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DIVERSITY AND BIOMASS PRODUCTION OF FERTILIZER STIMULATED PASTURE RIPARIAN WETLAND ECOSYSTEM IN DRY SEASON

ABSTRACT: The swamp ecosystem has long served as a home to buffalo, cows, and other swamp animals. In order to preserve plant diversity and guarantee the feed supply, swamp conservation and restoration projects are crucial. The study was conducted from August 2021 to July 2022 in Rambutan Village (-3.123910, 104.937812), Indonesia. The stimulants used in this research were buffalo manure, NPK fertilizer and Urea fertilizer. During dry season, the stimulant solution was once uniformly applied on the plots. Soil pH for all plots were comparatively constant (4-6) during the research, while water pH varied from 3.7-6.5 and water level 0-83 cm over 8 months. It was found that plots stimulated with manure, NPK, and urea fertilizer resulted in 13, 6, and 3 species, respectively. *Hymenachne amplexicaulis*, *Cyperus digitatus*, and *Sacciolepis interrupta* had the highest SDR values among the species identified in all plots. The yearly biomass generated by manure, NPK and Urea were 8.97 kg/m^2, 3.01 kg/m^2, and 2.08 kg/m^2, in respectively. Stimulants derived from buffalo manure promote faster growth and greater diversity.
Keywords: diversity, forage grass, inland swamp

DIVERSIDADE E PRODUÇÃO DE BIOMASSA DE PASTAGENS ESTIMULADAS POR FERTILIZANTE ECOSSISTEMA DE ZONAS ÚMIDAS RIBEIRINHAS NA ESTAÇÃO SECA

RESUMO: O ecossistema do pântano há muito que serve de lar para búfalos, vacas e outros animais do pântano. Para preservar a diversidade vegetal e garantir o fornecimento de rações, os projetos de conservação e restauro de zonas úmidas são cruciais. O estudo foi realizado de agosto de 2021 a julho de 2022 na aldeia de Rambutan (-3.123910, 104.937812), Indonésia. Os estimulantes utilizados nesta investigação foram o estrume de búfala, o fertilizante NPK e a Ureia. Durante a estação seca, a solução estimulante foi aplicada uniformemente nas parcelas. O pH do solo para todas as parcelas foi comparativamente constante (4-6) durante o levantamento, enquanto o pH da água variou de 3,7-6,5 e o nível da água de 0-83 cm ao longo de 8 meses. Verificou-se que as parcelas estimuladas com estrume, NPK e adubo de ureia resultaram em 13, 6 e 3 espécies, respectivamente. *Hymenachne amplexicaulism*, *Cyperus digitatus* e *Sacciolepis interrupta* apresentaram os valores mais elevados de SDR entre as espécies identificadas em todas as parcelas. A biomassa anual gerada pelo estrume, NPK e Ureia foi de 8,97 kg/m², 3,01 kg/m² e 2,08 kg/m², respectivamente. Os estimulantes derivados do estrume de búfalo promovem um crescimento mais rápido e uma maior diversidade.
Palavras-chave: diversidade, erva forrageira, pântano interior

1. INTRODUCTION

Wetlands known as swamps provide a special kind of agroecosystem when water from rivers or lakes overflows, either occasionally or continually, for three to six months out of the year, at a depth that ranges from 50 to more than 150 cm (Alwi & Tapakrisnanto, 2017). The water levels fluctuate according to the seasons, becoming progressively lower during the dry season and higher or even flooded during the rainy season.

Since large-scale plantations developed, swamps have undergone hydrological changes that have altered the pattern of height and duration of water inundation (Ma et al., 2019). The types and growth of different plants are greatly influenced by the flooding and drying of water in swamp areas; a limited variety of plants were found in the dry season (Afriani et al., 2023). The changes of flooding duration from up to six months to only one month in swamp area during rainy sesason has resulted in the dominance of Imperata cylindrica (Ikhsan et al., 2020). The long dry season is also a factor causing few plants and grass to be able to live in swamp areas.

Naturally, plant species in swamps remain basically unchanged year after year. Swamp environments are home to swamp buffalo and other cattle because they are abundant with grass species like Digitaria sp. and Alternanthera sp. (Naemah et al., 2020). The type and quality of forage grass greatly influences livestock feed (Quintero-Anzueta et al., 2021). Thus, the swamp ecosystem becomes a contributor and supplier of feed for buffalo.

