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The Effect of the Dose of the Proportion of Organic Fertilizer with NPK on the Management of Cashew Stands on the Growth and Yield of Plants, as Well as its Capacity for the Maintenance of Cattle

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Abstract: The reason for the low productivity of cashew in the Indonesian province of West Nusa Tenggara is that they are never cared for and the land between the cashew tree rows is not intensively cultivated. The first factor is the type of organic fertilizer: cow, horse, and chicken manure; a mixture of cow + horse manure, cow + chicken manure, and horse + chicken manure. The second factor is the dosage ratio of organic fertilizer: 35 tons + NPK 0 kg ha^{-1}, 25 tons + NPK 250 kg ha^{-1}, 15 tons + NPK 500 kg ha^{-1}, and 0 tons + NPK 750 kg ha^{-1}. The application of organic fertilizer from a mixture of cow and chicken manure at a dose of 15-25 tons + NPK 250-500 kg ha^{-1} significantly increases soil fertility status and reduces the rate of soil erosion. When applying the best type of organic fertilizer, the dosage ratio of 35 tons + NPK 0 kg ha^{-1} and 0 tons + NPK 750 kg ha^{-1}, the effect is not significantly different for all parameters. Applying a dose of 15 to 25 tons per hectare can replace the role of NPK fertilizer by 33.33 to 66.67% of the 750 kg per hectare dose and significantly increase the cattle breeding capacity of cashew plantations by up to 5,875 livestock unit $hectare^{-1}$ $season^{-1}$

Keywords: Animal feed; Cashew; Forages; Grasses; Planting patterns

Introduction

The increasingly expensive price of nutmes and tends to increase both in the domestic and international markets, encourage farmers to strive independently in the form of people's plantation businesses. Therefore several regions in Indonesia, such as North Sulawesi, South Sulawesi, East Java, Central Java, West Nusa Tenggara (NTB), and East Nusa Tenggara, continue to try to develop this commudity extensively and incentives (Anggarawati & Suwarnata, 2020). The area of cashew plantations in the six regions is around 585.000 ha or 90% of the total area in Indonesia, which in 2019 reached 671.58 ha (Rostiana et al., 2017). NTB Province ranks third nationally has a cashew plantation area, which is 49,582 ha with an average production of 12.73 tons of 1 year-1, involving 53.90 households and spread in North Lombok, East Lombok, Bima and Dompu regencies (Rosman, 2019). However, the productivity of cashews in NTB is very low compared to the national average productivity and the countries of nutrient nuts such as Vietnam, India, Nigeria and the Pilipina. Vietnam is able to reach the level of productivity of the Nut Cashew 38.94 kg ha-1, India 36.76 kg ha-1, nigeria 22.85 kg ha-1 and phillipina 46.80 hg ha-1 (Ibouraïman & Essehou Léonard, 2015). While Indonesia 2.006 kg ha-1 and NTB only 373 kg ha-1.

The cause of low cape productivity in NTB due to lack of maintenance due to the perception that develops in the farm environment, that cashew does not require

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tight growth requirements so that the most marginal land can be planted (Ngawit et al., 2023). The perception of the wrong mindset causes farmers to only hope that their plants will give as many results as possible with low production costs. As a result, most cashew farmers in Indonesia have never pruning and fertilizing (Suryadi, 2019). If there is a fertilizing, it is still very dependent on the use of inorganic fertilizer (Daras & Pitono, 2020). The existence of rare fertilizer phenomena and the price is expensive, causing farmers to have never fostered his cashew plants since 2018. As a result, the production of nutme nuts has declined very sharply, from 373.43-398.84 kg ha-1 in 2015-2018 to only 102.42-116.32 kg ha-1 in the period 2018-1023 (Proborini et al., 2020). Some farmers do fertilization to increase production with NPK fertilizer dose of 1000 g of trees-1 years-1 but unable to increase the production of nutrient nut due to the meeting of weed populations.

Another factor causing the low productivity of cashews in NTB is the pattern of monoculture planting with the development pattern using sweeping seeds, namely seeds derived from seeds originating from random trees from the farming garden itself with low genetic potential. The implication is low in the adaptation of plants to the environment so that many cashew plants are damaged and do not produce. The monoculture planting pattern causes the soil to stand guava is always in the condition of no plant management, so the process of the occurrence of critical soil is relatively faster as a result of lack of input of organic matter and high intensity of soil erosion (Ngawit & Farida, 2022). The phenomenon of the degradation of cashew plantation land in NTB, especially in North Lombok Regency, has long occurred, which is demonstrated by the low productivity of plants and soil fertility status (Ngawit et al., 2020). This phenomenon causes weed problems that are difficult to overcome, so that for the control it costs 25-30% of the total production costs (Farida et al., 2022). Control of weeds in cashew plantations is carried out by giving, eroding and using herbicides (Drewitz & Stoltenberg, 2018).

Control of this method, less effective and efficient because weeds grow back and are more difficult to control. Technical and biological culture such as the management of guava stands and using nuts as a ground cover is very rarely found. Likewise, weed control by using it as animal feed, still with traditional patterns by releasing livestock in the garden area without being grazed so that its utilization is still limited from the grass group, ineffective and has the potential to damage plants (McKenzie-Gopsill et al., 2022). Bearing in mind, cashew plantations are in the tropical area of dry climate with limited rainfall and wet months less than 6 months 1, the availability of forage is only abundant during the rainy season (Khoirunisa & Santhyami, 2023). While during the dry season the availability is rare, this has negative implications for the livestock business (Rostini et al., 2020). One of the actions to overcome these problems is to utilize the reciprocal system between plants and cattle (crop and life stock animals) through consistently improvement of ruminant livestock populations. The consequences of increasing the population of livestock, of course, must be balanced with improving the supply of Fortes for feed. Therefore, the management of standing soil between the ranks of cashew plants for the production of forage as raw material for animal feed by utilizing appropriate technology, is the right one. Thus organic fertilizer can also be produced independently by farmers in a continuous manner (Khan et al., 2024; Gamage et al., 2023).

Management of cashew stands applied, by forming an integrated ecological farm model designed based on land formation design, soil management, planting patterns and plant maintenance systems such as pruning forms, pruning maintenance, production pruning and rejuuvenism. The design of land formation is designed in the form of permanent ecological beds resembling a width of 8 m - 10 m with a slope of ± 7.50 cm that leads to the bottom sides. As a dike is a cashew stand-shaped width and 1-1.5 m (Ngawit et al., 2020). In the Cashew Guava is planted with inserted plants as a guludan amplifier such as gamal, turi and aquaculture grass as a source of animal feed. Whereas permanent ecological plots are planted with annual crops with a rotating planting pattern system between corn and peanut plants. Soil management is carried out at a minimum tilage and the application of organic fertilizer from cattle, chickens and horses to reduce the use of inorganic fertilizers (Ngawit & Jayaputra, 2023). This farming design rests on the integration of reciprocal relations between plants and cattle. Where, the cashew garden contributes toge as a source of feed and cattle, horses and chicken to provide waste as raw material for organic fertilizer (Kadam et al., 2024).

In connection with the problem described, a study was carried out aimed at evaluating the management of cashew stands with the formation of an integrated ecological farming design model, through the application of organic fertilizer from dirt and waste of cattle, chickens and horses in the rotating planting system between corn and peanuts. The results of the study are expected to increase soil fertility status, plant productivity and total hectare-1 day-1 Forage production, so that the ideal capacity of cattle maintenance with a cut and carry system, can be achieved in cashew plantations.

