Selected Dominance Plant Species for Increasing Availability Production of Cattle Feed

Roni Yulianto[*], Amam, *Pradiptya* Ayu Harsita, and *Mochammad* Wildan Jadmiko

Department of Animal Husbandry, Faculty of Agriculture, Universitas of Jember.Jl. Kalimantan 37 – Kampus Tegal Boto Jember 68121, East Java, Indonesia

Abstract. Production and availability of plant species have an essential role as cattle feed. Feed supplies for animal depend on plant species to produce more preferred types of quantity and quality. The purpose of this study was to select dominance of plant species to increasing productivity and develop grazing area. The study was conducted at field farming with large area ± 1.2 ha, consists of 6 cows, and 10 goats in Bondowoso. Identification of species composition was conducted following method Braun-Blanquet scale using a line transect of 0-70 m at every 10 m interval to determine the adaptation of plant species. The purpose of this study was to determine the population of dominance plant species (%), and as information for the conservation of land areas to increase the availability of animal feed in Jember, East Java. The number of plant species as animal feed were 22, consist of 12 types of grass, 6 types of legumes, and 4 types of weeds. The population of grass species more than 75% consisted of *Axonopus compessus* (85.71%), *Para Grass* (82.14%), *Bracharia decumben* (75.00%), *Kyllinga Brevifolia* (75.00%), and clover was *Centrosema Molle* (78.57%). The comparison frequency between plant species consists of grass 57.77%, legumes 22.31%, and weeds 19.92%. The observation diversity of plant height was 17.16 cm, vegetation cover rate was 71%. The findings of this study suggest that *Axonopus Compessus*, *Para Grass*, *Bracharia Decumben*, *Kyllinga Brevifolia*, and *Centrosema Molle* are the dominance of plant species could increase production, and availability cattle feed in the grazing area.

1.INTRODUCTION

The community of plant species has an essential of plants and animals feed. Feed supplies for livestock depend on grasslands, and grass species to produce more preferred types.At the same time, the balance of the grass ecosystem and enrichment of soil nutrients from manure can be used as fertilizer for grass. In various pastures, and the integration of plant species, because of their complexity, plant-animal interactions are considered in various processes that occurat different spatial and temporal scales [1,2].

The level of ecosystem regulation depends on diversity of plant species in the area. The management of grassland areas has a significant impact on nature conservation and landscape integrity. The livestock production is dependent on both plant species and genetic diversity of a grazing area. The variety of the population of plant ecology outside of animal feed production includes recycling of nutrients, climate change, and detoxification of hazardo us chemicals [3].

To determine a grazing area should be supported by the availability of feed, especially in the heterogeneous environments between plant species and cattle. In medium intensity farming areas, the productivity of grazing areas requires management for biodiversity consistent and development conservation. Determination plant species of feed cattle in rubber plantation land based on frequency of plant species that gives decision of what and how much to eat under conditions where are widely controlled plant species as cattle feed. The choice of test has frequently used in ecological research [4], but fewer used to obtain new insights in to aspect of ruminant nutrients of grazing area. At the same time, soil nutrient enrichment, and grass ecosystem balance from their feces could beused as fertilizer for the soil on the grazing area.

Fertilization and transport of nutrients excreta is also significant for fertilizer and adjacent biocenosis which maybe used by herbivores for feeding. The assumed that wild plants are adaptable to herbivores since plant species evolved together. The structural and qualitative factors, such as nutrient contents, digestibility, and plant morphology interact with the choice of animals [5,6] and their behavior [7]. Novelty of this study was to select dominace plant species could adapt in grazing area as feed cattle. Appearance frequency of various species gived impacts on plant community, plant height, vegetation cover rate, and species number for availability as feed cattle in grazing area.

---

[*] Corresponding author: roniyulianto99@gmail.com

2. MATERIALS AND METHODS

2.1 Study site

The study was conducted at field farming with large area ± 1.2 ha, consists of 6 cows, and 10 goats in Bondowoso East Java Province, Indonesia. The topography of the Bondowoso from an altitude 113°48′10″ - 113°48′26″ BT dan 7°50′10″ - 7°56′41″ LS.

Figure 1. The study area in Bondowoso East Java Province, Indonesia

2.2 Vegetation analysis

Identification of species composition was conducted 2018 following method Braun-Blanquet scale was used to determine the adaptation of plant species. Assessment of dominant plant species was determined by comparing the abundance and appearance of dominant plant species. The phyto sociological attributes of plant species were studied by using a line transect of 0-70 m at every 10 m interval. Specimens of each plant species were recorded in a plot with an area of 1×1 m quadrate (n = 8). Of which, one-meter square makes 16 parts of 0.25×0.25 m sub-quadrate [8].