The length and depth of flooding are affected by changes in land use and climatic change, which affects the dominance of plant community species (Ardiansyah et al., 2021; Garssen et al., 2015). Important species in the ecology of forage grasslands are declining in line with the shift in species dominance (Barbosa da Silva et al., 2016). For this reason, maintaining plant diversity and guaranteeing the supply of animal feed depend heavily on the conservation and rehabilitation of swamp area. Replanting native flora and managing swamp land sustainably are two of these initiatives (Badan Penelitian dan Pengembangan Pertanian, 2014). For swamp vegetation to continue providing animal feed, technological intervention is required. There has been research on regrowing native species in swamp areas (Lampela et al., 2017; Wahyudi & Triyadi, 2019; Wibisono & Dohong, 2017). There's no special method for cultivating native grass in South Sumatra's swamp areas. Theoretically, the types and population of grass can be increased by incorporating organic material from animal manure into plant cultivation (Little et al., 2015). Based on this concept, the addition of fertilizer from buffalo dung in swamp land can regrow plants in the swamp. In addition, the condition of the swamp land which is poor in nutrients and dry during the dry season is thought to be the cause of the limited ability of grass to grow. Through the addition of inorganic fertilizer, it is thought to be able to stimulate the growth of natural plants and grass that already exist there.

For this reason, knowledge on the potential of inorganic fertilizers to promote plant diversity as well as information on the revegetation of animal waste-derived plant diversity are essential for reforestation in wetland areas during the dry season.

2. MATERIAL AND METHODS

2.1. Study Area

The study was carried out in Rambutan Village (-3.123910, 104.937812), Banyuasin Regency, South Sumatra Province, Indonesian from August 2021 to July 2022 and August 2021. The study area was a buffalo pasture wetland environment on a shallow swampland. The sample plots were positioned at a distance of roughly 10 meters apart, in parallel positions, and about 100 meters from the swamp's edge. The plot size was 4 x 4 meter and surrounded by 1.2-meter-tall wooden fences.

2.2. Fertilizer stimulant application

Inorganic (NPK and urea fertilizers) and organic (fertilizer made from buffalo manure) were applied as the treatment. The dosages of each treatment plot consisted of 12 kg of buffalo manure (10 tons/ha), 2.4 kg of NPK (200 kg NPK/ha), and 2.4 kg of urea (200 kg Urea/ha). Each treatment substance then was dilluted into 50 liters of water. The stimulant application was carried out in the afternoon by equally scattering them on the soil surface. All treatment plots were also left unwatered and without any additional fertilizers given. Three different plots were identified by different names: the Manure Plot, NPK Plot, and Urea Plot.

2.3. Soil, waterlogging and agroclimate observations

A digital soil pH meter of Hanna H199121, was used to monitor soil pH prior to stimulants application on each plot. Swamp water pH was also measured with a digital pH meter of AMTAST KL6022. Water level was also measured directly in the plots. The measurements were made on the plot every month. While the data on regional rainfall and wetdays were provided by Meteorology, Climatology, and Geophysics Agency.

2.4. Data Analysis

The data were analyzed using the Student's t-test and the results were presented in tabulation and histogram form. The measurement of grass coverage percentage was carried at 2 and 6 weeks after application. Plant stems or clumps were cut approximately 5 cm above the ground and weighed using a scale to collect data of each type of plant from each plot. The samplings were carried out three times, in November 2021, March 2022 and July 2022.

Direct observations to identify the existing plant species and families were made based on Plants of the World Online (POWO, 2024). From each plot, the biomass were collected and sorted by the type of plant. To obtain the Summed Dominance Ratio (SDR) value, the frequency and dominance of plants were determined for each plot (Amarullah et al., 2017). The SDR value indicates the role level of the species in the sample plot which is a relative comparison of the Importance Value Index (IVI) value of the weed type. The stronger the role in the plant community, the higher the SDR value, which ranges from 1 to 100%.

$$\text{Species Frequency (F)} = \frac{\text{Number of plots where species found}}{\text{Total number of plots}}$$

$$\text{Species Dominancy (D)} = \frac{\text{The coverage area of the species found}}{\text{Total plots area}}$$

$$\text{Relative Frequency (RF) or Relative Dominancy (RD)}$$
$$= \frac{\text{F or D}}{\text{Total of F or D from all species}} \times 100\%$$

$$\text{Important Value Index (IVI)} = \text{RF} + \text{RD}$$

$$\text{Summed Dominance Ratio (SDR)} = \frac{\text{IVI}}{\text{Number of relative variables}}$$

3. RESULTS

3.1. Agroclimate, soil pH, and waterlogging in swamp pasture land

The study's initial four months of rainfall data indicated that the amount of precipitation was still low, at less than 100 mm/month. However, from August 2021 to July 2022, the amount of precipitation was already classed as high and was accompanied by a high number of wet days (Table 1).