Method

This study was conducted experimental in a cashew plantation owned by farmers in Sambik Elen Village, North Lombok, NTB, from January to November 2024. This study used a random design of factorial groups with two factors. The first factor is the type of organic fertilizer (cow dung, horse, chicken, and a mixture), and the second factor is the dose of organic fertilizer combined with NPK fertilizer. In total there are 24 combinations of treatment that are repeated three times, compiled in 72 experimental units.

Implementation and Observation

Each experimental unit is made in a 5 x 4 meters plot. The soil is processed using a hand tractor, then organic fertilizer and NPK are spread evenly according to the treatment dose. As a test plant, planted BISI-2 hybrid corn and elephant peanuts with specified spacing. Plants are doused regularly and pests and diseases are controlled using manual methods and chemical pesticides (hissing insecticide 25 EC and Siento 550 EC fungicide) at a specified time. Observed parameters include physical, chemical, and biological properties of soil, such as C-organic, N-Total, microbial population, and erosion rates. In addition, the parameters of the plant measured are the weight of dry biomas, the yield of dried corn and peanut seeds, and the botanical composition of the Fortis. Growth and results of cashews such as the number of flush, the number of leaves, the number of splash, and the weight of the nuts are also observed. For data analysis, variant analysis (ANOVA) is used at a real level of 5%, and if the results are significant, followed by the BNJ further test to compare differences between treatments.

Result and Discussion

The Effect of Organic Fertilizer Types and the Proportion of the Dose of its Application with NPK Fertilizer on Soil Fertility

Application of organic fertilizer from dirt and waste of cattle, chickens, and mixtures that are applied with a proportion dose of 35 tons + 0 kg ha-1 NPK, 25 tons + 250 kg ha-1 NPK, 15 tons + 500 kg ha-1 NPK, and 0 tons of organic fertilizer + 750 kg ha-1 NPK, able to improve the status of physical fertility, chemical and biological status of the soil, chemical and biological status of the soil, chemical and biological status of soil fertility. There is a significant improvement in the physical properties of the soil, especially the ability of the soil binding to water (porosity), water content, drainage pores (aggregate formation), water available, permiability, c-organic content and soil erosion. After harvesting the last plant from the Corn-Peanut-Corn planting cycle, almost all of the physical properties of the soil experienced a significant change when compared to the soil conditions before the experiment, except the parameter weight of the soil contents (g ml-1).

Data in Table 1, shows that in the treatment of organic fertilizer from a mixture of male + chicken dung and a mixture of guy + hors, with a proportion of 25 tons of ha-1 + npk 250 kg ha-1, giving results with a significant value better than other treatments in all observation parameters. For example, the parameter of the weight of the soil contents, the rapid draack pores and the slow drainage pores that have decreased sharply, namely the weight of the soil contents which were originally 1.64 g ml-1 to 0.82-0.74 g ml-1, the pores of the original draack were originally 19.50 % to 15.50-17.20 % and slow drainage pores that were originally 11.0 % to 4.0-5.50 %. These results have implications for increasing soil porosity and permiability, so that ground and water water content is available in various sizes of PF is also increasing. The average groundwater content before the treatment application is based on PF1 (10 cm) only 43.40 %, whereas after the application of the treatment of the two types of superior organic fertilizer it becomes 46.40 % and 65.20 %.

Meanwhile the water available in the ground before treatment is only 15.75 % after the application of the two superior treatment is the ground water content to 19.21 % and 23.45 %. These results are in accordance with Ernawati et al's report (Ren et al., 2024), that the first work of organic fertilizer from cow dung improves soil physical fertility so that crumbly aggregates are formed, macro and micro pores, soil water and O2 content is always balanced and maintained, so that soil biological fertility increases due to the population and activity of microorganisms. High decomposition of microorganisms, ensuring the availability of nutrients in the soil that is renewable continues to occur slowly (slowly). The better physical fertility of the soil can also reduce the rate of soil degradation through an increase in the status of the soil porosity which was originally 58.80% volume to 63.75 - 64.75 % volume, so that infiltration increases and the runoff water rate is inhibited. Soil per qualities also increased significantly which was originally only 65.0 cm-3 hours-1 to 0.80-0.87 cm-3 hours-1.

As a result, soil aggregation is getting better, so that the distribution of plant roots, weeds and other forage at a depth of 0 - 20 cm and 20-40 cm, is also increasing. In the treatment of organic fertilizer from a mixture of cow dung + chicken and cow + horse, with a proportion of 25 tons of ha-1 + NPK 250 kg ha-1, root distribution is found to a depth of 30 cm, and the amount is significantly higher than other treatments. Meanwhile, in the same organic fertilizer treatment the proportion dose of 0-10 tons HA-1 + NPK 500-750 kg ha-1 root distribution was only found at a depth of 10 cm, with a significant amount of less than other treatments. In entisol with a texture dominated by dust and clay fractions, if the level of organic matter is low, then the structure of the soil, lumpy and hard in kerty, clay and sticky conditions in water saturated conditions. Very slow permeability and very poor porosity greatly inhibits the activity of microorganisms in the soil due to diffisit O2 and H2O. As a result, decommissions and mineralization of organic and inorganic compounds into small nutrients, slow vegetation growth, low root distribution so that the soil is easily eroded (Maulana & Suswana, 2018).

The statement, in accordance with the results of this study, that soil erosion in the area of the experimental location was originally high, namely 12.14 tons of ha-1 years-1 after the application of the treatment of two types of organic fertilizer with a dose proportion of 25 tons of ha-1 + npk 250 kg ha-1 to 5.50 tons ha-1 year-1 (Table 1). The implication of the improvement of the components of the soil physical sifiat variable turned out to be able to increase the efficiency of irrigation (EPA) of corn and peanut plants, especially in the treatment of organic fertilizer from a mixture of cattle and chicken dose of 25 tons of ha-1 + NPK 250 kg ha-1, which reached 1.43 g L-1.

Table 1. Effect of the Types of Organic Fertilizers from Cattle, Chicken, Horse Manure and Their Mixtures and the Dosage Ratios of 35 Tonnes HA-1 + NPK 0 Kg Ha-1.25

