The 6th ISTAP International Seminar on Tropical Animal Production

“Integrated Approach in Developing Sustainable Tropical Animal Production”

PROCEEDINGS

October 20-22, 2015
Yogyakarta Indonesia

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PREFACE

On behalf of Faculty of Animal Science, Universitas Gadjah Mada, I am pleased to present you the 6th International Seminar on Tropical Animal Production (ISTAP) which is held on October 20 – 22, 2015 at Auditorium drh. Soepardjo, Faculty of Animal Science UGM, Yogyakarta. Under the main theme “Integrated Approach in Developing Sustainable Tropical Animal Production”, we expect that information and ideas on animal production systems in the tropics and its related problems will be shared among participants, thus we can elaborate an integrated approach in developing sustainable tropical animal production. I believe, this can be achieved since more than 250 animal scientists, researchers, students, and producers from more than 15 countries join this seminar.

In this moment, I have to address my great thanks to all people who have contributed for the success of this seminar. First, to all participants, thank you for your contributions, time, and efforts in participating in all sessions in this seminar. We also would like to extend our gratitude to the reviewers and editors for dedicate their expertise and precious time in reviewing and editing the papers. I deeply appreciate the hard work of all members of the Steering Committee, Organizing Committee, and students of Faculty of Animal Science UGM for making this seminar achieved a great success!

I hope all of you enjoy the seminar and Jogja as well!

Dr. Cuk Tri Noviandi

Editor in Chief
REPORT FROM ORGANIZING COMMITTEE

Dear all of the scientists, delegates, participants, ladies and gentlemen,

Praise be to The Almighty for His Merciful and Beneficent to raise up this memorable moment for all of the scientists and delegates from all over the world who were interested in Animal Science field to meet up together.

On behalf of all the members of Board Committee, it is my great pleasure and honor to welcome all of you and impress thankful, and present a high appreciation for your participation in joining the 6th ISTAP in Yogyakarta, one of the Special Region in Indonesia where culture and tradition live in harmony with the modern nuance and educational spirit makes it a beautiful venue of this seminar.

During this event, we have distinguished scientists from all over the world to present plenary papers Livestock Management, Production, and Environment; Feed, Land, and Landscape for Sustainable Animal Production; Livestock Industry and Technology; Economics, Social, and Culture in Livestock Development; and Special issue on Halal Food, Safety and Regulation. It is noted that around 200 scientists as well as livestock producers, companies, graduate and postgraduate students from 15 countries attend the seminar; and more than 160 research papers will be presented. We can see great enthusiasm of all the scientists to solve livestock problems as well as to share valuable information and knowledge for human prosperity all over the world.

The 6th ISTAP Program consists of scientific and technical programs as well as social and cultural activities. The scientific and technical programs offer 4 plenary sessions, field trip, and many scientific sessions (both oral and poster presentation). The social and cultural programs of the 6th ISTAP are very important as the scientific and technical programs since the promotion of friendship and future scientific cooperation are also central to this seminar. Opening Ceremony offers you the Seminar Program a glance. Participants will attend a warm invitation from Dean Faculty of Animal Science UGM in a Welcome Dinner that will give you the most memorable moment to attend. Field trip activity offers a wonderful sightseeing to the most spectacular natural landmark in Yogyakarta, Merapi Lava Tour and Ulen Sentalu Museum. We do hope that you will not miss any of these wonderful opportunities.

Closing Ceremony will be held on October 22nd, 2015, immediately after the last session of presentation. The 6th ISTAP award will be announced for some participant as an appreciation for their valuable research.

Finally, on behalf of 6th ISTAP Committee, I wish all of the participants having a great achievement of success and fulfill the expectation as well as enjoying the interaction with all scientists participating in the seminar.

High appreciation I may acknowledge to the Rector of Universitas Gadjah Mada and Dean Faculty of Animal Science UGM, who have concerned to facilitate the seminar site host. Special thank to the Steering Committee, Scientific Committee, Reviewers and Editorial Boards for their great contribution to make the seminar successfully organized.

