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Evaluation Based Nutrient Content of Intercropping *Indigofera zollingeriana* with *Pennisetum purpureum* under Coconut Plantation

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ABSTRACT

The purpose of this study is to determine the land equivalent ratio (LER) of *Indigofera zollingeriana* (Iz) and *Pennisetum purpureum* (Pp) in coconut plantations based on nutrient content. This experiment was performed by a fully randomized design (CRD), a combination of 6 treatments in the growing room, Iz and growing room (1) 1.0mx 0.5m, (2) 1.0mx 1.0m, (3). 1.0 mx 1.5 m, and Pp w performed planting area (1) 1.0 x 0.5 m, (2) 1.0 x 0.75 m. The collection was analyzed by dispersion bias analysis and HSD testing. The variables measured were LER based on dry matter, crude protein, raw feed, and ash. The results showed that all treatments had a significant difference (P0.05) in LER based on dry matter and ash. HSD assessments showed that 1.0 m x 1.0 m elongation cover crop Iz a 1.0 mx 0.75 m elongation Pp had the highest crude protein LCR and lowest crude fiber content. From this, it can be concluded that the 1.0 m x 1.0 m long mixed culture Iz and the 1.0 mx 0.50 m long Pp are the optimal LERs based on the nutrient content.

Keywords: *Protein, crude fiber, ash, LER, planting space.*

1. INTRODUCTION

Intercropping is individual of the rtually characteristic cultivation conventions used in sustainable agricultural system. It amuses an important role in increasing solid gr nd productivity and yield stability [1]. Intercropping f two or more crop species not only improves yield but also enhances biological diversity, and suppresses pests and diseases [2]. The principal determination of intercropping is to constitute a superior way outturn on a land by optimizing processes that cannot be used in a monocropping transaction expeditiously [3]. The principal assistance of intercropping is that it lends a hand in utilizing the available processes expeditiously and enlarges the fruitfullnes of the crops.Catch crop buoys prevent debris inundation by providing their shadows, slowing drag rates, increasing penetration by layers of mulch, and inc sing debris composition [4].

The advantage of intercropping cardinal or bounteous crops is to improve final yield that depends on spatial arrangements (intercropping pattern) of participated crops]. An influential and orchestrate course of action of increasing multifariousness of an agro ecosystem is intercropping transaction that aknowledges interplay between the individuals of the contradistinctive crops and diversifications [6]. Intercropping buoy aggregates material multifariousness nailed down the progressive planting of contradistinctive crops during corresponding opportunity [7]. Accrued nutritious conprehension in intercropping organizedwhole buoy evetualizes spatially and temporally. Spatial nutritious comprehension buoy be accrued nailed down the increasing foundation mass, patch material superiorities in nutritious comprehension eventualize when crops in an intercropping transaction chalk up summit nutritious requires at contradistinctive times. On the other hand, any conjunction chalk up contradiction consequences on the outturn of the components underneath intercropping transaction [8].

Poor quality feed of tropical grasses given by the farmer leads to low daily gain of cattle. The problem is that supply of forages is insufficient due to limitation of space for forage production and depends on the seasons

exceptionally in dry battery period. Tropical grasses as the principal fountain-head of feed is never adequate to accomodate nutritious qualification at littlest 8% of crude protein [9]. *Indigofera zollingeriana* grows up extravagantly and available on the year, where those corner legumes bring out foliage and could build the superiority of low-quality grasses. Indigofera species has considerables anticipate as forages for ruminants. It is a potentiality legume because it has a first-class aggrandizement [10] with high production [11] and nutritive value [12; 1]. The use of this herb species accrues protein content of ration, dry matter complication degradability, and volatile fatty acid value in *in vitro* stomach representation [13].

A far-reaching belonging for contemplate and valuation of intercropping organized whole is the Land Equivalent Ratio (LER). LER is a measurement of the effectiveness of an intercrop or mixture, land equivalent ratio which is the virtually unremarkably euphemistic pre-owned for intercrop versus solitary harvest juxtapositions [14]. The LER makes an analogy with land spaces compulsory underneath unmarry or solitary cropping to come across the give up the fight obtained from the constituent crops of mixture. LER verifies the effectualness of intercropping for victimisationing the process of the surrounding compared to solitary cropping [15]. The LER is the comparative land environment compulsory underneath solitary cropping to come across the give up the fight obtained from the constituent crops of the mixture. If the LER is in a superior way than one, the intercrop or combination is advantageous; if the LER is few than one, intercropping is harmful [16]. Values in a superi way than individual demonstrate intercropping to be more efficient than solitary cropping in designation of land use, patch expenditure few than individual demonstrate epriviation in effectiveness outstanding intercropping The purpose of this stud is to determine the area equivalent ratio (LER) of *Indigofera zollingeriana* (Iz) and *Pennisetum purpureum* (Pp) in coconut plantations based on nutrient content.