Treatment		Parameters of soil physical properties										
TOF	DOF	Mass of soil (gml^{-1})	Porosity (% volume)	Water content (volume %) pF1	pF2	pF3	pF4	Drainage process Fast	Slow	Water available (%)	Percolation (cm^{-3} ha^{-1})	Soil erosion ($t^{-1}h^{-1}y^{-1}$)
	D1	0.98 ns	59.55 ns	45.80 ns	34.50 ns	25.50 ns	13.60 ns	17.60 ns	9.50 ns	19.55 ns	0.75 ns	7.78 ns
Cow	D2	0.94 ns	60.00 ns	46.40 ns	34.60 ns	26.00 ns	14.50 ns	17.50 ns	9.70 ns	20.75 ns	0.77 ns	7.46 ns
(C)	D3	0.91 ns	61.55 ns	45.00 ns	34.50 ns	24.50 ns	13.00 ns	18.60 ns	9.60 ns	18.72 ns	0.70 ns	8.13 ns
	D4	0.90 ns	62.00 ns	44.00 ns	33 ns	23.00 ns	12.60 ns	19.00 ns	9.70 ns	17.75 ns	0.69 ns	8.45 ns
	D1	0.97 ns	61.00 ns	45.70 ns	35.50 ns	24.50 ns	13.50 ns	17.50 ns	9.60 ns	18.55 ns	0.76 ns	6.86 ns
Horse	D2	0.95 ns	61.50 ns	45.50 ns	34.00 ns	25.00 ns	14.00 ns	17.00 s	9.50 ns	19.00 ns	0.78 ns	6.76 ns
(H)	D3	0.90 ns	62.75 ns	44.50 ns	33.20 nn	22.50 ns	13.20 ns	18.00 ns	9.50 ns	18.45 ns	0.72 ns	7.16 ns
	D4	0.89 ns	63.00 ns	43.60 ns	31.50 ns	22.00 ns	13.00 ns	19.20 ns	9.30 ns	17.65 ns	0.70 ns	7.52 ns
	D1	0.97 ns	58.55 ns	46.40 ns	33.50 ns	23.50 ns	14.70 ns	15.60 s	7.50 ns	20.45 ns	0.80 ns	6.66 ns
Chicke	D2	0.96 ns	59.75 ns	44.20 ns	33.80 ns	23.60 ns	15.00 ns	16.00 s	7.60 ns	20.85 ns	0.87 ns	6.54 ns
n (C)	D3	0.92 ns	60.00 ns	44,0 ns	35.60 ns	22.80 ns	14.60 ns	16.70 s	8.50 ns	19.00 ns	0.76 ns	7.13 ns
	D4	0.91 ns	60.50 ns	45.4ns	34.00 ns	26.00 ns	14.00 ns	17.20 ns	8.00 ns	18.45 ns	0.70 ns	7.23 ns
	D1	0.97 ns	63.75 ns	55.50 ns	35.00 ns	25.50 ns	13.50 ns	17.50 ns	7.50 ns	19.00 ns	0.78 ns	6.75 ns
C+H	D2	0.96 ns	71.55 s	61.30 s	38.50 s	31.00 s	18.80 s	14.00 s	6.00 s	23.86 s	0.87 s	5.43 s
	D3	0.94 ns	64.0 ns	50.60 ns	33.20 ns	24.50 ns	13.70 ns	15.50 s	7.00 ns	18.55 ns	0.76 ns	5.45 s
	D4	0.93 ns	62.50 ns	46.60 ns	31.50 ns	24.00 ns	13.50 ns	16.00 s	7.50 ns	17.50 ns	0.75 ns	7.57 ns
	D1	0.90 ns	63.55 ns	53.40 ns	34.50 ns	26.00 ns	14.50 ns	15.50 s	7.00 ns	22.75 ns	0.85 s	5.55 s
C+Ck	D2	0.88 ns	79.88 s	65.20 s	39.00 s	30.60 s	19.00 s	14.00 s	5.50 s	24.45 s	0.89 s	5.56 s
	D3	0.85 ns	63.50 ns	50.00 ns	34.50 ns	25.50 ns	15.50 ns	15.00 s	70.50 ns	21.20 ns	0.80 ns	6.72 ns
	D4	0.82 ns	62.00 ns	55.70 ns	33.50 ns	25.00 ns	15.40 ns	15.80 s	7.50 ns	22.15 ns	0.76 ns	6.56 ns
	D1	0.95 ns	58.75 ns	50.50 ns	34.00 ns	26.00 ns	15.50 ns	17.50 ns	8.00 ns	0.80 ns	0.80 ns	6.65 ns
H+C	D2	0.93 ns	59.85 ns	50.00 ns	34.60 ns	26.60 ns	14.00 ns	18.00 ns	7.50 ns	0.80 ns	0.80 ns	6.73 ns
	D3	0.90 ns	61.00 ns	57.20 ns	33.50 ns	24.50 ns	15.50 ns	18.80 ns	7.00 ns	0.75 ns	0.75 ns	6.85 ns
	D4	0.88 ns	62.50 ns	55.00 ns	30.00 ns	23.60 ns	15.00 ns	18.50 ns	7.60 ns	0.72 ns	0.72 ns	7.25 ns
Control		1.10	58.50	43.40	29.70	21.50	11.60	19.50	11.00	15.75	0.65	12.12
t-table 0.025		2.06	2.06	2.06	2.06	2.06	2.06	2.06	2.06	2.06	2.06	2.06

Note: Tof = Types of Organic Fertilizer Made from Cow, Chicken, Horse Manure and a Mixture of Men + Horse Manure, Men + Chicken Manure and Horse + Chicken Manure; D1 = Dosage of Organic Fertilizer 35 Tonnes HA-1 + NPK 0 Tonnes Ha-1, D2 = Dosage of Organic Fertilizer 25 Tonnes Ha-1 + NPK 250 tons HA-1; D3 = Dosage of Organic Fertilizer 15 Tonnes HA-1 + NPK 500 Tonnes HA-1; D4 = Dosage of Organic Fertilizer 0 Tonnes HA-1 + NPK 750 Tonnes HA-1

Before the average treatment of EPA the two types of plants were only 0.74-0.84 g L-1. It turns out that with the increasing number of slow drainage pores and soil permiability causing the soil holding capacity to water also increases, water is longer in the gradient of plant roots which in turn can be absorbed more plants for growth, so that the value of the plant's EPA becomes higher (Aryal, 2024). The improvement of the physical fertility of the soil, apparently also has an impact on improving the fertility of biological and chemical soil. Data in Table 2 shows that a significant treatment increases the status of soil chemical fertility is the application of organic fertilizer from a mixture of man impurities + chicken + chicken + chicken, with a proportion dose of 25 tons of ha-1 + npk 250 kg ha-1. As a result of the addition of 250 kg HA-1 NPK fertilizer, the process of decomposition of organic matter in the soil is faster, so that the concentration of organic acids, N-total, C-organic increases, as a result there is a decrease in soil pH, which was originally neutral (Table 2). Furthermore, P which is bound in Ca3 (PO4) 2 and K3 (PO4) 2 Thermineralization becomes anion [H2PO4] -1 and [PO4] -2 which ultimately increases the content of P TERSIA in the soil (Herliana et al., 2019). Also reported by (Sun et al., 2021), that the content of protein, lignin and cellulose cellulose organic fertilizer is higher than Almi minerals, the decomposition process is faster, thus affecting the increase in cation exchange capacity, K-DD, C-organic, the availability of N-total nutrients and K-total soil.

The increasing content of N-Total and C-organic soil after the end of the corn-crop cycle of the soil, it turns out that the content of soil humus is also characterized by increasing microbial activity and earthworm population (Table 3). In the process of decomposition of organic fertilizer and In-Situ Plants, Selian releasing nutrients, also produces complex compounds called humus. This humus is very instrumental in improving the physical, chemical and biological properties of the soil. The presence of humus in a clay textured soil, will reduce the adverse effects of clay on soil structure, because humus stimulates aggregate granulation. The humus also increases the number and activity of micro and macro soil bodies. Increased earthworm population improves the formation of macro pores so that the soil is loose (Sari et al., 2024). As a result of the input of these ingredients simultaneously, soil aeration also gets good. Land with good aeer, O2 enters from the atmosphere through diffusion in the soil quickly can be used for respiration of plant roots and microorganisms. As a result, plant roots will develop better and the cruising and distribution power is wider, so that it takes more nutrients in the soil. In turn will produce a dry weight of plants and the yield of dried seeds of plants per plot is also higher (Table 4).

