Paddy Ratoon (*Oryza Sativa*) Nutrients Quality as Feed Forages at Various Cutting Height and Cutting Ages

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Abstract. This study was aimed to determine the nutrient quality of paddy ratoon (*Oryza sativa*) at various cutting ages. The design used was completely randomize design with factorial design. The first factor is the cutting height with a cutting height of 10 cm, 20 cm. The second factor is cutting ages which is 14 days cutting ages, 21 days cutting ages and 28 days cutting ages and 35 days cutting ages. The result showed that cutting age of paddy ratoon as forages that produce optimal nutrient quality is at the age 14 days after cutting, with 10.34% crude protein and 28.45% crude fiber and 1.15% crude fat. Height cutting of paddy ratoon is not significantly affected nutrient quality.

1. Introduction

Paddy plants are a major component in the national food security system. Paddy is used as a staple food but the byproduct of paddy have enormous potential for animal husbandry. Efforts to increase the productivity of livestock continue to be carried out, one of which is by utilizing paddy straw and other products, namely paddy ratoon is a clump of paddy plants that grow back after being harvested. This paddy ratoon advantage is practical, and has nutritional value that is good enough to increase livestock productivity. The potential of crude protein forage of paddy ratoon reached 8%. This shows that the quality of the forage is almost equivalent to field grass / nature. The production of a second rice crop in one growing season is known as ratooning. Ratoon plants develop by seedling rice regeneration from nodal buds from straw left behind after the first seasonal rice harvest. A study showed that cultivars with a long duration of vegetative growth, high weight per tillers can produce high dry matter that produces in the first and second plants. The increase in ratoon grain yield due to harvesting of main crops at a lower than normal height increases the ratoon yield. Lowering the height of the harvest has shifted the panicle from the origin and delayed appearance of panicles. The yield advantage of the first 20-cm high plant straw can be attributed to panicles that are heavier than tillers coming from basal nodes. Genetics, hay health, availability of soil and water nutrients, and / or weather during the process of growth of the weeds precedes the harvesting factor as the most limiting factor for producing potential. The producer must evaluate the potential yield before applying it lower than the traditional harvest height. The crossing point of the origin can differ between cultivars, by using a standard high 40-cm cutting, it is reported that 'Jasmine 85' ratoon seedlings appear basipetally (starting from the node in the top of the straw and developing down towards the base) and that 60% of tillers originate from the node. The length of the planting season allows for the production of the ratoon plant, which is the second crop that develops from the main straw plant. Rice is traditionally harvested with a cutting height of 40 cm above ground level. However, reducing crop cutting height has the potential to increase crossing yield.
2. Materials and Methods

The research material was paddy plant (*Oryza sativa*) Ciherang that had been planted for six month in area of 320 m². The research location was area in Jatinangor West Java with altitude of about 2874 m above sea level, the temperature was 23-27°C and average rainfall of 2963 mm per year. Experimental plots were made with the size of 4x5 m. Paddy planted land was weeded and cleaned from weeds, which were scattered around the plant.

The paddy ratoon were crude protein, crude fiber and crude fat analyzed by proximate method [1], and lignin analyzed by the method [2]. The design used was completely randomize design with factorial design. The first factor is the cutting height with a cutting height of 10 cm, 20 cm. The second factor is cutting ages which is 14 days cutting ages, 21 days cutting ages and 28 days cutting ages and 35 days cutting ages. Duncan’s multiple range test was conducted to see the difference between treatments.

3. Results and Discussions

3.1. Crude Protein Content of Paddy Ratoon at Various Cutting Ages and Cutting Height

Crude protein is an essential nutrient in ruminant feed, It is required by ruminants for growing and maintenance the cells and tissues of the body. The average of crude protein content of paddy ratoon at various cutting and cutting height can be seen in Table 1.

| Cutting Height (cm) | Cutting Age (day) | Cutting Height (day) | Cutting Height (day) | Cutting Height (day) |
|---------------------|-------------------|----------------------|----------------------|----------------------|
|                     | 14                | 21                   | 28                   | 35                   |
| 10                  | 11.18e             | 7.98c                | 6.91b                | 5.06d                | 7.78                 |
| 20                  | 9.51d             | 8.52ed               | 6.76b                | 5.83ab               | 7.65                 |

