halid, 1993)

Ash Content

Process Ash content analysis is carried out over several hours with the aim of get perfect ashing results. Perfect ashing is marked with the change in the shape of the sample to gray and the color becomes grayish white color (PP-Kimia LIPI, 2011). Determination of ash content is determined directly by burning grass at a temperature of 600 oc for 3 hours, then the ash content is weighed with the remaining minerals.

Based on the results of the proximate analysis carried out as seen in the table above, the ash content (8.55%) is highest in the highlands, while in the lowlands the ash content is only (6.74%). This is thought to be due to the drying factor of the samples for too long in the lowland samples, where the samples look drier than the highland samples.According toSudarmadji et al., (1989) said that there are several factors that affect the ash content of a food ingredient, namely the ashing method, type of food ingredient, temperature and time during drying. The ash content in a food ingredient indicates the amount of minerals in the food ingredient.

The interaction between temperature and extraction time affects the ash content of the pectin produced. The results of the study showed that the higher the temperature and the longer the extraction time, the higher the ash content.(Desmawarni et al., 2017).

Fat Content

The results of the proximate analysis carried out showed that the highest fat content was in the highlands (4.65%) while in the lowlands (2.77%), because fat is a more effective source of energy compared to carbohydrates and protein (Winarno, 2004).

Determination of fat content was carried out with hexane solution as a solvent. The function of the hexane solution is to extracting fat or used to dissolve fat, so that change the color from yellow to clear (Mahmudi, 1997). The fat content of a feed ingredient can be determined using the soxhlet method,namely the process of extracting a material in a Soxhlet tube (Soejono, 1990).

Fat has a role as a component of bio-molecular materials and a component of cell walls. In terms of nutrition, fat is a biocalorie, in which there are essential unsaturated fatty acids, namely linoleic and linolenic, also a source of fat-soluble vitamins such as A, D, E,

and K. The function of fat in the body of livestock includes energy storage, energy sources after carbohydrates, and protectors of animal organs). Fat in liquid form is called oil while fat in solid form is called fat(Wahyuni, 2009).

Protein Content

Protein is a food substance (containing nitrogen) which is a factor important for body function. In body tissues, the largest component that makes it up After water is protein. Liver and meat tissue, there are approximately 50% of the dry weight of the cells in the form of protein. Protein if consumed has the main function, namely meet the needs of amino acids and nitrogen, then synthesize body protein and other substances containing nitrogen. Protein deficiency can causes the body's resistance to disease and metabolic processes to decrease body disturbed(Rusdi et al, 2016).

Based on the results of proximate analysis, it shows that the highest protein content in the highlands is (8.62%) while in the lowlands (7.27%). Suyitman et al (2003) said that the crude protein content of elephant grass is 13%-14%. Thus, the cause of the low protein content in elephant grass in both plains is suspected to be the low content of nutrients in the soil, especially nitrogen as a protein former and the age of grass cutting.

Energy source feed is a feed ingredient that has Crude protein content < 20% and crude fiber < 18%. PK levels are influenced by plant age. PK levels are high at the beginning of growth. and decreases when it is old. According to research conducted by Hartadi et al., (1990) it was shown that the PK levels of elephant grass on days 15-28 were 11.5% while at harvest age (43-56 days) it will decrease to 9.1%.

Carbohydrate

Greens are a source of carbohydrates. Energy source feed ingredients contain relatively higher carbohydrates compared to other food substances. Carbohydrates are divided into two groups, namely SK and BETN or *Nitrogen free extract*(NFE). Crude fiber is part of the cell structure in plant tissues. Crude fiber contains cellulose, hemicellulose, polysaccharides and lignin (Tillman et al, 1998).

Based on the results of the proximate analysis conducted, the carbohydrate content of elephant grass in the highlands was (20.57%) and in the lowlands was (20.54%). It can be seen that there is no significant difference between elephant grass from the two plains taken.According to Rukmana (2005), the crude fiber (CF) content in elephant grass is 34.2% and the nitrogen-free extract (BETN) is 42.3%.

The difference in results is influenced by the nutrients absorbed by the plants. So it can affect the water content in elephant grass, so according to Fathul et al. (2013), the higher the dry matter of a material, the water content will decrease or vice versa.

CONCLUSION

The results of the study showed that the nutritional content of elephant grass growing in the highlands and lowlands did not have a significant difference in nutritional value as seen in the protein content in the highlands of 8.62% and in the lowlands of 7.27%. This is influenced by the nutrients absorbed by elephant grass plants. So it is recommended for further research by taking soil samples on the two different plains.

REFERENCES

1. Desmawarni, D., Hanum Hamzah, F., Agricultural Product Technology Study, P., & Agricultural Technology, J. (2017). Students of the Faculty of Agriculture, University of Riau 2. Lecturers of the Faculty of Agriculture. In University of Riau JOM Faperta UR (Vol. 4, Issue 1).
2. Dumadi, EH, Abdullah, L., & Sukria, H. (2021). The Quality of Elephant Grass (Pennisetum purpureum) Forage of Different Growth Types: A Quantitative Review. Journal of Nutrition Science and Feed Technology, 19(1), 6–13.https://doi.org/10.29244/jintp.19.1.6-13
3. Fathul, FL, Purwaningsih, N., and Tantalo (2013). Knowledge of feed and ration formulation. Department of Animal Husbandry. Lampung: Faculty of Agriculture.
4. Hartadi, H., S. Reksohadiprojo, and AD Tillman. 1990. Feed Composition TableFor Indonesia. Faculty of Animal Husbandry, Gadjah Mada University. Yogyakarta.
5. Mihrani. 2008. Evaluation of extension of the use of cow dung bokashi on the growth and production of elephant grass. Agrisistem Journal, June 2008, Vol. 4 No. 1.
6. PP-Chemistry LIPI. (2011). Advanced Characterization of Ash Content by Gravimetric Method. Bandung: LIPI Chemical Research Center.
7. Rukmana, R. 2005. Cultivation of Superior Grass. Kanisius Publisher. Yogyakarta.
8. Seseray, DY, Santoso, B., & Lekitoo, MN (2013). Production of Elephant Grass (Pennisetum purpureum) Given N, P and K Fertilizers with Doses of 0, 50 and 100% on the 45th Day of Devoliation. 11(1), 49–55.
9. Tillman, AD, H. Hartadi, S. Reksohadiprojo, S. Prawirokusumo and S. Lebdosoekojo. 1998. Basic Animal Feed Science. Gajah Mada University Press. Faculty of Animal Husbandry. Gajah Mada University. Yogyakarta.
10. Winarno, FG 2004. Food Chemistry and Nutrition. Jakarta: PT Gramedia Pustaka Utama.