The Effect of Organic Fertilizer Types and the Proportion of the Dose of its Application with NPK Fertilizer on Plant Growth and Yield

Data in Table 4, shows that the type of organic fertilizer from cattle, horses, chickens and mixtures that are applied with the proportion of different doses with NPK fertilizer, have a significant effect on all parameters of plant product components and irrigation efficiency (EP). Treatment of organic fertilizer mixture from cattle dung + chicken (C + CK) with a proportion of 25 tons of HA-1 + NPK 250 kg HA-1, able to significantly give the yield of dry seeds per plot which is converted to the results of the milling dry rice is higher than other treatments (Table 4). The advantage of this treatment is also shown through its significant revenue to the growth and results of cashew guava, such as the number of Tree-1 moon-1 flush, the number of fresh leaves of flush-1, the total number of trees-1 and total tree nutritional weight-. The effect of interaction between the treatment factor of organic fertilizer and the proportion dose factor for the results of grain equivalent, the weight of the plant dry biomass (Table 4), the weight of the dry biomass, the composition of the firage and the production of the forage per hectare per day.

However, the effect of interaction between the two factors of this treatment does not occur to the capacity of land for the maintenance of cattle, the efficiency of water use (EPA), growth and cashew results. The effect of the interaction between the two factors of the treatment, due to the negative effects of organic fertilizer of cow, horses, chicken and mixture is positively corrected by the dose of the proportion of its application with NPK fertilizer, and vice versa. Microorganisms in the organic material can balance the soil reaction (pH), nutrient composition and utilize excessive N elements due to high-dose NPK applications so that they are not toxic to plants (Singh et al., 2024). Cow and horse dung organic fertilizer mixed with crude fiber tissue from the remnants of feed, the decomposition process is slower so that it also provides plant nutrients. Conversely chicken manure that is rich in probitic bacteria and endif fungus process is efficient so that it is faster to provide nutrients, especially P and K (Maftei et al., 2024).

Lack of organic fertilizer from cattle dung and horse is covered by excess organic fertilizer from chicken manure. So that the application of organic fertilizer 35 tons of ha-1 without NPK fertilizer and NPK fertilizer application 750 kg ha-1 without orgak fertilizer, the results obtained are always significantly lower compared to the treatment of organic fertilizer dose 25 tons ha-1 + npk dose of 250 kg ha-1 to all parameters components of plant yields (Figure 1). These results are in accordance with the previous researcher's report, that the application of the Ground Cover legume and aquaculture grass on natural grassland, is able to reduce the negative impact of the excess of an-organic fertilizer applied for years. Humus from In-Situ Legume and Cultivation grass can be able to increase the level of P-Available levels due to a decrease in soil pH due to increased decomposition activity by healthy soil microorganisms (Pittman et al., 2020).

Table 2. The Effect of the Type of Organic Fertilizer from Cow, Chicken, Horse Manure and Their Mixtures and the Proportion of Doses of 35 Tons Ha-1 + NPK 0 Kg Ha-1, 25 Tons Ha-1 + NPK 250 Kg Ha-1, 15 Tons Ha-1 + Fertility Status of the Soil

Treatment		Parameters of soil chemical properties								
TOF	DOF	pH	N total (%)	N Uptake (g/plot)	K total (mg 100 g-1)	K Uptake (g/plot)	P is available (ppm)	K-dd (cmol kg^{-1})	KTK (cmol kg^{-1})	C-organic (%)
	D1	6.50 ns	1.45 ns	32.75 ns	22.54 ns	29.21 ns	6.56 ns	0.65 ns	44.65 ns	4.12 ns
Cow	D2	6.00 ns	1.40 ns	33.76 ns	23.45 ns	30.42 ns	6.75 ns	0.60 ns	44.86 ns	4.35 ns
(C)	D3	6.50 ns	1.15 ns	30.25 ns	21.45 ns	27.75 ns	6.25 ns	0.68 ns	44.21 ns	4.12 ns
	D4	6.50 ns	1.10 ns	31.25 ns	20.65 ns	26.84 ns	6.00 ns	0.65 ns	44.00 ns	4.00 ns
	D1	6.50 ns	1.45 ns	32.50 ns	21.65 ns	28.77 ns	6.75 ns	0.60 ns	42.35 ns	3.95 ns
Horse	D2	6.25 ns	1.45 ns	33.45 ns	22.35 ns	29.54 ns	6.55 ns	0.52 ns	43.76 ns	4.09 ns
(H)	D3	6.50 ns	1.25 ns	31.50 ns	20.75 ns	27.55 ns	6.57 ns	0.51 ns	43.32 ns	3.75 ns
	D4	6.50 ns	1.15 ns	30.25 ns	20.43 ns	26.56 ns	6.00 ns	0.67 ns	43.12 ns	3.55 ns
	D1	6.50 ns	1.40 ns	30.64 ns	23.75 ns	29.33 ns	7.25 ns	0.56 ns	43.88 ns	3.98 ns
Chicken	D2	6.25 ns	1.35 ns	31.22 ns	24.65 ns	30.55 ns	7.65 ns	0.66 ns	43.75 ns	4.00 ns
(Ck)	D3	6.50 ns	1.30 ns	30.45 ns	23.75 ns	29.00 ns	7.25 ns	0.62 ns	44.76 ns	3.85 ns
	D4	6.00 ns	1.20 ns	30.22 ns	22.85 ns	28.55 ns	6.87 ns	0.60 ns	44.50 ns	3.25 ns
	D1	6.75 ns	1.45 ns	27.85 ns	23.56 ns	30.45 ns	7.00 ns	0.67 ns	44.65 ns	3.65 ns
C+H	D2	6.50 ns	2.70 s	39.54 s	29.55 s	29.55 ns	8.85 s	0.78 s	48.75 s	7.75 s
	D3	6.50 ns	1.48 ns	29.86 ns	23.50 ns	28.00 ns	7.65 ns	0.62 ns	45.25 ns	5.25 ns
	D4	7.00 ns	1.40 ns	27.55 ns	22.50 ns	27.75 ns	6.84 ns	0.60 ns	44.00 ns	5.10 ns
	D1	6.50 ns	1.65 ns	35.67 ns	27.55 ns	32.45 ns	7.45 ns	0.57 ns	47.25 ns	5.44 ns
C+Ck	D2	5.00 s	2.77 s	44.75 s	32.65 s	37.55 s	9.56 s	0.98 s	49.57 s	7.57 s
	D3	5.50 s	2.70 s	40.54 s	31.75 s	35.67 s	8.84 s	079 s	48.50 s	7.23 s
	D4	6.75 ns	1.45 ns	33.25 ns	27.00 ns	33.35 ns	8.90 s	0.50 ns	47.00 ns	4.12 ns
	D1	6.00 ns	1.50 ns	30.54 ns	22.55 ns	32.45 ns	6.65 ns	0.54 ns	45.65 ns	4.25 ns
H+Ck	D2	6.75 ns	1.55 ns	27.65 ns	23.76 ns	32.45 ns	7.55 ns	0.40 ns	45.87 ns	4.45 ns
	D3	6.50 ns	1.50 ns	27.00 ns	21.85 ns	31.75 ns	7.00 ns	0.65 ns	44.50 ns	4.13 ns
	D4	6.50 ns	1.40 ns	26.56 ns	20.50 ns	30.25 ns	6.75 ns	0.62 ns	41.75 ns	3.02 ns
Control		7.56	0.25	9.75	2.85	6.75	3.75	0.22	38.45	1.25
t-table 0.025		2.06	2.06	2.06	2.06	2.06	2.06	2.06	2.06	2.06