Terima kasih (Thank you).
Sincerely Yours,

Prof. I Gede Suparta Budisatria, Ph.D
Chairman
The Organizing Committee of the 6th ISTAP
WELCOME ADDRESS

Selamat pagi (Good morning)

Dear Rector of Universitas Gadjah Mada, all of Invited Speakers, honorable guests, all of delegates, participants, distinguished guests, Ladies and Gentlemen
Attendants of The 6th ISTAP,

It is my great pleasure and honor to extend a warm welcome to all of you at The 6th International Seminar on Tropical Animal Production, which be held on October 20 – 22, 2015 at Auditorium drh. Soepardjo, Universitas Gadjah Mada, Yogyakarta Indonesia. This seminar is proudly organized by Faculty of Animal Science Universitas Gadjah Mada.

The contribution of this seminar to the development of national food security is truly significant for introducing of new scientific knowledge and equipments that is much needed in Indonesia to maintain a safe and secure environment and to look at more effective ways to meet future challenges. We can see great enthusiasm of the entire participant to present their latest research as well as to share valuable information and knowledge for human prosperity all over the world.

In these 3 days of seminar, we have invited some Plenary Speakers and Invited Papers who are qualified as scientists and bureaucrats in animal science field to share their valuable information and knowledge. Other participants can deliver their precious research through oral and poster presentations.

Finally, on behalf of Faculty of Animal Science, we would like to extend our sincere gratitude to the Minister of Rural, Rural Development, and Transmigration, Republic of Indonesia, Mr. Marwan Jafar, for his generosity to be with us here to give Keynote Speech. Then, it is our great honor and pleasure to have qualified scientists and bureaucrats as Plenary Speakers and Invited Papers to share their valuable knowledge during the plenary and concurrent sessions. Moreover, special thank you is for the Steering Committee, Scientific Committee, Reviewers and Editorial Boards for their great contribution to make the seminar a great success. Also, we would like to congratulate and deliver high appreciation to the Organizing Committee as the organizer for their great contribution and generous efforts to make the seminar successfully organized.

And to all of the participants, I hope that this seminar will always success and bring some acknowledgement for all of us. Also, I wish all of the participants having a great achievement of success and fulfill the expectation as well as enjoying the interaction with all participants.

With all of our hospitality, we will try our best to make your brief visit to our country become a wonderful and memorable moments.
We are looking forward to meeting you all in the future event.

Wish you all a very pleasant and most enjoyable stay in Yogyakarta, Indonesia, beside you scientific journeys.

Terima kasih (Thank you).

Sincerely Yours,
Prof. Dr. Ali Agus
Dean Faculty of Animal Science UGM
OPENING REMARKS

Dear all of Scientists, distinguished guests, delegates, participants, Ladies and Gentlemen,

On behalf of Universitas Gadjah Mada, I am happy to welcome you and present a high appreciation for your participation in joining the 6th International Seminar on Tropical Animal Production hosted by the Faculty of Animal Science UGM in Yogyakarta from 20 – 22 October 2015.

Under the theme of “Integrated Approaches in Developing Sustainable Tropical Animal Production”, we do hope that this seminar concludes with shared ideas and best practices, technology, and global networks that are required to increase animal production. The increase of animal production as one source of food is crucial to feed the world given that the population is expected to increase from 6 billion to about 8.3 billion in 2030. According to FAO (2008, 2009), the consumption of animal food increased from 10 kg/per annum in 1960, 26 kg/per annum in 200, and it is expected to be 37 kg/per annum. Animal production is an integral part of food production and contributing for the quality of human food supply. Animal and agricultural production is an important component in the integrated farming systems in developing countries as this produces high quality foods, provides job opportunities in rural areas, as well as enriching livelihood.

As a tropical country with high animal biodiversity, Indonesia and other tropical countries, have a variety number of indigenous and local animal genetic resources and germ plasm. This variety of animal germ plasm could be explored and developed not only for animal and food production but also for animal conservation. Apart from being exploited as food resources, it is therefore important to consider animal conservation. Conservation will protect the genetic potency of local bred and their family, and the domesticated animal bred, and this would secure our future food resources.

In these 3 days of seminar, we believe those aforementioned issues will be discussed, and technical solution as well as recommendation will be provided to solve the existing problems in tropical animal production.