Table 1. Precipitation and number of wet days at the research location for one year

Month	Year	Precipitation (mm)	Wet days (days)
August		0	2
September		15	3
October	2021	76	5
November		68	9
December		242	27
Total 2021		401	46
January		114	25
February		298	22
March		367	18
April	2022	396	24
May		264	20
June		133	19
July		17	16
Total 2022		1589	144
Yearly total		1990	190

Source: Indonesian Meteorological, Climatological and Geophysical Agency (Analyzed data).

One month after the treatment was applied, swamp land inundation started due to heavy rainfall in the swamp location and an increase in the Komering River's water level. Early in September, the swamp land's water level started to rise. It continued to rise until it reached the first and second peaks of the inundation in December 2021 and March 2022, respectively, at 60 and 82 cm, respectively. After that, the inundation in the lowland swamp land gradually decreased (Figure 1).

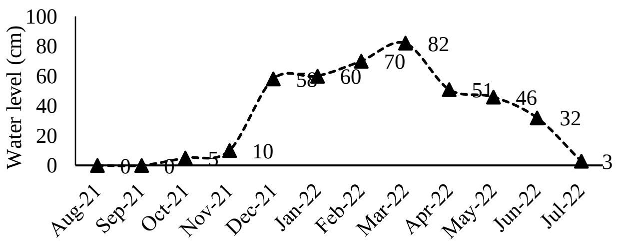


Figure 1. Monthly swamp water level during research periods

Swamp water pH levels appear to follow a pattern of high inundation: all treatment plots have higher pH levels in response to increased water inundation. The water pH reached a peak of 6.5 when the water inundation reached 70 cm, which occurred in February 2022, regardless of the high inundation was less than 10 cm (Figure 2).

All treatment plots had a rise in soil pH that correlated with an increase in water pH, and all treatment plots saw a gradual reduction in soil pH that correlated with a decline in swamp water level (Figure 3).

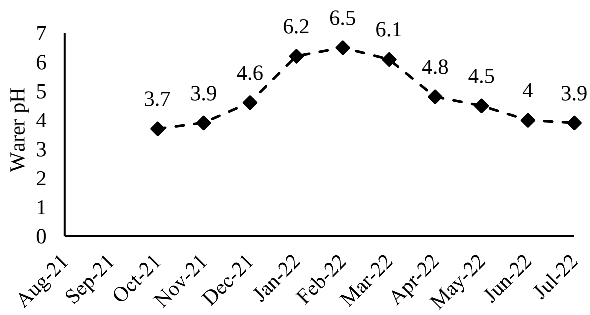


Figure 2. Monthly swamp water pH

Table 3. Plant species and water level based on harvest time

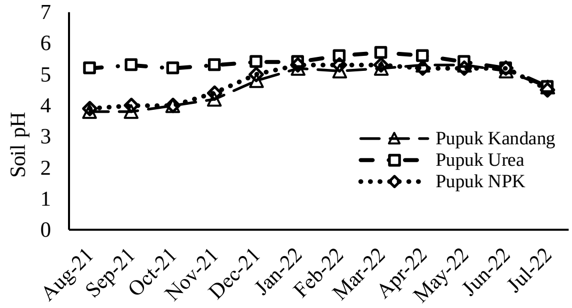


Figure 3. Monthly soil pH

3.2. Grass coverage area under various treatments

It appears that the growth of different grasses was encouraged more in the first two weeks following the application of buffalo manure than in the plots treated with NPK and urea fertilizers. The surface area of the grass-covered field was approximately 1.5 m^2/12 m^2 when manure was applied, but after six weeks of application, it increased to 6.5 m^2/12 m^2, making it wider than the plots treated with NPK and urea fertilizers (Figure 4).

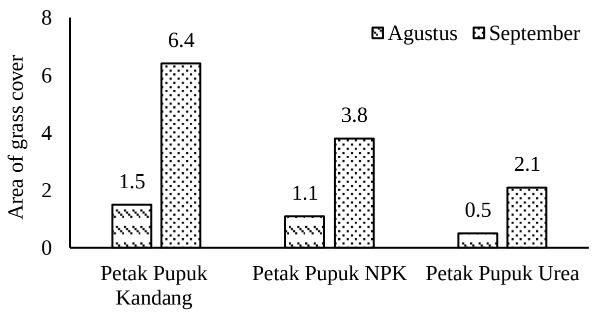


Figure 4. The surface area of land covered with grass from each treatment plot in swampland

3.3. Type of grass from each harvest for each treatment

Two species of grass, *Hymenachne acutigluma* and *Digitaria* sp., were found in the manure sampling plot; these same species were also present in the NPK-treated plot (Table 2).