Note: Tof = Types of Organic Fertilizer Made from Cow, Chicken, Horse Manure and a Mixture of Men + Horse Manure, Men + Chicken Manure and Horse + Chicken Manure; D1 = Dosage of Organic Fertilizer 35 Tonnes HA-1 + NPK 0 Tonnes HA-1; D2 = Dosage of Organic Fertilizer 25 Tonnes HA-1 + NPK 250 Tonnes HA-1; D3 = Dosage of Organic Fertilizer 15 Tonnes HA-1 + NPK 500 Tonnes HA-1; D4 = Dosage of Organic Fertilizer 0 Tonnes HA-1 + NPK 750 Tonnes HA-1

The total yield of dry seeds of corn and peanuts per plot of treatment when converted to the results of the equivalent of dry grain per hectare, is still in the range of results below the average national production which reaches 7.30 tons of ha-1 (Table 4). The low yield of plants obtained due to the low absorption of the N and K element at the end of the corn-crop cycle-the ground-corn, which for K only reaches 27.75-37.55 g plot-1 or equivalent to 28-38 kg ha-1 K, and N absorption which only reaches 37.55-48.75 g plot-1 or equivalent to 38-49 kg ha-1 n (Table 2). While on the side of a good soil environmental condition will spur the growth of optimum plant roots, so that it can absorb K at least 40 kg ha-1 and n of at least 51 kg ha-1 until the beginning of requests for rice or pods for peanut plants(Begum et al., 2019). The main cause of low nutrient absorption, because during plant growth, groundwater status is lacking so that plants often experience drought stress in each phase of growth. Application of organic fertilizer 15 tons - 25 tons ha -1 which is accompanied by the application of mulch several types of forage, NPK application dose 250 kg - 500 kg ha -1 and irrigation every 10 days during plant growth, its contribution to improvement of physical and biological properties of soil is not optimal. This can be seen from the change in soil permiability which is still in the rather slow range, which is 0.89 cm at-1 and slow aeration pores are still below 10-12 % soil volume (Table 1).

Such soil conditions and often experience drought stress, contribute greatly to low root distribution. Only in the treatment of organic fertilizer mixture of cow dung + chicken and cow + horse, a proportion dose of 25 tons of ha-1 + npk 250 kg ha-1 found a significant root distribution higher than other treatments. In the two combinations of treatment, the root distribution at the depth of the soil layer 0-10 cm 2.96-3.56 g L-1 soil volume and at the depth of the soil layer> 10-20 cm 1.55-1.57 g L-1 soil vulume (Table 3). At the depth of the soil layer> 20 cm, the root distribution is very low and does not differ significantly in all treatments. Broad and deep root distribution is needed to support plant growth. Because nutrient absorption of plants is dominated by root organs. Macro nutrients are generally more effectively absorbed by plant roots through diffusion and mass flow. Meanwhile, micro nutrients, ZPT and oligoelemen are more effectively absorbed through the application of leaf (foliar fertilization) with inlet in the form of stomata and cuticle diffusion. But nutrient absorption through roots tends to be more optimal (Melo et al., 2024), If the root distribution at a low soil depth, Weed Reproductive Organs such as rhizomes, stolen, rod segments, tubers and low roots. As a result, the potential of land as a low bank seed, vegetation at land surface is rare and open. Conditions like this characterize degraded and critical soil for recovery takes a long time.

Table 3. The Effect of the Type of Organic Fertilizer from Cow, Chicken, Horse Manure and Their Mixtures and the Dosage Ratios of 35 Tons Ha-1 + NPK 0 Kg Ha-1, 25 Tons Ha-1 + NPK 250 Kg Ha-1, 15 Tons Ha-1 + Fertility Status of the Soil

Treatment		Parameters of soil biological properties							
TOF	DOF	Bacterial population (10^6 x 1 gram of soil^{-1})	Quantity Colony (Petri dish^{-1})	Number of colonies in the holozone (Petri^{-1})	Earthworms population (0.25 x 1 m^{-2})	Distribution of plant roots (1g/ 1 l soil volume) Depth 0-10 cm	Depth >10-20 cm	Depth >20 – 30	Depth> 30 cm
	D1	2.76 ns	567.55 ns	88.64 ns	4.84 ns	2.21 ns	0.66 ns	0.55 ns	0.15 ns
Cow (C)	D2	2.85 ns	575.45 ns	91.22 ns	5.32 ns	2.42 ns	0.75 ns	0.50 ns	0.16 ns
	D3	2.70 ns	570.62 ns	90.76 ns	5.12 ns	2.75 ns	0.45 ns	0.38 ns	0.21 ns
	D4	2.65 ns	570.12 ns	89.82 ns	5.22 ns	1.84 ns	0.50 ns	0.50 ns	0.20 ns
	D1	2.64 ns	572.22 ns	87.75 ns	5.33 ns	1.75 ns	0.75 ns	0.40 ns	0.35 ns
Horse	D2	2.81 ns	578.34 ns	88.94 ns	5.78 ns	1.54 ns	0.55 ns	0.42 ns	0.36 ns
(H)	D3	2.72 ns	575.62 ns	88.56 ns	5.65 ns	1.55 ns	0.57 ns	0.41 ns	0.32 ns
	D4	2.64 ns	572.04 ns	88.00 ns	5.55 ns	1.85 ns	0.55 ns	0.37 ns	0.12 ns
	D1	2.80 ns	589.77 ns	90.84 ns	7.34 ns	1.33 ns	0.45 ns	0.36 ns	0.18 ns
Chicken	D2	3.04 ns	591.34 ns	90.55 ns	7.56 ns	1.75 ns	0.65 ns	0.36 ns	0.25 ns
(Ck)	D3	2.95 ns	590.92 ns	90.24 ns	7.43 ns	2.00 ns	0.45 ns	0.32 ns	0.26 ns
	D4	2.76 ns	589.88 ns	90.24 ns	7.03 ns	1.55 ns	0.67 ns	0.30 ns	0.21 ns
	D1	2.76 ns	590.66 ns	88.12 ns	7.56 ns	2.45 ns	0.75 ns	0.47 ns	0.25 ns
C+H	D2	3.62 s	698.20 s	97.56 s	8.66 s	2.95 s	1.55 s	0.58 ns	0.35 ns
	D3	2.94 ns	589.30 ns	90.24 ns	7.33 ns	1.80 ns	0.65 ns	0.52 ns	0.25 ns
	D4	2.82 ns	578.26 ns	90.12 ns	6.77 ns	1.75 ns	0.84 ns	0.50 ns	0.15 ns
	D1	3.31 ns	622.78 ns	90.54 ns	6.12 ns	2.45 ns	0.84 ns	0.57 ns	0.25 ns
C+Ck	D2	3.74 s	730.34 s	99.98 s	8.95 s	3.55 s	1.56 s	0.58 ns	0.37 ns
	D3	3.11 ns	625.77 ns	96.86 s	8.76 s	2.37 ns	0.84 ns	0.52 ns	0.30 ns
	D4	2.44 ns	620.55 ns	90.04 ns	6.66 ns	2.35 ns	0.50 ns	0.50 ns	0.21 ns
	D1	2.31 ns	590.78 ns	89.64 ns	5.33 ns	1.45 ns	0.65 ns	0.44 ns	0.15 ns
H+C	D2	2.35 ns	599.25 ns	89.74 ns	5.66 ns	2.15 ns	0.55 ns	0.40 ns	0.17 ns
	D3	2.25 ns	595.77 ns	88.22 ns	4.55 ns	1.75 ns	0.52 ns	0.35 ns	0.12 ns
	D4	2.23 ns	590.78 ns	80.45 ns	4.30 ns	2.25 ns	0.64 ns	0.20 ns	0.12 ns
Control		1.12	321.66	36.81	0.08	1.04	0.64	0.55	0.11
t-table 0.025		2.06	2.06	2.0687	2.06	2.06	2.06	2.06	2.06