2. MATERIALS AND METHODS

2.1. Experimental Site

The ponder turned into performed withinside the observational gion of Asassement Institute of Agriculture Technology (AIAT) of Northwards Sulawesi, located 12 km from Manado City. Observational state of affairs conentional an intermediate precipitation of 500 mm, and moderatly apportioned all the more on all sides of location, apart from for the amplitude of mark down precipitation of 50-100 mm monthly. The pH of the fertile, blond loam begrime was on all sides of 6. Flourescent transmitance at 10.00 a.m on a sunny daily as PAR beneath mature tall coconuts turned into averaging of seventy three percents. begrime shade turned into dark-skinned chocolate-brown clay. Precipitation peaks came about in January, with high-pitched precipitation concentration. This attention precipitated high-pitch comparative humidness of 86 percents. Atmosphere temperature ranged from 23.1 ^{0}C to 32.7 ^{0}C.

2.2. Experimental Design

Grass seeds of *Pennisetum urpureum* cv Mott (Pp) have been acquired from Asassement Institute of Agriculture Technology (AIAT) of North Sulawesi. Herb kernels of *Indigofera zollingeriana* (Iz) have been acquired from the Agrostology place of the organization of Animal Science, Bogor Agricultural University. Indigofera seeds sown on land have been processed as a nursery. Plant seeds that had grown properly have been then moved into the 2.5 kg plastic bag already packed with soil (one plant/plastic bag). Subsequently ontogenesis of two months in a medium plastic bag, the communicate was so transferred in to observational situation in a machination proportion of 3m x 4m that had been clarified with 6 treatments of behaviour towards of planting placement with string placement of 1m apart. Intercropping having six mixtures and every turned into plante in 3 plots. Three planting area turned into Iz : (i) 1.0m x 0.5m, (ii) 1.0m x 1.0m, and (iii) 1.0m x 1.5m. Two Planting area Pp : (i) 1.0m x 0.50m, and (ii) 1.0m x 0.75m. After one month Indigofera in plant s e, Pp turned into planted. The plot mixtures were: I1= 1.0m 0.5m Iz & 1.0m x 0.50m Pp; I2= 1.0m x .5m Iz & 1.0m x 0.75m Pp; I3= 1.0m x .0m Iz & 1.0m x 0.50m Pp; I4= 1.0m x 1.0m Iz & 1.0m x 0.75m p; I5= 1.0m x 1.5m Iz & 1.0m x 0.50m Pp; and I6= 1.0m x 1.5m Iz & 0.75m x 1.0m Pp. Indigofera became harvested at ± ninety days after planting. Indigofera have been defoliated at peak degree a hundred cm above ground. Pennisetum became defoliated at peak degree 10 cm ve ground. Samples representatives have been dried at 60 ^{0}C for forty eight rs. Samples have been analyzed for dry matter, crude protein, and crude fiber following Association of Official Analytical Chemists (2005) procedure.

Data had been analysed the use of evaluation of variance (ANOVA) through MINITAB (Version 16). Significance Difference (HSD) become carried out to research the have an impact on of differentiation sorrounded through treatments. Significant variations had been popular if P <0.05.

2.3. Land Equivalent Ratio

The LER was determined according to the formula:

$$\text{LER} = \frac{Y_{iz}\text{in mixed stand}}{Y_{iz}\text{in pure stand}} + \frac{Y_{pp}\text{in mixed stand}}{Y_{pp}\text{in pure stand}}$$

Where: LER= Land equal ratio, Yiz= nutrient content material of Indigofera zollingeriana, Ypp= nutrient content material of Pennisetum purpureum.

3. RESULTS AND DISCUSSION

3.1. Land Equivalent Ratio

LER with expenditure in a advanced manner than 1.zero suggests that intercropping is a serviceable patch, the LER few than 1.zero confirmed that intercropping is harmful [18]. For instance, an LER 1.25 factors out that an surroundings cropped solitary harvest or monoculture might bounteous 25% greater land to represent the corresponding outturn because the corresponding surroundings cropped in an intercrop [19]. Statistical evaluation of the information confirmed that aggregate of intercropping structures have significant outcomes on LER primarily based totally on crude protein and crude fiber content, however it does now no longer have significant outcomes on LER primarily based totally dry rely and ash content (Table 1)

3.2. Land Equivalent Ratio Based on Dry Matter

A LER primarily based totally on dry depend content material has approximately 1.641 to 1.709 indicating that an surroundings cropped an intercrop has better 64.1% to 70.9% dry depend content material greater than dry depend content material because the corresponding surroundings cropped in sole crop or monoculture. A LER primarily based totally on dry depend content material does now no longer have substantial outcomes on dry depend content material, however there may be tendency that aggregate planting area 1.0mx1.0m Iz and 1.0mx0.75m Pp has the best dry depend worry content material. It is properly proven in Table 1 that intercropping at exclusive spacing does now no longer have widespread results on LER primarily based totally on dry depend content material.

3.3. Land Equivalent Ratio Based on Crude Protein

A LER based on crude protein content has about 1.026 to 1.101 indicating that an environment cropped an intercrop has higher 2.6% to 10.1% crude protein content more than crude protein content as the corresponding environment cropped in sole crop or monoculture. A LER based on crude protein content has significant effects. The combination of planting space 1.0mx1.0m *Iz* and 1.0mx0.75m *Pp* has the highest crude protein content. It is well shown in Table 1 that intercropping at different spacing has substantial consequences on LER based on crude protein content.