2.3 Data analysis

The vegetation data were quantitatively analyzed for density, abundance, and frequency as described in [8]. Data were analyzed to determine the appearance population of the frequency of plant species (%), plant height (cm), vegetation cover rate (%) computed following a method of reporting in [9]. The relative frequency of theseparameterswascalculated as noted in [10].

3. RESULT AND DISCUSSION

3.1 Diversity frequency of various plant species (%)

Diversity of plant species of the community was determined by species to grow and develop in such an environment [11]. Grass, clover, and weed species frequency is one characteristic of functional species group community. It is a mechanism for generating stability. Generally, frequency of plant species in the

observation was 13 grass, 8 clovers, and 4 weed (**Table 1**).

Table 1. Diversity of the plant species (%)

Nama Spesies	Spesies Group	Total of Plant Species	Persentage of Plant Species (%)
Axonopus Compessus	Grass	24	85.71
Para Grass	Grass	23	82.14
Bracharia Decumben	Grass	21	75
Kyllinga Brevifolia	Grass	21	75
Cynodon Dactylon	Grass	20	71.43
Brachiaria Mutica	Grass	11	39.29
Echinochloa Polystachya	Grass	6	21.43
Cynodon Aethiopicus	Grass	5	17.86
Chlorisgayana	Grass	5	17.86
Imperatacyndrica	Grass	4	14.29
Cyperusrotundus	Grass	3	10.71
Eleusineindica	Grass	2	7.14
Total	**Grass**	**145**	**57.77**
Centrosemamolle	Clover	22	78.57
Colopogonium Mucunoides	Clover	13	46.43
StylosanthesHumilis	Clover	7	25
Macroptilium Lathyroides	Clover	6	21.43
Mimosa Pudica	Clover	5	17.86
White Clover	Clover	3	10.71
Total	**Clover**	**56**	**22.31**
Neonotonia Wightii	Weed	16	57.14
Pueraria Phaseoloides	Weed	14	50
Ageratum	Weed	12	42.86
Stachytarphetasp	Weed	8	28.57
Total	**Weed**	**50**	**19.92**
Total all species		**251**	**100**

Observations mirrored to present study was also mentioned by [12]. In the rubber plantation land, grass is high if compare than clover and weed, because grass could adapt in plantation land, it is mean grass could use for feed cattle. The maximum occurrence of species could increase the productivity of plant species, due to the availability by rains and other environmental factors.

The number of plant species as feed cattle were 22, consist of 12 types of grass, 6 types of legumes, and 4 types of weeds. The population of grass species more than 75% consisted of *Axonopus Compessus* (85.71%), *Para Grass* (82.14%), *Bracharia Decumben* (75.00%), *Kyllinga Brevifolia* (75.00%), and clover was *Centrosema Molle* (78.57%). The comparison frequency between plant species consists of grass 57.77%, legumes 22.31%, and weeds 19.92%. The finding dominance of plant species could be used to development and conservation plant species to increasing productivity and quality as feed cattle for future.

3.2 Plant Height (cm)

Plant height of diversity plant species shows in Figure 2. Ranging from 9.31 cm to 22.69 cm, with an average plant height of 17.16 cm. The population of plant density, cover, biomass per unit area and plant height, isused to measure abundance plant dominance, species composition and spatial patterns of vegetation in different plant communities [13].
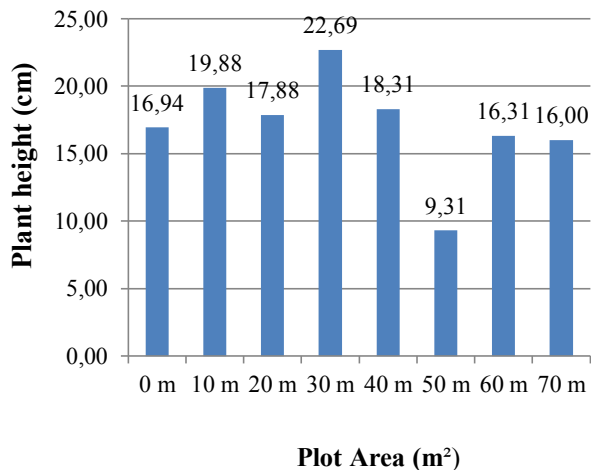
Figure 2. Plant Height of Plant Species (cm)

