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Yield and Nutritional Value of *Brachiaria humidicola* Grass Planted in Thua Thien Hue Province, Vietnam

Bui Van Loi[1*], Nguyen Thi Mui[2], Tran Van Giang[3], Pham Thanh[3] and Nguyen Xuan Ba[2]
[1]Hue university, Hue 530000, Vietnam.
[2]Hue University of Agriculture and Forestry, Hue university, Hue 530000, Vietnam.
[3]Hue University of Education, Hue university, Hue 530000, Vietnam.
*Corresponding author email id: bvanloi@hueuni.edu.vn.

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***Abstract* – *Brachiaria humidicola* is high important and economic value for livestock production in Vietnam. This study aimed to assess the biomass and nutrient production of *B. humidicola* which is first-introduced and cultivated in rice crop land in Thua Thien Hue province, Vietnam. The results showed that *B. humidicola* adapted sucessfully under Hue's environmental conditions by showing the physiological growing traits. Growth and yield of *B. humidicola* were higher in twice crop land than in once crop land. The results showed that survival ratio after 3-month establishment reached more than 96%. Additionally, green matter, dry matter and protein yield were above 12.89, 3.62, 0.98 ton/ ha/ time harvested, respectively. Furthermore, this result showed also that dry matter (%), crude protein, total mineral, insoluble fiber in neutral detergent of *B. humidicola* were 25.36, 6.73, 70.44, 8.66 % dry matter, respectively. Our research results could provide more useful information about new introduced grass off *B. humidicola* planted in rice-crop lands. This might have benefical contributions to local farmers in converting cultivated crops from planting rice to grasses for cattle. In our data will providing science data and experimental facilities for planting new species for climate change adaptor in areas of Thua Thien Hue province**.

***Keywords* – Green Matter Yield, Dry Matter Yield, Protein Content, Cow Feed.**

I. INTRODUCTION

Cow breeding is one of the production sectors that plays a very important role in the development of agricultural and rural economy in Vietnam. However, the biggest obstacle for Crow breeding was that the area of grazing land increasingly narrowed due to many different reasons, so it is difficult to solve the problem of feed for cattle. In order to solve this problem, one of the current priority solutions is the policy of converting inefficient rice-growing areas to growing grass to enhance the value in agricultural production. Whereas, in recent years, the rice production industry is facing many difficulties due to climate change, natural disaster, drought, flood [1].

B. humidicola grass is a new grass and characterized by growth and adaptability to growing conditions in the field. Some localities in Vietnam have planted *B. humidicola* to make food for cattle, such as Binh Dinh and Phu Yen provinces. The results showed that it brought high economic efficiency for those provinces [2]. Particularly, planting this grass species requires low fertiliser-input and produces less CH_4 emission [3], which is universally concerned. However, it has not been particularly evaluated on rice-crop land.

Agricultural land area accounts for 15.4% of total Hue's land, in which rice production accounts for more than 54% [4]. Rice growers fronted many difficulties due to more frequent of natural disasters, storms and floods. However, cattle production is faced with feeding deficit caused by hot climatic conditions or prolonged floods (from September to November) [4]. In recent years, there have been many grass varieties such as VA06, TD58 were planted to solve the problem of feeding shortage, but showing low efficiency because those grasses were able to withstand inundation and inadequate on land sunken [5], alternative grass of *B. humidicola* is experienced

tolerant to flooding by maintaining of leaf chlorophyll content [6] and lower reduction growth under submerged soil compared to other grass species [7]. Hence, understanding extent to which alternative grass being suitable with rice-land is important in the context of solving animal feeding resources and inefficiency in rice production.

Thus, we investigated the production and nutritional value of *B. humidicola* planted in Thua Thien Hue province. A better understanding in growth and nutrient of alternative wetland-grass will help livestock producers have more solutions which are suitable with their farming conditions.

II. Materials and Methods

Experimental Material

B. humidicola grass was imported from Phu Yen province and planted in Thua Thien Hue province, Vietnam.

Methods

Experimental Design

The experiment was completely randomized with two treatments corresponding to two different types of cultivated land: once crop land and twice crop land. Once crop land is the land used for once rice crop and one crop for growing or leaving unused, every year wetland from September to the end of March of the following year, the remaining time is dry. The twice crop land is the land used for both winter-spring and summer-autumn rice crops, the land is completely sunken, the field foot is experimented all year round, about 20 cm or more.

The grass was planted in 5 different sub-areas (5 plots) of each type of soil.

Planting time, cutting and fertilizing regime in 10 plots are the same.

The soil before planting was cleaned of weeds, thoroughly raked, ensured porosity,

B. humidicola was planted in rows and dust 30 cm apart. *B. humidicola* was planted by stem cutting sapling. Stem cutting sapling was cut with 30 cm long, corresponding to about 3-4 eyes on the stem. Transplant three of stem cutting saplings into each other, dig deep into the soil about 7-10 cm in rows, about 20 cm from the original. It then was tranfered into the prepared soil with 7-10 cm in deep-digs, and 20 cm between 2 adjacent plants.