Finally, on behalf of Universitas Gadjah Mada, we would like to congratulate and thanks to the Faculty of Animal Science UGM as the organizer for their great efforts to make the seminar successfully organized. To all of participants, I wish all of you have a great discussion and interaction with other scientists participating in the seminar as well as enjoying your time in Yogyakarta.

Thank you

Prof. Ir. Dwikorita Karnawati, M.Sc., Ph.D.
Rector of Universitas Gadjah Mada
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Growth and Productivity of *Brachiaria brizantha* cv MG 5 under the effect of different dose of NPK fertilization

Nafiatul Umami¹, Meita Puspa Dewi¹, Bambang Suhartanto¹, Cuk Tri Noviandi¹, Nilo Suseno¹, Genki Ishigaki², Ryo Akashi²

¹Faculty of Animal Science, Universitas Gadjah Mada, Jalan Fauna No.3 Bulaksumur UGM, Yogyakarta
²Faculty of Agriculture University of Miyazaki, Japan

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**ABSTRACT:** This research aimed to investigate the influence of a different dose of NPK fertilization to growth, productivity, and nutrient content of *Brachiaria brizantha* cv. MG 5. The research was conducted at the Green House of Faculty of Animal Science Universitas Gadjah Mada. Regosols added with manure as basic fertilizer was placed in the poly bag with diameter 25 cm and capacity up to 10 kg. Germination was performed on the poly tray then its results were moved to the poly bag. NPK fertilization was treated on three levels with five replications. The treatment was as follows: given NPK fertilizer level 0 kg ha⁻¹ (P0), 150 kg ha⁻¹(P1) and 300 kg ha⁻¹ (P2), respectively. Fertilization was performed twice during the cultivation period on the 15 and 30 days old. The primary and secondary tillers, the plant’s height, and length were observed once a week in 60 days. Devoliation was performed on the 60th day, with the plants’ height of 10 cm from the soil surface. The variable observed was the plant’s height and length, root biomass production, the ratio of stem and leaves, and dry and organic matter contents. The data was analyzed using analysis of variance. Further, the significantly different result was tested with Duncan’s New Multiple Range Test. The research data showed that the average of the growth of the plants’ length per week for *Brachiaria sp* age 60 days fertilization level 300 kg/ha resulted the longest plant of 130.7 cm and different (P<0.1) than the others. The number of tillers resulted in no difference, but the biomass production showed that fertilization 150 kg/ha and 300 kg/ha resulted in higher production than 0 kg/ha (P<0.1). The research showed that fertilization 150 kg/ha resulted in higher biomass production than 0 kg/ha, but that of 300 kg/ha did not show a significant difference.

**Keywords:** *Brachiaria sp* grasses, NPK fertilizer dose, nutrient content, growth, production

**INTRODUCTION**

*Brachiaria brizantha* grasses are very productive and suitable for continuous or rotational grazing. *Brachiaria brizantha* is resistant to animal’s step and chomp, and also resistant to drought. Miles *et al.* (1996) states that the nutrient value of *Brachiaria brizantha* grass depends on the soil fertility, fertilizing and the plant regrowth. The crude protein content of *Brachiaria brizantha* in the tropics is 7 to 16%, and the digestibility is 51 to 75%. This grass grows well in the dry season with DM production about 8 to 20 tons/ha/year.

*Brachiaria brizantha* grass is very responsive to nitrogen fertilizer, grows well at an altitude of 0 to 1200 m above sea level with an annual rainfall of over 1500 mm, but is not resistant to waterlogging. This grass grows quickly and forms a vertical and horizontal stretch with the high reaches 60 to 150 cm, resistant to drought, have high productivity and palatable (Ishigaki *et al*., 2012). Hartadi *et al.* (2005) reports that *Brachiaria brizantha* contains nutrients 10.9% of
ash, 1.35% of ether extract, 32.2% of crude fiber, 49.1% of BETN and 6.6% of crude protein. Tekletsadik et al. (2004) finds that devoliation of Brachiaria brizantha with the remaining 10 cm above the ground can affect the nutritional value of the grass. It is in agreement with who states that leaving the grass 1 to 10 cm above the ground provides 20% rather than of that 15 to 20 cm above the ground.