Note: Tof = Types of Organic Fertilizer Made from Cow, Chicken, Horse Manure and a Mixture of Men + Horse Manure, Men + Chicken Manure and Horse + Chicken Manure; D1 = Dosage of Organic Fertilizer 35 Tonnes HA-1 + NPK 0 Tonnes Ha-1, D2 = Dosage of Organic Fertilizer 25 Tonnes Ha-1 + NPK 250 tons HA-1; D3 = Dosage of Organic Fertilizer 15 Tonnes HA-1 + NPK 500 Tonnes HA-1; D4 = Dosage of Organic Fertilizer 0 Tonnes HA-1 + NPK 750 Tonnes HA-1

This is proven, at the beginning of the management of cashew stands, the growth and results of nutrient nuts did not experience significant changes. But after the end of the cycle of the cropping pattern of rotating Corn-Peanut-Corn and Peanut-Corn-Peanut Growth and the results of cashew nutrition showed a positive trend. Data in Table 4, shows that the application of the type of organic fertilizer of cow, horses, chicken and mixture with a proportion of 25 tons of HA-1 + NPK 250 kg HA-1 and 15 tons of HA-1 + NPK 500 kg HA-1 Average number of PLAUS Branch-1 and Friday Leaves PLAUS-1, showed a significant value higher than other treatments. The same thing also happened to the total number of tree-1 splashing and total tree nutritional weight-1. In the treatment dose proportion of organic fertilizer 0 tons HA-1 + NPK 750 kg ha-1 and vice versa the application of organic fertilizer 35 tons ha-1 + npk. 0 kg Ha-1 Dry Biomas Weight Plant, the result of milling dried grain, total weighted the coconut-1 guava fruit, the total weight of the Tree-1 cashew nuts, the weight of the dry biomass and the production of the Fortar per hectare per day, not significantly different.

However, in the treatment of the dose of the proportion of organic fertilizer 25 tons of ha-1 + NPK 250 kg ha-1 and 15 tons of ha-1 + npk 500 kg ha-1 the average value of all of these parameters is significantly higher, especially in the treatment of organic fertilizer types from a mixture of cow and chicken dung. So, it can be stated, that the application of organic fertilizer mixture of cow dung and chicken dose of 15 tons ha-1 to 25 tons of ha-1 can replace the role of NPK fertilizer as much as 33.33-66.67 % of the dose of 750 kg ha-1. However, the total yield of plants equivalent to dry grain when converted to results per hectare, in these superior treatments, is still in the range of yields below the average production in technical irrigation paddy fields. The maximum results achieved in the leading treatment are only 16.31-17.42 tons of HA-1 years-1. While the average technical irrigated rice field production has reached 18.43 tons of dried grain Grinding Ha-1 year-1 (Tirtalistyani et al., 2022). Conversely, the results of nutme nuts assuming the population of 750 ha-1 trees, obtained in the superior treatment have reached 2,059-2,158 kg ha-1, while the national average production is 2,006 kg ha-1 [2].

The Effect of Organic Fertilizer Types and Application Dosage Proportions on Forage Production and Land Capacity for Cattle Farming

Intensive cashew tree management with consistent application of organic fertilizer during each annual crop planting significantly increases forage production, both in quantity and quality. Data in Tables 5 and 6 show that forage dry biomass, botanical composition, daily forage production per hectare, forage TDN, and forage nutrient chemical composition were significantly better in the organic fertilizer applications of a mixture of cow manure + chicken (CCk) and cow manure + horse manure (CH) at a dose of 25 tons ha-1 + NPK 250 kg ha-1 (D2) compared to the other treatments. The protein, fat, carbohydrate, and crude fiber content of forage in both treatments were higher, with lower ash content: 5.58–6.48% protein; 3.25–4.31% fat; and 46.34–56.14% carbohydrate fiber 46.53–47.37% and ash content 11.08–13.71% (Table 6). This indicates improved forage growth due to the intensive use of soil fertilizers during plant maintenance. Similar results were reported by Hadijah et al.

Riddech et al. (2025), who reported that the application of solid organic fertilizer as a base fertilizer and the regular application of liquid fertilizer at each growth phase of the forage grass significantly increased its biomass weight from 1193 g m2 day-1 to 1443 g m2 day-1. Javanmard et al. (2020) also reported that the association of legumes with corn in an intercropping system can increase the protein, carbohydrate, and fat content of corn kernels and forage clippings. This is due to the significant increase in the absorption of N, P, and K nutrients and the soil's cation exchange capacity. Furthermore, the level of dissolved P in the soil also increased due to the high population and activity of phosphate-solubilizing bacteria and arbuscular mycorrhizae. In addition to soil fertility, forage quality is also influenced by the intensity of sunlight received by the plant. Protein concentration is much more responsive to low light intensity (shaded) than fat, carbohydrates, and fiber. Shade by 63% can reduce the protein content of Texas weed (Caperonia palustris) by 26%. Several types of weeds in the Poaceae family that are tolerant to shade remain active in their metabolic activity, synthesizing normal proteins so that enzyme activity remains stable.

Efficient utilization of sunlight and water makes this group of weeds resistant to drought stress, thus determining the quality of a green fodder product source (Caruso et al., 2018). A good green fodder source for feed production is a composition of grass (Poaceae) and legume (Fabaceae) with a ratio of 6.50:3.50. However, the productivity of legumes as a protein source in all treatments of this study was not found to be adequate. Because only three species of legume weeds were found, namely, Mimossa pudica L.., Oxalis barrelieri L. and Oxalis corniculata L.