Table 2. Types of plants from each plot that grew on the land prior to waterlogging

No	Manure	NPK	Urea
1	*Digitaria ciliaris*	*Digitaria longiflora*	*Cynodon dactylon*
2	*Hymenachne acutigluma*		

There were variations in the kinds of grass that grew when forage grass was harvested three times a year, every four months. With a water level of 82 cm, the manure plot had the highest number of grass species—up to 9—during the second harvest. In the NPK and urea fertilizer treatments, the *Cyperus difformis* species emerged when the water level shrank to just 3 cm during the third harvest (Table 3).

Harvest time	Treatment Plots			Water level (cm)
	Manure	NPK	Urea	
Harvest-1 (November 2021)	*Digitaria ciliaris; Alternanthera philoxeroides; Hymenachne acutigluma*	*Digitaria longiflora; Hymenachne acutigluma*	*Saciolepis interupta; Cynodon dactylon*	10
Total	3	2	2	
Harvest-2 (March 2022)	*Digitaria ciliaris; Heliotropium indicum; Cyperus digitatus; Cynodon dactylon; Digitaria ciliaris; Echinocloa colona; Hymenachne amplexicaulis; Leersia hexandra; Saciolepis interrupta*	*Hymenachne acutigluma; Saciolepis interupta*	*Saciolepis interupta; Cynodon dactylon*	82
Total	*9*	*2*	*2*	
Harvest-3 (July 2022)	*Leersia hexandra; Saciolepis interrupta; Ludwigia octovalvis; Ludwigia adscendens; Oxalis barrelieri; Hedyotis corymbosa*	*Hymenachne acutigluma; Alternanthera philoxeroides; Hedyotis corymbosa; Cyperus difformis*	*Saciolepis interupta; Cynodon dactylon; Cyperus difformis*	3
Total	*6*	*4*	*3*	

Table 4. Plant species in various fertilizer treatment plots in lowland swamps

No.	Species	Local name	Family	Plot		
				1	2	3
1	*Alternanthera philoxeroides*	Gulma buaya	Amaranthaceae	+	+	-
2	*Alternanthera sessilis*	Keremah	Amaranthaceae	+	-	-
3	*Heliotropium indicum*	Kumpai tikus	Boranginaceae	+	-	-
4	*Cyperus digitatus*	Rumput Musang	Cyperaceae	+	+	+
5	*Cynodon dactylon*	Rumput Bahana	Gramineae	-	-	+
6	*Digitaria ciliaris*	Rumput jari	Poaceace	+	+	-
7	*Echinocloa colona*	Rumput Tuton	Gramineae	+	-	-
8	*Hymenachne amplexicaulis*	Kumpai tembaga	Poaceace	+	+	+
9	*Leersia hexandra*	Kalamenta	Poaceace	+	-	-
10	*Sacciolepis interrupta*	Rumput wuwudan	Poaceace	+	+	+
11	*Ludwigia octovalvis*	Cacabean	Onagraceae	+	-	-
12	*Ludwigia adscendens*	Tapak doro	Onagraceae	+	-	-
13	*Oxalis barrelieri*	Calincing	Oxalidaceae	+	-	-
14	*Hedyotis corymbosa*	Rumput mutiara	Rubiaceae	+	+	-
Total species				13	6	3

Table 5. Dominant plants based on the Importance Value Index (IVI) and Summed Dominance Ratio (SDR) values of plants from various fertilizer treatment plots in lowland swamps

No	Species	Manure		NPK		Urea	
		IVI	SDR	IVI	SDR	IVI	SDR
1	*Alternanthera philoxeroides*	11.46	5.73	15.31	7.65	-	-
2	*Alternanthera sessilis*	7.67	3.83	-	-	-	-
3	*Heliotropium indicum*	9.38	4.69	-	-	-	-
4	*Cyperus digitatus*	14.93	7.47	32.30	16.15	51.70	25.85
5	*Cynodon dactylon*	-	-	-	-	30.29	15.14
6	*Digitaria ciliaris*	26.74	13.37	35.39	17.70	-	-
7	*Echinocloa colona*	8.33	4.17	-	-	-	-
8	*Hymenachne amplexicaulis*	62.46	31.23	69.80	34.90	82.81	41.40
9	*Leersia hexandra*	9.03	4.51	-	-	-	-
10	*Sacciolepis interrupta*	13.54	6.77	30.62	15.31	35.20	17.60
11	*Ludwigia octovalvis*	8.33	4.17	-	-	-	-
12	*Ludwigia adscendens*	8.06	4.03	-	-	-	-
13	*Oxalis barrelieri*	7.67	3.83	-	-	-	-
14	*Hedyotis corymbosa*	12.42	6.21	16.57	8.29	-	-