The success of forage cultivation depends on several factors such as the type of forage, climatic conditions, water and soil fertility. Soil fertility is one of the factors that determine whether the forage results will be good or not. Soil fertility can be identified by the availability of nutrients in the soil. The availability of nutrients in the soil can be fulfilled with fertilization. Marassing (2013) states that the amount of fertilizer given to the plant depends on its response to fertilizer. The complete nutrient supplied in the right amount, the better and maximum the results will be.

Fertilization improves the soil fertility by supplying nutrient content to the soil. This opinion is in agreement with Hardjowigeno (1987) who states that fertilization is the addition of materials that is used to improve the soil fertility. Novizan (2007) states that nutrients N, P, and K in the soil is not sufficiently available and continuously reduced for the plants growth and taken away at the harvest time, washed, evaporated and erosion. By this reason, fertilization is necessary to be conducted. N, P, and K contents are absolute macro nutrients in the soil that is beneficial for the plants growth.

Production of Brachiaria sp grass will result in better production when it is planted on the right and appropriate dose of fertilizer. Therefore, a study on the effect of doses of NPK fertilizer to the growth, production, and nutrient content of some varieties of Brachiaria sp that has not previously been conducted is necessary. The results of this study are expected to provide information for the farmers about the ideal dose of fertilizer for Brachiaria brizantha.

**MATERIAL AND METHODS**

Some seeds were germinated in the pot tray filled with soil. Brachiaria brizantha cv MG 5 was germinated for two weeks. During those weeks, the plants were watered and observed the days of their germination, the leaves emerge, the plant height and number of leaves. The soils were filled into polybags and randomly divided into three treatments with five replications. The soils were put into the polybags as much as ¾ capacities of the polybags with diameter 25 cm. The row spacing used was 50 x 50 cm.

After the preparation for planting medium was completed, planting process was carried out. The germination results were then moved into the polybags 5 cm from the soil surface and then closed again with soil. One polybag contained one plant. Watering was done every day once in the morning. Weeding was done every week.

Fertilization was done twice during the period of cultivation on 15 and 30 days after planting. The treatment consisted of a combination of the level of NPK fertilizer (25-5-7), which consisted of: not given or 0% NPK fertilizer as control (P0) (0 g/polybag), given NPK fertilizer with a dose of 150 kg/ha (P1) (3.75 gram/polybag), and given NPK fertilizer with a dose of 300 kg/ha (P2) (7.5 gram/polybag). Fertilization was made after weeding process.

Harvesting was carried out on the 60th day after planting with the cutting length of 10 cm from the ground. Plants in each polybag were weighed immediately to obtain the fresh weight of biomass canopy. The roots were also weighed to measure the root biomass. The stems and leaves were separated then weighed and chopped and put in the paper bags. The dried samples were weighed, stems and leaves samples were ground using Willey mill equipped with a 1 mm porosity of sieve.
Stem and leaf samples were mixed then proximately analyzed including the dry matter, organic matter, crude protein, crude fiber and crude fat (AOAC, 2005). The variables measured were growth (the height of germinated plant, the number of germinated leaves, the day of germination and leaf germination, the height of the plant, the number of leaves); productivity (production of fresh plants, dry matter production of stem, organic matter production of leaf, production of dry matter and organic matter) and chemical composition.

RESULTS AND DISCUSSION

The quality of the soil that used in the research contained nutrients (C, OM, total-N, total-P, and C/N) had a low value. The variable of the soil quality is usually determined by the content of organic matter and total-N in the soil so that it can increase the productivity of the plant biomass.

The values of total-N, total-P and total-K contained in the soil were 0.26%, 18.75%, and 1.26% respectively. The nutrients value N, P and K in the soil was relatively low. The addition of NPK fertilizer 25-5-7 was expected to increase the nutrient content of the soil for growing Brachiaria grass. Element N is an element that is easily leached and evaporates into the air so that it may take the element N in greater numbers. This is in agreement with Novizan (2007) who finds that nutrients N, P, and K in the soil is not sufficiently available and continuously reduced for the plants growth and taken away at the harvest time, washed, evaporated and erosion. By this reason, fertilization is necessary to be conducted. Nitrogen is the element that is most absorbed by the plants and provides a real and rapid effect on the plant growth such as increasing the number of tillers.