3.4. Land Equivalent Ratio Based on Crude Fiber

A LER based on crude fiber content has about 0.941 to 0.980 indicating that an environment cropped an intercrop has lower 2.0% to 5.9% crude fiber content more than crude fiber content as the corresponding environment cropped In sole crop or monoculture. A LER primarily based totally on crude fiber content material has full-size effect. The combination planting space 1.0mx1.0m *Iz* and 1.0mx0.75m *Pp* has the lowest crude fiber content. It is well shown in Table 1 that intercropping at different spacing has substantial consequences on LER based on crude fiber content.

3.5. Land Equivalent Ratio Based on Ash

A LER based on ash content has about 1.046 to 1.415 indicating that an environment cropped an intercrop has higher 4.6% to 41.5% ash content more than ash content as the corresponding environment cropped In sole crop or monoculture. A LER primarily based totally on ash does now no longer have vast results on dry count number content, however there may be tendency that mixture planting area 1.0mx1.5m Iz and 1.0mx0.75m Pp has the very best ash content. It is well shown in Table 1 that intercropping at different spacing had no substantial consequences on LER based on ash content.

3.6. Implication of LER

The land equivalent ratio (LER) is an extensively euphemistic pre-owned comparative pointer of economical dependability of an intercrop, contrastive with outturn as a self-determined one. It calculable at the justification of the outturn of every constituent in an intercrop and in its unadulterated be upstanding; if terrific 1.00, an intercrop is recommended economically depenable [20]. A LER that is extra than 1 for crude protein content material can regularly be attributed to beautify nitrogen fixation and nitrogen uptake in intercropping [21].

The superiority of intercropping is due to the free use of constrained processes such as light, nutrients and water [22]. The nutritional composition of a plant is influenced by several factors, including the fertility rate of the growing medium and the biological environment. Short distances (increased density) increase the competition between nutrient requirements and sunlight. Planting expands the exaggerated microenvironment (temperature, humidity, light) and expands the rod to deepen understanding [23]. Since light is provided by sky plants, individuals that determine sky leaves are indirectly like cow flies from the introduction of attached photosynthesis and by reducing the growth of these neighbors through the shade. He is the blessing of his neighbor [24].

Narrower row spacing of 1.0m x 0.5m reduced the number of branches [25]. It is practicable that the considerable placement between conterminous plants inside strings enhanced the aptitudes of the plants to transform the intercepted solar dispersal to foliage creation [11]. When mixed with corn-inoculated soybeans, higher corn than uninoculated soybeans and pure stock corn was obtained. The reason for this strength is the effect of light competition as the inoculated soybeans grow faster and provide sufficient competition for corn in the first weeks of plant growth, resulting in increased plant height. .. Another factor that may have contributed to the increase in maize plant height when soybean growth ceased is the effect of nitrogen fixed from the legume constituents of the cover crop [26].

The abundant number of branches, the increased ontogeny characteristic of leaf development, and the availability of associated energy storage (carbohydrates) support feed regrowth [27]. Studies in the shade of coconut plantations showed that plant populations per hectare increased, but dry weight did not increase linearly. This phenomenon is probably due to a lack of light on the coconut plantation [28]. The results of the study are inconsistent with the results found in a perfect sunlight environment that increases the number of plants per unit area. This condition linearly approached the production limit [25].

Deterioration of the properties of Gambopod mixed with corn Silene. The continuity of generalization shows the result of the peak of nutritious flowering [29]. Maize plant shading reduced the photosynthetic capacity of cotton in mixed-covered crop patterns. [30] In addition, the characteristic nogin yield simplification in catch crop cultivation, compared to undistorted shading, can counteract the chain reaction [31]. Brachiaria fumicola-based willows under the coconut plantation could not stay permanently in the crossed willows characterized by Brachiaria aggression due to co-educational herbs or creeping herbs, so the corner legumes It should improve protein [32]. Indigofera pseudotinus integrated into pastures under mature coconuts has the potential to increase livestock productivity, but needs to be fully elucidated.

The coconut plantation debate is an even more important topic in livestock exploitation as this product is invested in bone farming at the farmer level [33]. The formation of dry matter complications in the feed is caused by the formation of exaggerated leaves and stems by cell division and elongation. Both physiological treatments are sites of high metabolic activity, including aggregation of dry matter complications, and fix the use of atmospheric CO2 photosynthetic activity [34]. Indirectly, for the beneficial management of tropical grazing systems, rangelands interested in mitigating changes in conditions have levels of soil organic carbon equal to or higher than those found under primeval forests. (SOC) may be included [35].

4. CONCLUSION

Based on the results of this study, the most appropriate land equivalent ratio based on nutrient content in terms of crude protein content, crude fiber content, and dry matter content in the 1.0mx1.0m size combination of *Indigofera zollingeriana* You can conclude that it was obtained. As a planting distance under the coconut plantation, 1.0m x 0.75m *Pennisetum purpureum* cvMott.

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