There is a comparatively greater diversity of plant types (13 species) in the buffalo manure treatment's range (Table 4). Buffaloes graze extensively in the grasslands, and their diet of seeds provides the source of diversification. In some plots, chemical fertilization is used to support only three to six species. All plots contain the following species: *Sacciolepis interrupta*, which has low dominance, followed by *Cyperus digitatus* and *Hymenachne amplexicaulis*, both of which have high dominance. A complete list of grass types collected is given in Table 5.

3.4. Biomas of forage grass in lebak swamp land

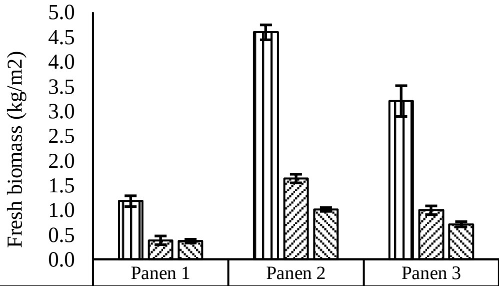
The t-test showed that all comparisons between fertilizer treatments were significantly different. NPK fertilizer and urea fertilizer did not differ significantly at the time of the first harvest, but they did at the second and third harvests (Table 6).

Table 6. Fresh biomass weight of various fertilizer treatment based on t-test

Plot / Harvest time	Manure	NPK	Urea
Harvest-1			
Manure	-	5.37E-03*	6.7E-03*
NPK	-	-	5.45E-03^{ns}
Urea	-	-	-
Harvest-2			
Manure	-	8.66E-05*	6,.7E-04*
NPK	-	-	1.48E-03*
Urea	-	-	-
Harvest-3			
Manure	-	7.11E-03*	5.34E-03*
NPK	-	-	1.71E-02*
Urea	-	-	-

Note: * = Significant (P(T<=t) two-tail<0.05); ns = Non-significant (P(T<=t) two-tail>0.05)

With the highest findings reaching 4.59 kg/m^2, the grass harvest demonstrated that manure had a significant impact on biomass in the swamp's grazing fields. Based on the number of species found, the manure treatment was more potential to have species with high tolerance and competitive ability. Given that of the comparatively smaller species diversity factor, the urea fertilizer treatment produced the lowest results with only 1.01 kg/m^2. Grass biomass from several fertilizer treatment plots in lowland swamp are given in Figure 5.



	Panen 1	Panen 2	Panen 3
Petak Pupuk Kandang	1.18	4.59	3.20
Petak Pupuk NPK	0.38	1.63	0.99
Petak Pupuk Urea	0.37	1.01	0.71

Figure 5. Grass biomass from several fertilizer treatment plots in lowland swamps

4. DISCUSSION

Soil pH in each treatment plot was found to be significantly impacted by the high water levels. Before puddles formed, the pH of the soil was found to be influenced by various fertilizer treatments. Manure, for example, could raise the pH of the soil to 5.2, which is higher than NPK and urea fertilizers, which have a pH of less than 4. But while the water level was high, it tended to return almost exactly to the same plot and did not vary much when the water subsided, possibly as a result of floods rinsing the water away. Floods alter the way that soil functions by releasing nutrients into the soil quickly, which lowers soil fertility. (Sánchez-Rodríguez et al., 2019).

It is believed that the stimulant manure made from buffalo manure contains a variety of plant seeds, allowing many to thrive in the first 2 weeks after application. The availability of native grass seeds is typically restricted, making it impossible for the growth of more grass to be stimulated by NPK and urea fertilizers.

The manure sampling plot may cover the soil surface more quickly at the beginning of the application due to differences in the types and numbers of species that grow. Prior to the formation of puddles, the sampling plot treated with urea fertilizer only covered 2.1 m2/12 m2 until the sixth week following application. Apart from seeds preserved in the soil, feces also disperse seeds, particularly those that haven't broken down into manure for seed transmission (Oveisi et al., 2021).

Responses of plant growth to hydrological circumstances vary by species. A species' ability to expand is greatly enhanced by flooding, but plants that have not adapted to high water levels will find their growth restricted. High water levels do not effect all plant communities; species composition and stem density define plant biomass. It is also affected by other abiotic elements like temperature, soil nutrients, and light intensity. On the other hand, elevated water levels have an indirect impact on soil nutrients (Lou et al., 2016).