The harvesting was three times. The first harvesting was at 60 days after planting. Next harvesting was at 35 days after last time harvesting. The grass was cut at around 3-5 cm above the ground. The experimental sites were removed weeds and the grass is supplied fertilizer after each harvesting time.

Indicators and Monitoring Methods

Survival rate (%): The number of live tillers/plant was counted after 20-days establishment and counted again just before cutting.

Leaf length (cm) OR plant height (cm): This data was collected just prior cutting and measured as the distance from the soil surface to the tip of the longest expanded leaf.

Average Height of Plant: Measure at Harvest Time.

Number of live tillers: is the number of branches that can be counted in a growth phase on the initial branch number before. The number of branches includes the number of new branches that grow from the root and the br-

-anches that continue to grow.

Green matter yield (GMY): The grass of each plot was cut at 5-10cm from the ground on no rainy time and weighted immediately to collect total green biomass. It was then estimated to total dry yield as following calculation.

Dry matter yield (DMY) = GMY * ratio of dry matter

Dry matter (DM %) was determined by drying material at 105°C until constant mass.

Protein yield (PY) = DMY * Ratio protein in DM

Chemical Analysis

B. humidicola samples were analysed for DM%, crude protein (CP%), total mineral (Ash%) according to AOAC (1990) [8]; Neutral detergent fibre (NDF) was determined by Van et al. (1991) [9], at the Laboratory, Analytical Center of the Department of Animal Husbandry, University of Agriculture and Forestry, Hue University.

Statistical Analysis

Analysis of variance and Turkey's multiple range in SPSS 15.0 software test was used for comparison among treatment means.

III. Results and Discussion

Growth Ability of B. humidicola was planted in Thua Thien Hue province, Vietnam.

Survival rate, leaf length and average height of plant of *B. humidicola* planted in Thua Thien Hue differed significantly in 2 study sites. A Turkey's test showed that those growth indicators were significantly higher in the twice crop land than in once crop land (Table 1). Whereas, number of tillers not differed between 2 places (Table 1).

Survival rate of *B. humidicola* in this research was higher comparing with previously study of Hoang and Tran (2012) [10]. In which of result, ratio of live bushes of *B. Mulato* II, *Panicum,* Fabaceae tree was 91,1 %, 92 %, 94 %, respectively [10]. In addition, our result was similarly with Nguyen (2017) [11]. This of results showed that *B. humidicola* planting in flooding conditions was highest compering other grasses [11].

Additionally, early study showed that different crop lands were efficient in highest tree in bush and height of bush of *B. humidicola*. Study conducted by Nguyen (2017), the author planted *B. humidicola* in Quang Binh province, showed that the highest leaf of this grass in twice crop land was 74 cm which was higher than 66.5 cm in once crop land. Similarly, average height of grass was also in twice crop land higher than in once crop land with 74 cm and 72 cm, respectively [11].

Yield of B. humidicola was planted in Thua Thien Hue province, Vietnam.

Comparing green matter, dry matter and protein yields of *B. humidicola* among different treatments showed those were significantly differences between treatments (Table 2). A Duncan's test showed that this average length of shoot regenerations those yields were both higher in twice crop land than in once crop land (Table 2). Similarly, Nguyen (2017) reported that yield indicators such as green, dry matter and protein of *B. humidicola* planting in

Quang Binh provice were higher in in twice crop land than in once crop land. Besides, those yield values of *B. humidicola* in this research comparing with our study were the same [11].

Chemical Compounds and Nutritional Value B. humidicola were planted in Thua Thien Hue province, Vietnam.

There is no significant difference in terms of chemical composition and nutritional value of this studied grass (Table 3). Nguyen et al. (2010) and Nguyen et al. (2010), protein content of large leaf citronella grass small leaf citronella grass, *Paspalum atratum*, Setaria grass were 11,5; 10,5; 10,8; 11,6; 11,5 %, respectively [12] [13]. Additionally, Hoang and Tran (2012) repoted that protein content of *B. Mulato* II grass was 11.3 % [10]. So, our result DM (%) was higher, however, protein content was contrary comparing with those of research.

IV. CONCLUSIONS

In our research, we investigated *B. humidicola* planting on crop land in Thua Thien Hue province, Vietnam. The results showed that growth, yield and chemical compounds, nutrition of *B. humidicola* were same comparing with previous results, in which, those of indicators were significantly higher in twice crop land than in once crop land, except nutritional indicators. This result suggested that *B. humidicola* may be planted in Thua Thien Hue province for cattle feeding.

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Table 1. Effect of Different Crop Land on Growth of *B. humidicola* was Planted in Thua Thien Hue Province, Vietnam.