The data in Table 1 show that the increased the cutting ages makes the percentage of crude protein content decreased. Result showed that the ages of cutting significantly effect on crude protein content of the paddy ratoon. Further test with Duncan’s multiple range test was conducted to determine the effect of differences between treatments. The data in table 1 also showed that the various cutting height not significantly affect on crude protein content of paddy ratoon. The data in table 1 indicate that the crude protein content of each treatment show significant differences. Plant at a young age has a higher protein than the old plant. Cutting age of 14 days containing the highest crude protein (10.34%) and the lowest is in the cutting ages of 35 days (5.45%). This is because in the cell wall older plant largery composed from cellulose and hemicelluloses. The value of nutrient including protein is decreasing. This is in accordance [3] that the plant at a young ages has better quality because has a lower crude fiber and higher crude protein content. Low level of protein in older plants can also be caused by the percentage of stems is higher than leaves.

3.2. Crude Fiber Content of Paddy Ratoon at Various Cutting Ages and Cutting Height

Forages fiber fraction varies depending on the growth, chemical composition and structure of these plants. The average of crude fiber of paddy ratoon at various cutting ages and cutting height can be seen in Table 2.
Table 2. Average of Crude Fiber of Paddy ratoon at Various Cutting ages and Cutting Height

| Cutting Height (cm) | Cutting Age (day) |
|---------------------|-------------------|
|                     | 14                | 21    | 28    | 35    |
| 10                  | 28.67<sup>a</sup> | 32.95<sup>c</sup> | 30.93<sup>bc</sup> | 31.53<sup>bc</sup> | 31.02 |
| 20                  | 29.80<sup>ab</sup> | 31.52<sup>bc</sup> | 31.59<sup>bc</sup> | 31.85<sup>bc</sup> | 31.19 |

The data in Table 2 show that the crude fiber content of the paddy ratoon increase with cutting ages. The lowest average of the crude fiber content obtained in the treatment or 14 days cutting ages (28.45%). While the highest average of the crude fiber content obtained in the treatment of cutting ages 35 days (31.69%). The various cutting height was not significantly increasing the crude fiber percentages. Result of variance analyzed showed that the cutting age significantly affected on crude fiber content of paddy ratoon (p<0.05). Further test with Duncan’s multiple range test was conducted to determine the effect of differences between treatments.

The data in Table 2 indicates that the crude fiber content of each treatment show significant difference. In the older age of the cell wall formation process still continues to rise. The cell walls of plants composed of cellulose, hemicellulose and lignin. Which are component of crude fiber. In Addition, the increase production of crude fiber was also caused by the process of lignification are increasing as the cutting ages increase. Research result [4], showed that the production of crude fiber gliricidia increases along with the cutting age. The study [5] showed that the content of the fiber fraction on mulberry plants continues to increasing along with the cutting ages.

3.3. Crude Fat Content of Paddy Ratoon at Various Cutting Ages and Cutting Height

The average of crude fiber of paddy ratoon at various cutting ages and cutting height can be seen in Table 3.

Table 3. Average of Crude Fat of Paddy ratoon at Various Cutting ages and Cutting Height

| Cutting height (cm) | Cutting age (cm) |
|---------------------|------------------|
|                     | 14               | 21    | 28    | 35    |
| 10                  | 1.23<sup>d</sup> | 1.01<sup>c</sup> | 0.97<sup>bc</sup> | 0.79<sup>a</sup> | 1.00 |
| 20                  | 1.06<sup>c</sup> | 0.84<sup>ab</sup> | 1.01<sup>c</sup> | 0.95<sup>bc</sup> | 0.96 |

Crude fat content of the paddy ratoon increased with cutting ages and cutting height (Table 3). The lowest average of the crude fiber content obtained in the treatment 35 days cutting ages (0.86%). While the highest average of the crude fat content obtained in the treatment of cutting ages 14 days (1.15%). All the above are due to the fact that leaves have a higher content of total fat, compared to the stems [6] and that the content of the plants in total fat decreases as the plants mature [7]
4. Conclusion
Cutting age of paddy ratoon as forages that produce optimal nutrient quality is at the age 14 days after cutting, with 10.34% crude protein and 28.45% crude fiber and 1.15% crude fat. Height cutting of paddy ratoon is not significantly affected nutrient quality.

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