The least amount of different types of grass are found in areas treated with urea fertilizer. This is believed to be because urea is applied by dissolving it in water, which produces a high concentration of ammonium that kills seed deposited on the soil's surface. (Sundaram et al., 2019). Then the sprouts that grow after receiving the stimulant from Ammonium then die when exposed to the heat of the sun.

Digitaria ciliaris (13.37%) and Hymenachne amplexicaulis (31.23%) were the two most common species in the manure treatment. Since Hymenachne amplexicaulis is a semi-aquatic annual grass, it can withstand severe levels of flooding. Then, as a sort of swamp greenery, the vegetation has a comparatively high mineral content (Muhakka et al., 2019). The most common species in the NPK fertilizer treatment are *Hymenachne amplexicaulis* (34.90%), followed by *Hymenachne amplexicaulis* (41.40%) and *Cyperus digitatus* (25.85%) in the urea fertilizer treatment. While *Cyperus digitatus* is present in every treatment, Digitaria ciliaris is only found in the manure and NPK fertilizer treatments. Livestock use grasses and teki grasses, such *Cyperus digitatus* and *Digitaria ciliaris*, as animal fodder, with varying degrees of preference from mildly to frequently utilized (Ernawati & Ngawit, 2015).

Good pastures produce feed consisting of grass (Poaceae) and legumes (Fabaceae). Legumes were not found in all fertilizer treatment plots in the lowland swamp land. The proportion of forage sources and productivity as sources of feed protein in both research areas were inadequate. Rainwater runoff from river overflows affects groundwater, causing plants to have difficulty absorbing soil nutrient ions. Solid/hard and alkaline soil conditions cause very few legume plants. The lack of legume proportions in grasslands causes low forage quality, especially during the dry season (Nurjaya et al., 2023).

In swamp areas, livestock pastures are characterized by inundation for several months of the year, resulting in periods of flooding followed by dry periods. Different biomass production is caused by flood patterns, such as the depth and duration of inundation, depending on the species' tolerance (Dai et al., 2020). Furthermore, in this region, competition plays a significant role in determining plant distribution and community structure. As stated by Zhang et al. (2014) that there is a reliance on specific species' existence. Due to more competition, legumes make up a smaller percentage of grazing pastures than weeds and gramineae.

The aim of fertilization treatment for pastures is to supply nutrients; nevertheless, it is important to consider the type, requirements, methods, and timing of application. Additionally, it is crucial to examine the impact of soil and plant characteristics (Marta, 2016).

Despite the same comparison across treatments, the third harvest was marginally lower because it was still impacted by the prior harvest. As stated by Lan et al. (2021), flooding's impact on wetland plant biomass is contingent upon the season, soil nutrient availability, and inundation period. The period of flooding has a quadratic relation with the total soil N content, total P content, and N:P ratio, peaking at about 220 days. So there is still potential for further increase of up to seven months.

A substantial amount of nutrients from sediment and river runoff supports the various species that manure provides, leading to eutrophication and an increase in the number of productive species. Species that are not adequately adapted will die off, and plant communities will shift toward groups with a high number of tolerant species (Garssen et al., 2015). It could harm the species diversity in the swamp grasslands if improperly managed, which will lower the amount and quality of available feed. Therefore, to optimize the potential of swamp fields as a source of forage grass, a thorough understanding of the dynamics of water levels and species richness management is essential. Seasons, grazing frequency, and other human activities that could impact the results of revegetation should also be taken into account. Furthermore, to evaluate the viability of the revegetation techniques employed, long-term research may be required. The results of this study can provide valuable insights for ranchers, land managers, and policy makers in managing grasslands for sustainable forage production. It further implies the mechanisms for maintaining diversity in swamp communities.

5. CONCLUSIONS

Based on the results, it was concluded that: 1) Buffalo manure stimulant can be used for pasture revegetation activities. Particularly when it comes to plant diversity and biomass production, it outperformed urea and NPK fertilizer stimulants; 2) Manure application in pastures contributed to a greater variety of species. The SDR of dominant species found in Manure, NPK and Urea fertilizer plots were Hymenachne amplexicaulis (31.23:34.90:41.40), Cyperus digitatus (7.47;16.15;25.85) and Sacciolepis interrupta (6.77;15.31;17.60), respectively; 3) There were 13 species were identified in the manure treatment, 6 in NPK fertilizer, and 3 in urea fertilizer treatment; 4) The inundation patern in swamp area provides a suitable environment for some species and also at the same time limits the growth of other species. Inundation during the rainy season brings high nutrient content from river runoff and sediment causing an increase in the abundance of productive species.