Treatments / Growth Indicators	Once crop land	Twice crop land	P
Ratio of live bushes (%)	96 ± 0.02b	98 ± 0.01a	0.007
Highest tree in bushes (cm)	84.98 ± 0.08b	92.60 ± 0.03a	0.000

Growth Indicators \ Treatments	Once crop land	Twice crop land	P
Height of bushes (cm)	66.80 ± 0.05b	71.52 ± 0.03a	0.002
Number of branches (cm)	36.70 ± 0.22a	41.30 ± 0.13a	0.051

Lower-case letters in a cell show results of significant differences between treatments using Duncan's multiple range test ($p < 0.05$). The same letters within each column and each row indicates no statistically significant differences. The values represent the mean (± SE) of three independent experiments.

Table 2. Effect of Different Crop Land on Yield of *B. humidicola* was Planted in Thua Thien Hue Province, Vietnam.

Yield Indicators (Ton/ha/harvested time) \ Treatments	Once crop land	Twice crop land	P
Green matter	12.89 ± 0.12b	13,83 ± 0.11a	0.047
Dry matter	3.26 ± 0.08b	3,65 ± 0.02a	0.004
Protein	0.98 ± 0.01b	1,04 ± 0.01a	0.000

Lower-case letters in a cell show results of significant differences between treatments using Duncan's multiple range test ($p < 0.05$). The values represent the mean (± SE) of three independent experiment.

Table 3. Effect of Different Crop Land on Chemical Compounds and Nutritional Value of *B. humidicola* was Planted in Thua Thien Hue Province, Vietnam.

Indicators \ Treatments	Once crop land	Twice crop land	P
DM (%)	26.23 ± 0,50a	25.38 ± 0,70a	0.087
CP (%)	6.92 ± 0,55a	6.73 ± 0,61a	0.064
NDF (% DM)	70.97 ± 2.34a	70.44 ± 2.19a	0.125
Ash (% DM)	8.73 ± 0.82a	8,66 ± 0.31a	0.118

The same letters within each column and each row indicates no statistically significant differences ($p > 0.05$). The values represent the mean (± SE) of three independent experiments.

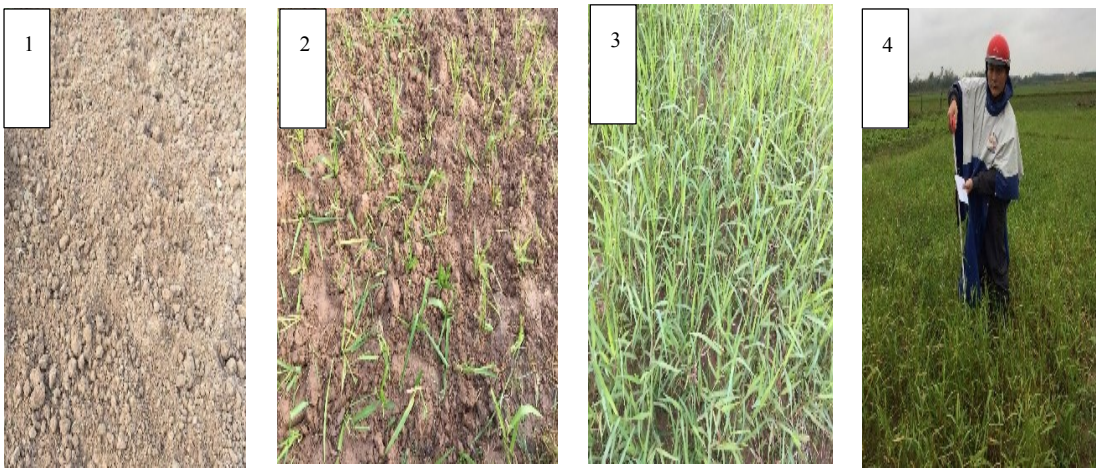

Fig. 1. Some photos of B. humidicola were planted in Thua Thien Hue province.

1. Land preparation ; 2. Planting B. humidicola ; 3. 30 days after planting; 4. Data collection.

AUTHORS PROFILE'

Author 1:
Dr. Bui Van Loi
Undergraduate degree (2000), Master degree (2007) and Doctoral (2014) in Hue University of Agriculture and Forestry, Vietnam. Lecturer at the Biology Department, Hue University of Education, Vietnam. Major scientific fields animal nutrition and feed technology.

Author 2:
Dr. Tran Van Giang
Undergraduate degree (2003) and Master degree (2008) in Ha Noi University of Education, Vietnam. Doctoral (2014) in Montpellier University 2, France. Lecturer at the Biology Department, Hue University of Education, Vietnam. Major scientific fields, Biotechnology of animal.

Author 3:
Dr. Pham Thanh
Undergraduate degree (2006) and Master degree (2009) in Hue University of Agriculture and Forestry, Vietnam. Doctoral (2015) in Northwest A&F University, Shaanxi, China. Lecturer at the Biology Department, Hue University of Education, Vietnam. Major scientific fields Medicinal plant, Biotechnology, Forest Ecology, Weed Control, and Horticulture.