The result has shown that plant height affects species diversity, spatial heterogeneity, and vegetation structure [14]. The frequency distribution of density, cover, and biomass of plants as well as plant height are commonly used as indicators to describe composition of plant species and spatial patterns of vegetation in different plant communities [15].
The stronger photosynthesis may positively increase plant growth. Plant height depends on different kind of plant species presenting in grazing area; thus the management and production of plant height are essential to increase the abundance of plant species for feed cattle. Species that are either tolerated or adapted to grazing area, and can react with compensatory growth, or even increasing productivity and availability as feed cattle.

The plant heightgives distribution to the density, cover, and biomass of plants as well as commonly used as indicators to describe diversity of species composition and spatial patterns [15]. Plant species tolerated or adapted to grazing (e.g., low palatability, adapted growth form) can react with compen satory growth, or even increasing productivity [16], and they given contribution for availability feed cattle in the grazing area.

3.3. Vegetation Cover Rate (%)

In ecosystem Vegetation cover rate has been used to estimate the monitoring of vegetation growing in a particular area (Figure 3).
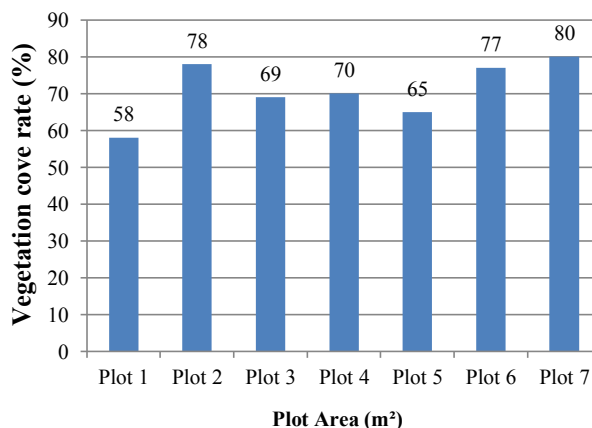
Figure 3.Vegetation Cover Rate (%)

The result of Figure 3 shows vegetation cover rate ranges from 58% to 80% with an average of 71%. The level of vegetation cover of plant species as fodderis moderate, because the average percentage is 77%, it is expected to renovate land for animal feed to increase the population of dominance plant species, because the dominant plant species can survive with the original environment as well as contribute to the availability of animal feed.

Most plant species show dominance, thus often due to events varying between temperature, sufficient humidity, and micro nutrients [17]. Although there are more exotic species that appear, in this case, it is necessary to select plant species that can contribute as animal feed [18].

4. CONCLUSION

The number of plant species as animal feed were 22, consist of 12 types of grass, 6 types of legumes, and 4 types of weeds. The population of grass species more than 75% consisted of *Axonopus Compessus* (85.71%), *Para Grass* (82.14%), *Bracharia Decumben* (75.00%), *Kyllinga Brevifolia* (75.00%), and clover was *Centrosema Molle* (78.57%). The comparison frequency between plant species consists of grass 57.77%, legumes 22.31%, and weeds 19.92%. The observation diversity of plant height was 17.16 cm, vegetation cover rate was 71%.

The findings of dominance plant species in Bondowoso suggest that *Axonopus Compessus, Para grass, Bracharia Decumben, Kyllinga Brevifolia*, and *Centrosema Molle* could increase production, and availability feed cattle in the grazing area. The number of plant species was 22, consist of 12 types of grass, 6 types of legumes, and 4 types of weeds. The population of grasss pecies more than 75% consisted of *Axonopus Compessus* (85.71%), *Para grass* (82.14%), *Bracharia Decumben* (75.00%), *Kyllinga Brevifolia* (75.00%), and clover was *Centrosema Molle* (78.57%). The comparison frequency between plant species consists of grass 57.77%, legumes 22.31%, and weeds 19.92%. The observation diversity of plant height was 19.08 cm, vegetation cover rate was 66%. The findings of this

study suggest that *Axonopus Compessus, Para Grass, Bracharia Decumben, Kyllinga Brevifolia*, and *Centrosema Molle* are the dominance of plant species could increase production and availability as feed cattle.