6. ACKNOWLEDGEMENT

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7. REFERENCES

AFRIANI, P., JUSWARDI, J., and MARISA, H. 2023. Komposisi, Keragaman dan Struktur Vegetasi Rawa Lebak Tanjung Senai, Ogan Ilir, Sumatera Selatan. Spizaetus: **Jurnal Biologi Dan Pendidikan Biologi**, 4(2), 168. https://doi.org/10.55241/spibio.v4i2.167

ALWI, M. and TAPAKRISNANTO, C. 2017. Potensi dan Karakteristik Lahan Rawa Lebak. In Karakteristik dan Pengelolaan Lahan Rawa. IAARD PRESS. https://repository.pertanian.go.id/handle/123456789/6628

AMARULLAH, E. T., TRIZELIA, YAHERWANDI, and HAMID, H. 2017. Diversity of plant species in paddy ecosystem in West Sumatra, Indonesia. **Biodiversitas**, 18(3), 1218–1225. https://doi.org/10.13057/biodiv/d180346

ARDIANSYAH, M., NUGRAHA, R. A., IMAN, L. O. S., and DJATMIKO, S. D. 2021. Impact of Land Use and Climate Changes on Flood Inundation Areas in the Lower Cimanuk Watershed, West Java Province. **Jurnal Ilmu Tanah dan Lingkungan**, 23(2), 53–60. https://doi.org/10.29244/jitl.23.2.53-60

Badan Penelitian dan Pengembangan Pertanian. 2014. Biodiversiti Rawa : Eksplorasi, Penelitian, dan Pelestariannya. In Biodiversiti Rawa : Eksplorasi, Penelitian, dan Pelestariannya. IAARD Press.

BARBOSA DA SILVA, F. H., ARIEIRA, J., PAROLIN, P., NUNES DA CUNHA, C., and JUNK, W. J. 2016. Shrub encroachment influences herbaceous communities in flooded grasslands of a neotropical savanna wetland. **Applied Vegetation Science**, 19(3), 391–400. https://doi.org/10.1111/avsc.12230

DAI, X., YU, Z., YANG, G., and WAN, R. 2020. Role of Flooding Patterns in the Biomass Production of Vegetation in a Typical Herbaceous Wetland, Poyang Lake Wetland, China. **Frontiers in Plant Science**, 11(October), 1–11. https://doi.org/10.3389/fpls.2020.521358

ERNAWATI, N. M. L. and NGAWIT, I. K. 2015. Eksplorasi dan Identifikasi Gulma, Hijauan Pakan dan Limbah Pertanian yang Dimanfaatkan Sebagai Pakan Ternak di Wilayah Lahan Kering Lombok Utara. **Buletin Peternakan**, 39(2), 92. https://doi.org/10.21059/buletinpeternak.v39i2.6713

GARSSEN, A. G., BAATTRUP-PEDERSEN, A., VOESENEK, L. A. C. J., VERHOEVEN, J. T. A., & Soons, M. B. 2015. Riparian plant community responses to increased flooding: A meta-analysis. **Global Change Biology**, 21(8), 2881–2890. https://doi.org/10.1111/gcb.12921

IKHSAN, Z., HIDRAYANI, H., YAHERWANDI, Y. and HAMID, H. 2020. Keanekaragaman dan Dominansi Gulma pada Ekosistem Padi di Lahan Pasang Surut Kabupaten Indragiri Hilir. Agrovigor: **Jurnal Agroekoteknologi**, 13(2), 117–123. https://doi.org/10.21107/agrovigor.v13i2.7463

LAMPELA, M., JAUHIAINEN, J., SARKKOLA, S. and VASANDER, H. 2017. Promising native tree species for reforestation of degraded tropical peatlands. **Forest Ecology and Management**, 394, 52–63. https://doi.org/10.1016/j.foreco.2016.12.004

LAN, Z., CHEN, Y., SHEN, R., CAI, Y., LUO, H., JIN, B. and CHEN, J. 2021. Effects of flooding duration on wetland plant biomass: The importance of soil nutrients and season. **Freshwater Biology**, 66(2), 211–222. https://doi.org/10.1111/fwb.13630

LITTLE, N. G., MOHLER, C. L., KETTERINGS, Q. M., and DITOMMASO, A. 2015. Effects of Organic Nutrient Amendments on Weed and Crop Growth. **Weed Science**, 63(3), 710–722. https://doi.org/10.1614/ws-d-14-00151.1