Table 4. The Effect of the Type of Organic Fertilizer from Cow, Chicken, Horse Manure and Their Mixtures and the Proportion of Doses of 35 Tons Ha-1 + NPK 0 Kg ha-1, 25 Tons Ha-1 + NPK 250 Kg Ha-1, 15 Tons Ha-1 + NPK 500 Kg Ha-1 and 0 Tons Ha-1 + NPK 750 Kg Ha-1 on Plant Growth and Yield

	Observation Parameters						
Treament	Total weight of dry biomass of maize and peanut plants (g m-2)	Total weight of dry maize and peanut kernels equivalent to dry milled grain (tonnes hectare^{-1})	Number of cashews plaus per branch	Number of fresh cashew leaves per plaus	Total number of cashew fruit per tree	Total weight of cashew nuts per tree (kg)	Water us efficiency (WUE (g l^{-1})
Cow (C)	979.78d*/	9.56 f*/	23.57 d*/	11.11 d*/	249.77 d*/	12.76 c*/	0.72 b*
Horse (H)	965.17 e	10.07 e	31.05 c	14.42 c	251.24 d	14.54 c	0.75
Chicken (Ck)	1038.54 c	14.60 b	32.73 c	14.04 c	253.45 d	15.54 c	0.85

							Observation Parameters
Treament	Total weight of dry biomass of maize and peanut plants (g m-2)	Total weight of dry maize and peanut kernels equivalent to dry milled grain (tonnes hectare^{-1})	Number of cashews plaus per branch	Number of fresh cashew leaves per plaus	Total number of cashew fruit per tree	Total weight of cashew nuts per tree (kg)	Water us efficiency (WUI (g l^{-1})
C + H	1227.26 b	12.95 c	39.33 b	18.33 b	367.66 b	22.34 b	0.93
C + Ck	1494.22 a	17.41 a	45.74 a	21.67 a	377.84 a	27.45 a	1.43
H + Ck	961.39 f	12.31 d	38.44 b	18.34 b	365.74 b	21.33 b	0.83
LSD 0.05	0.78	0.10	4.632	2.58	10.44	3.56	0.4
D_1	1078.04 c	15.53 c	35.72 b	17.72 c	288.64 c	15.22 b	0.83
D_2	1182.93 a	16.30 a	45.65 a	22.34 a	382.42 a	28.77 a	1.21
D_3	1103.57 b	16.15 b	37.64 b	20.74 b	360.93 b	26.33 a	0.82
D_4	1078.70 c	15.53 c	36.44 b	18.33 c	294.33 c	14.17 b	0.80
LSD 0.05	0.64	0.08	5.184	0.96	15.28	9.77	0.4
Interaction	s	s	ns	ns	Ns	ns	n

The same letters indicate non-significant different between levels of a treatment factor; ns= non-significant; s= significant

Note: */Numbers in the same column followed by the same lower case letter are not significantly different in the $LSD_{0.05}$ test.

Table 5. The Effect of the Type of Organic Fertilizer from Cow, Chicken, Horse Manure and Their Mixtures and the Proportion of Doses of 35 Tons ha^{-1} + NPK 0 Kg Ha^{-1}, 25 Tons Ha^{-1} + NPK 250 Kg Ha^{-1}, 15 tons ha^{-1} + NPK 500 Kg Ha^{-1} and 0 Tons Ha^{-1} + NPK 750 Kg Ha^{-1} on Dry Biomass Weight of Feed, Botanical Composition of the Feed, Feed Production and Cashew Plantation Capacity for Raising Cattle

				Average value of the observation result parameters
Treatment	Dry biomass weight of feed (kg ha^{-1} day^{-1})	Botanical composition of the feed (%)	Feed production (quintal ha^{-1} day^{-1})	Cashew plantation capacity for raising cattle (LU hectare^{-1} year^{-1})
Cow (C)	201.83 d*/	49.64e*/	5.76 f*/	4.40 e*/
Horse (H)	205.17 d	46.42 f	5.88 e	3.32 f
Chicken (Ck)	345.54 b	54.24 b	7.02 b	5.52 b
C + H	227.26 c	53. 68 c	6.55 c	4.78 c
C + Ck	494.22 a	55.31 a	8.49 a	6.61 a
H + Ck	341.39 b	52.73 d	6.193 d	4.65 d
LSD 0.05	15.77	0.16	0.04	0.04
D_1	278.04 c	51.89 c	6.58 c	4.80 c
D_2	582.93 a	52.54 a	6.90 a	5.14 a
D_3	403.57 b	51.45 d	6.62 b	4.94 b
D_4	283.30 c	52.13 b	6.59 c	4.62 d
LSD 0.05	16.43	0.13	0.03	0.04
Interaction	S	s	s	ns

The same letters indicate non-significant different between levels of a treatment factor; ns= non-significant; s= significant

Note: */Numbers in the same column followed by the same lower case letter are not significantly different in the $LSD_{0.05}$ test; D1 =Dosage of organic fertilizer 35 tonnes ha^{-1} + NPK 0 kg ha^{-1}, D2 = Dosage of organic fertilizer 25 tonnes ha^{-1} + NPK 250 kg ha^{-1}; D3 = Dosage of organic fertilizer 15 tonnes ha^{-1} + NPK 500 kg ha^{-1}; D4 = Dosage of organic fertilizer 0 tonnes ha^{-1} + NPK 750 kg ha^{-1}.

As a source of forage, these three weed species do not meet the criteria because their populations are very low due to intensive tillage. The chemical composition of forage nutrients, especially protein and fat, significantly determines the TDN value of feed. Texture, freshness, and flavor cannot be ignored (Elfaleh et al., 2023). The TDN value of feed dominated by a mixture of C. dactylon, C. nlemfuensis, and E. Colona grasses was only 39.80%. Meanwhile, feed containing peanut straw, mung beans, corn kernels, and rice bran reached 47.03% (Pandey et al., 2025). The TDN value of the feed product in the best treatment in this study was obtained in the range of 44.53–45.51%. High TDN value of feed and forage production per hectare over a certain period are the main variable components that determine the land capacity for raising cattle. The high potential of forage as a feed source in increasingly intensive cashew stand management has a significant impact on the capacity per hectare of land for raising cattle.

The holding capacity of the organic fertilizer application treatment from a mixture of cow + chicken manure (CCk) with a dose proportion of 25 tons ha-1 + NPK 250 kg ha-1 (D2), was significantly higher, namely 5.14 – 6.61 ST ha-1 compared to other treatments. However, the holding capacity obtained was still low, because according to (Kairupan et al., 2022), the holding capacity of the land under the shade of coconuts in the Sangihe Islands Regency as natural grasslands was classified as very low, namely 1.52 ST ha-1 year-1. In contrast, (Kairupan et al., 2023), reported that the holding capacity of coconut stands whose grass was maintained could reach 4.50 ST ha-1. Grasslands rotated with napiergrass (Pennisetum purpureum) had a holding capacity of 8.64 ST ha-1 during the dry season and 12.72 ST ha-1 during the rainy season (Fukagawa & Ishii, 2018). Intercropping corn, soybeans, and peanuts with napiergrass during the dry season can ensure an ideal forage supply of 12.50–15.50 kW ha-1 day-1, thus achieving an ideal carrying capacity of 15 ST ha-1 year-1 using a cut-and-carry system.