REFERENCES

1. M.D. Bejarano, C. Nilson, F.C. Agular. and D.M. Mateos. Riparian plant guilds become simpler and most likely fewer following flow regulation. – J. Appl. Ecol. **55**: 365–376 (2018).
2. L. Astigaraga, Peyraud, and L Delaby. Effect of nitrogen fertilizer rate and protein supplementation on the herbage intake and the nitrogen balance of grazing dairy cows, Animal Res. **4**: 279-293 (2002).
3. M.A. Altieri. Biodiversity and pest management in agroecosystems, Howarth Press, New York (1994).
4. E.A. Felnagle, J.J. Barkei, H. Park, A.M. Podevels, M.D Mc. Mahon, D.W Drott. Too close for comfort: Effect of trap spacing distance and pattern on statistical inference of behavioral choice test in the field, Entomologia Experimentalis et Applicata. **136**: 66-71 (2014).
5. R.J. Orr, B.A. Griffith, V.J. Rivero, M.R.F. Lee. Livestock Performance for Sheep and Cattle Grazing Lowland Permanent Pasture: Benchmarking Potential of Forage-Based Systems . Agronomy. **9** (2), p. 101 (2019).
6. A.J. Rook. Effect of long-term change in relative resource availability on dietary preference of grazing sheep for parenial ryegrass and white clover, Grass Forage Science **57**: 54–60 (2002).
7. M..Meisser. Foraging behavior and occupation pattern of beef cows on a heterogeneous pasture in the Swiss Alp. Czech Journal of Animal Science **50**: 84–95 (2014).
8. J. Braun-Blanquet. Pflanzensoziologie: Grundzüge der Vegetationskunde (In German), 3te Aufl. Spring-Verlag, Wien 865 (1964).
9. V.J. Rivero, R.J. Orr, J. Coumbe, B. Willson, J. Evans, M.R.F. Lee. Replacing a permanent pasture and its effect in the first year on a commercial dairy farm. Agro Sur. **46** (1), pp. 3-12 (2018).
10. D.A. Beaumont, B.A. Griffith, R.M. Dunn, R.J. Orr, V.J. Rivero, B. Woodcock, R. Pywell, J.R.B Tallowin. Creating productive diverse grassland for multi-ecosystem services: an example of agri-environment schemes policies driven by science in United Kingdom. Agro Sur. **46** (2), pp. 3-5 (2018).
11. T. Takahashi, P. Harris, M.S.A. Blackwell, L.M Cardenas, A.L. Collins, J.A.J. Dungait, J.M.B, Hawkins, T.H. Misselbrook, G.A. McAuliffe, J.N. McFadzean, P.J. Murray, R.J. Orr, M.J. Rivero, L Wu, M.R.F. Lee. Roles of instrumented farm-scale trials in trade-off assessments of pasture-based ruminant production systems. Animal. **12** (8), pp. 1766-1776 (2018).
12. J. Sharma. Phosphorus solubilizing capabilities of microorganisms isolated from grapevine rhizophere and non rhizhosphere soil, J. Eco-Friendly Agric. **7**: 38-42 (2012).
13. J. Chen, M. Shiyomi, and Y Yamamura. Frequency distribution model for spatial patterns of vegetation abundance, Ecol. Mod. **211**: 403-410 (2008).
14. M.J. Metzger. The ATEAM vulnerability mapping tool, Quantitative approaches in systems analysis no. 27, CD-ROM publication, Office C.T. de Wit Graduate School for Production Ecology and Resource Conservation (PE and RC), Wagenigen, the Netherlands a climatic stratification of the environment of Europe (2004).
15. M. Shiyomi J. Chen, and Y. Yamamura. Distribution model of frequency for spatial patterns of vegetation abundance, Ecol. Mod **221**: 203-210 (2008).
16. A.O. Eludoyin, B. Griffith, R.J. Orr, R Bol, T.A. Quine, R.E. Brazier. An evaluation of the hysteresis in chemical concentration–discharge (C–Q) relationships from drained, intensively managed grasslands in southwest England. Hydrological Sciences Journal. **62** (8), pp. 1243-1254 (2017).
17. D Tillman. The ecological consequences of change in biodiversity a search for general principles, Ecology **80**: 1455-1474 (1999).
18. P. Harris, J.A.J. Dungait, B.A. Griffith, A. Shepherd, H.M. Sint, M.S.A. Blackwell, L.M. Cardenas, A.L. Collins, K.W.T. Goulding, M.R.F. Lee, R.J. Orr. The North Wyke Farm Platform, a UK national capability for research into sustainability of temperate agricultural grassland management **50**: 30-33. Spring-Verlag (2015).