LOU, Y., PAN, Y., GAO, C., JIANG, M., LU, X. and XU, Y. J. 2016. Response of plant height, species richness and aboveground biomass to flooding gradient along vegetation zones in floodplain wetlands, Northeast China. **PLoS ONE**, 11(4), e0153972. https://doi.org/10.1371/journal.pone.0153972

MA, X., LACOMBE, G., HARRISON, R., XU, J. and VAN NOORDWIJK, M. 2019. Expanding rubber plantations in Southern China: Evidence for hydrological impacts. **Water** (Switzerland), 11(4), 8–12. https://doi.org/10.3390/w11040651

MARTA, Y. 2016. Manajemen Padang Penggembalaan Di Bptuhpt Padang Mengatas. **Pastura**, 6(1), 36. https://doi.org/10.24843/pastura.2016.v06.i01.p11

MUHAKKA, M., SUWIGNYO, R. A. 2019. Kandungan Mineral Hijauan Rumput Rawa Sebagai Pakan Kerbau Pampangan di Sumatera Selatan. Seminar Nasional 978–979.

NAEMAH, D., RACHMAWATI, N. and PUJAWATI, E. D. 2020. Keragaman Jenis Tumbuhan Bawah Hutan Rawa Gambut Di Kabupaten Banjar. **Jurnal Hutan Tropis**, 8(3), 298. https://doi.org/10.20527/jht.v8i3.9630

NURJAYA, SEPTIANI, T., NURCAYA and SEMA. 2023. Produksi Hijauan dan Komposisi Botanis di Padang Penggembalaan Alam Desa Ujung Baru Kecamatan Tanasitolo Kabupaten Wajo. **Jurnal Ilmu dan Industri Peternakan**, 9(1), 10–19. https://doi.org/10.24252/jiip.v9i1.31596

OVEISI, M., OJAGHI, A., RAHIMIAN, M.H., MÜLLER-SCHÄRER, H., YAZDI, R.K., KALEIBAR, P.B., and SOLTANI, E. 2021. Potential for endozoochorous seed dispersal by sheep and goats: Risk of weed seed transport via animal faeces. **Weed Research**, 61(1), 1–12. https://doi.org/10.1111/wre.12461

POWO. 2024. Plants of the World Online | Kew Science. Facilitated by the Royal Botanic Gardens, Kew. https://powo.science.kew.org/

QUINTERO-ANZUETA, S., MOLINA-BOTERO, I. C., RAMIREZ-NAVAS, J. S., RAO, I., CHIRINDA, N., BARAHONA-ROSALES, R., MOORBY, J. and ARANGO, J. 2021. Nutritional Evaluation of Tropical Forage Grass Alone and Grass-Legume Diets to Reduce in vitro Methane Production. **Frontiers in Sustainable Food Systems**, 5(June), 1–13. https://doi.org/10.3389/fsufs.2021.663003

SÁNCHEZ-RODRÍGUEZ, A. R., HILL, P. W., CHADWICK, D. R. and JONES, D. L. 2019. Typology of extreme flood event leads to differential impacts on soil functioning. **Soil Biology and Biochemistry**, 129, 153–168. https://doi.org/10.1016/j.soilbio.2018.11.019

SUNDARAM, P. K., MANI, I., D. LANDE, S. and PARRAY, R. A. 2019. Evaluation of Urea Ammonium Nitrate Application on the Performance of Wheat. **International Journal of Current Microbiology and Applied Sciences**, 8(01), 1956–1963. https://doi.org/10.20546/ijcmas.2019.801.205

TRINUGROHO, M. W. and MAWARDI. 2018.. Pemantauan Area Genangan Air Pada Rawa Lebak Menggunakan Teknologi Penginderaan Jauh. **Jurnal Ilmiah Geomatika**, 23(2), 49. https://doi.org/10.24895/jig.2017.23-2.716

WAHYUDI and TRIYADI, A. 2019. Growth of Jelutung rawa (Diera lowii) at the Peat Swamp Land in Pulang Pisau District, Cetral Kalimantan. **Jurnal Hutan Tropika** , 14(2), 99–107. https://e-journal.upr.ac.id/index.php/JHT/article/view/1152

WIBISONO, I. T. C. and DOHONG, A. 2017. Panduan Teknis Revegetasi Lahan Gambut (Vol. 4, Issue 1). Badan Restorasi Gambut (BRG) Republik Indonesia.

ZHANG, X. H., MAO, R., GONG, C., YANG, G. S., and LU, Y. Z. 2014. Effects of hydrology and competition on plant growth in a freshwater marsh of northeast China. **Journal of Freshwater Ecology**, 29(1), 117–128. https://doi.org/10.1080/02705060.2013.825821

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