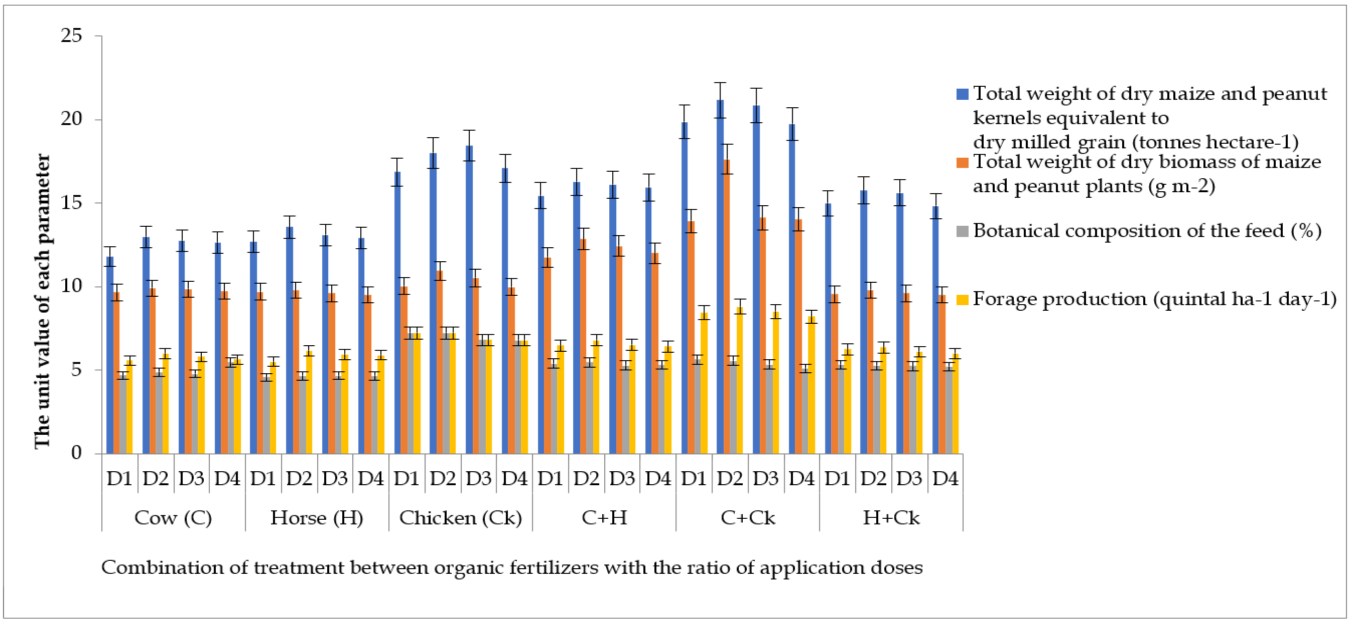

Figure 1. Interaction between types of organic fertilizer from cow, horse, and chicken manure and their mixtures with their application doses on dry plant biomass, plant yield equivalent to dry milled grain, botanical composition of forage, and forage production per quintal per hectare per day

Table 6. The Effect of the Type of Organic Fertilizer from Cow, Chicken, Horse Manure and Their Mixtures and the Proportion of Doses of 35 Tons Ha-1 + NPK 0 Kg Ha-1, 25 Tons Ha-1 + NPK 250 Kg Ka-1, 15 Tons Ha-1 + NPK 500 Kg Ha-1 and 0 Tons Ha-1 + NPK 750 Kg Ha-1 on the Chemical Content of Nutrients in Feed and Land Capacity for Beef Cattle Farming

	Average value of the observation result parameters					
Treatment	Protein (%)	Fat (%)	Carbohydrate (%)	Fiber (%)	Ash content (%)	TDN (%)
Cow (C)	3.59 f*/	2.14 f*/	36.230*/	42.32 d	18.00 b*/	40.25 b */
Horse (H)	4.25 e	2.37 d	38.94 e	43.68 c	19.02 a	34.46 c
Chicken (Ck)	6.14 b	3.51 b	45.15 c	43.71 c	12.03 e	40.11 b
C + H	5.50 d	2.26 e	45.10 d	44.12 b	12.68 d	33.64 c
C + Ck	6.48 a	4.30 a	56.14 a	46.53 a	11.08 f	44.53 a
H + Ck	5.67 c	3.34 c	50.33 b	42.52 d	12.72 c	33.22 c
LSD 0.05	0.04	0.14	0.03	0.12	0.02	3.63
D1	5.11 c	2.91 c	44.29 d	42.72 c	14.71 a	35.34 c
D2	5.57 a	3.25 a	46.33 a	47.37 a	13.71 d	45.51 a
D3	5.29 b	3.02 b	45.95 b	44.54 b	14.03 c	40.24 b
D4	5.11 d	1.56 d	44.68 c	42.68 c	14.71 a	35.62 c
LSD 0.05	0.03	0.08	0.02	0.22	0.01	4.24
Interaction	ns	ns	ns	ns	ns	ns

The same letters indicate non-significant different between levels of a treatment factor; ns= non-significant; s= significant

Note: */Numbers in the same column followed by the same lowercase letter are not significantly different in the LSD0.05 test; D1 = Dosage of organic fertilizer 35 tonnes ha-1 + NPK 0 kg ha-1, D2 = Dosage of organic fertilizer 25 tonnes ha-1 + NPK 250 kg ha-1; D3 = Dosage of organic fertilizer 15 tonnes ha-1 + NPK 500 kg ha-1; D4 = Dosage of organic fertilizer 0 tonnes ha-1 + NPK 750 kg ha-1.

Therefore, to maintain land carrying capacity, forage availability must remain stable throughout the year. Therefore, standing soil between cashew rows, whether in the form of embankments, ridges, swales, and terraces, should be planted with low-growing crops such as napiergrass and legumes to achieve a sustainable, ideal carrying capacity. Forage quality can also be improved by adding soil amendments such as fertilizer. Fertilization of pastures in tropical climate areas routinely every year, with 100 kg urea + 50 kg SP-36 + 50 kg KCl for grass, and 50 kg SP-36 + 50 kg KCl for legumes ha-1 year-1 can increase the carrying capacity of grasslands from 2.78 ST ha-1 to 5.12 ST ha-1.

Conclusion

Application of organic fertilizer from a mixture of cow and chicken manure with a dose of 25 tons ha-1 + NPK fertilizer 250 kg ha-1 by cultivating the land once plowed and once harrowed, in a corn-peanut-corn rotational cropping system can improve the physical, chemical and biological fertility status of the soil and suppress the rate of soil erosion. Application of organic fertilizer with the best dose of proportion, provides significantly better crop yields compared to other treatments, such as dry seeds of plants per plot converted to dry grain equivalent yield of 16.87 tones ha-1 year-1, dry biomass weight of forage as a source of animal feed 538.58 kg ha-1 day-1, botanical composition of forage 53.93%, forage production 7.70 quintal ha-1 day-1, cashew nut production 2109 kg ha-1 and efficiency of irrigation water use (1.32 g l-1). The high potential forage yield as a feed source in the application of organic fertilizer with the best proportion dose is able to significantly increase the capacity of cashew plantation land to raise cattle as many as 5.87 livestock units per hectare-1 year-1 (ST ha-1 year-1).

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Author Contributions

Conceptualization, I.K.N. and IWS; methodology, I.K.N., I.W.S. and I.W.W.; formal analysis, I.K.N. and I.W.Sn.; investigation, I.K.N., I.W.S. and I.W.W.; resources, I.K.N., I.W.S. and I.W.W.; writing—preparation of original draft, I.K.N.; writing—reviewing and editing, I.W.S. and I.W. W.; visualization, IWS; supervision, I.W.W.; project administration, IKN; obtaining funding, I.K.N. and I.W.W. All authors have read and approved the published version of the manuscript.

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Conflict of Interest

The author declares that there is no conflict of interest in publishing this scientific article.

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