The growth rate of the plant height, leaf numbers and plant length of Brachiaria brizantha CV. MG5 per week until the age of 60 days given NPK fertilizer with a dose level of 0 kg/ha, 150 kg/ha and 300 kg/ha, listed in Table 1.

Table 1. The average growth of the plant height, leaf numbers and plant length per week several varieties of Brachiaria sp with different levels of fertilization.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Fertilization level</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 kg/ha</td>
<td>150 kg/ha</td>
</tr>
<tr>
<td>Plant height (cm)</td>
<td>6.74±1.56</td>
<td>7.86±1.16</td>
</tr>
<tr>
<td>Number of leaves</td>
<td>4.87±1.38</td>
<td>6.62±0.78</td>
</tr>
<tr>
<td>Plant length (cm)</td>
<td>12.32±1.4</td>
<td>12.4±1.95</td>
</tr>
</tbody>
</table>

\( ns \) : non significant

Based on statistics analysis of NPK fertilization with different levels, it showed a not real difference to the length of the plant, number of leaves and the plant height per week. Supporting a research that was conducted by Kauri et al. (1999), she suggests that Brachiaria decumbens cv Basilisk is responsive to phosphate fertilizer, so that at the level of 300 kg/ha, it has the highest rates of the plant height increment.

The Production of the Plants

The Production of fresh plants, dry matter production of Brachiaria brizantha cv MG 5 under different levels of fertilization is shown in Table 2.
Table 2. Average production of fresh, dry matter, Brachiaria sp under different levels of fertilization (ton/ha)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Fertilization levels</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 kg/ha</td>
<td>150 kg/ha</td>
</tr>
<tr>
<td>Production of fresh plants</td>
<td>5.02±1.59</td>
<td>6.85±3.16</td>
</tr>
<tr>
<td>Production of dry matter</td>
<td>0.78±0.35</td>
<td>1.13±0.53</td>
</tr>
</tbody>
</table>

From the research results, it shows that production of fresh plants with level of 300 kg/ha provides production of fresh plants with different results (P <0.05) rather than the level 0 kg/ha. It because the nutrients contained in the NPK fertilizer were absorbed by the root so that it can increase the production of the fresh *Brachiaria brizantha* MG 5. Phino (2014) suggests that the concept of NPK fertilization can increase the production and nutrient levels as it contains nutrients that are absorbed by the plant roots. Sondari (2011) states that the concept of the flow of nutrients to the root is composed of three mechanisms: interception, mass flow, and diffusion. NPK fertilization of 150 kg/ha resulted in the highest production of dry matter. On the other hand, giving NPK fertilizer of 300 kg/ha to *Brachiaria brizantha* cv MG 5 resulted in the decrease in its ability to absorb nutrient as it contains high phosphor and potassium. Novizan (2007) states that many factors determine the availability of phosphorus and potassium in the soil, but the most important is the soil pH. At low pH soil (acid), phosphorus ions will react with iron and aluminum. This reaction forms iron phosphate or aluminum phosphate that are difficult to dissolve in the water, so plants cannot absorb it. The land with a high pH (alkali), phosphorus reacts with calcium ions, and this reaction forms calcium phosphate that are soluble and cannot be absorbed by plants too. Thus, without considering the pH, phosphorus fertilization won’t be effective for the plant growth.

**CONCLUSIONS**

Based on the research results, it can be concluded that fertilization under different levels of the dose of fertilizer to *Brachiaria brizantha* MG 5 can increase the dry matter production and dry matter of Brachiaria grass.

**ACKNOWLEDGMENT**

The researcher wants to extend sincere gratitude to Prof. Ryo Akashi from Frontier Science Research Centre Univ of Miyazaki Japan who has supplied the seeds for this research and also to UGM Research Institutions and Community Service for funding the research through DIPA UGM 2014.

**REFERENCES**


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