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Exploration of Azolla LOF Effectiveness and Cultivars on Land Equivalence Ratio of Maize and Soybean in Intercropping System

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Abstract:- This study aimed to evaluate the impact of Azolla LOF concentration and cultivar selection on the Land Equivalency Ratio (LEC) of corn and soybean in intercropping system. The research was conducted at an altitude of 50 m above sea level with climate type C. The experimental design used a non-factorial Randomized Group Design with six soybean cultivar treatments and five Azolla LOF concentration treatments. Planting was done on a 1.5 m x 3 m field with a certain spacing. Data analysis used the method of variance and Scott-Knott further test.

The results showed that Azolla LOF concentration and cultivar had a significant effect on the growth and yield of soybean plants in intercropping system. Plant height, number of leaves, and seed weight per plant were affected by the treatment combination. Treatment with Anjasmoro cultivar and LOF Azolla concentration of 400 ml/l gave the highest yield. Analysis of Land Equivalency Ratio (LER) showed variation between treatments, with P21 + Anjasmoro showing the highest LER for soybean and intercropping. This indicates the superiority of the treatment in increasing soybean and intercropping crop production compared to corn.

Keywords: *LOF_Azolla, Cultivar, Intercropping, Soybean, Yield.*

1. Introduction

Intercropping has become an attractive strategy for increasing farmland productivity while maintaining environmental sustainability. This practice involves planting two or more crop species in one field at the same or different times. The success of these intercropping systems depends largely on the interactions between the crops grown, such as corn and soybean, as well as environmental factors, nutrients, and soil management [1].

One important aspect in intercropping farming practices is the effective and efficient use of inputs. Azolla Liquid Organic Fertilizer (LOF) has been identified as one of the promising inputs to improve productivity and sustainability of agricultural systems. Azolla is a small aquatic plant that has a high ability to fix nitrogen from the air through symbiosis with Rhizobium bacteria found in its roots. The application of Azolla LOF can help increase soil nitrogen availability and reduce dependence on chemical fertilizers [2].

However, although the potential of Azolla LOF has been recognized, there is still a significant need to explore its effectiveness in various agricultural systems, especially in the context of intercropping agriculture. Previous research has highlighted the potential of Azolla LOF in improving the growth and yield of certain crops, however, there is still a lack of understanding regarding the interaction between Azolla LOF and the main crops in intercropping systems such as corn and soybean [3].

Intercropping system is implemented as a cropping pattern that creates a symbiotic relationship between two or more types of plants. The selection of crops planted simultaneously is based on complementary growth characteristics, so as to achieve optimal results. In agricultural practices in Indonesia, corn and soybean are common choices for intercropping, considering both have advantages and uniqueness in plant growth [4].

Maize is known as a fast-growing crop and has a plant height that can provide shade for other plants around it. This trait is very beneficial for crops such as soybeans that tend to need more protection from excessive sunlight. Soybean as a leguminous plant is able to enrich the soil with nitrogen through the nitrogen fixation process carried out by soil bacteria in its roots. This provides additional benefits for other surrounding plants, including maize. By implementing maize and soybean-based intercropping systems, the government hopes to increase food production sustainably while minimizing negative impacts on the environment. By utilizing the complementary growth characteristics between the two crops, it is expected that agricultural yields can be optimized, while improving food security and farmers' welfare. In addition, intercropping systems can also be part of the solution to achieve sustainability in the agricultural sector [5].

The Land Equivalency Ratio (LER) is a parameter that shows the extent to which soybean and corn are equivalent or superior to corn in an intercropping system. An increase in LER indicates land use efficiency and the potential for increased crop yields. Increased LER is critical in efforts to support agricultural sustainability [6]. This parameter provides information on the extent to which soybean and corn crops are able to contribute equally or even more favorably than corn as the main crop in the intercropping system. By optimizing LER, synergistic benefits between the two crops can be achieved, which in turn can increase land productivity and food security [7].

Land use efficiency is becoming increasingly relevant given the limited agricultural land available. By measuring HCV, the government, farmers and researchers can evaluate and improve agricultural strategies, including cultivar selection and application of Azolla liquid organic fertilizer (LOF) at various concentrations. A significant increase in HCV can be interpreted as a positive step towards achieving the goal of sustainable and resilient agricultural development. Therefore, understanding and increasing HCV in the context of intercropping systems can be the key to achieving optimal efficiency and productivity [8].

Azolla Liquid Organic Fertilizer (LOF), derived from the aquatic plant Azolla, has been proven as a source of organic nutrients that has the potential to improve soil fertility. Azolla contains various nutrients, vitamins, and organic compounds that can contribute positively to plant growth. Especially in the context of intercropping systems, the use of Azolla LOF is becoming increasingly important because it can affect interactions between plants, growth, and production yields [9].

The concentration of Azolla LOF plays a crucial role in determining its effectiveness as a liquid organic fertilizer. An optimal concentration can increase the availability of nutrients for plants, while an inappropriate concentration can have a different impact. Thus, this study aims to assess the impact of varying Azolla LOF concentrations and cultivar selection on maize and soybean LER in an intercropping system. This research becomes relevant in the context of increasing sustainable agricultural productivity, efficient land use, and utilization of organic materials to improve the balance of agricultural ecosystems. The results of the study are expected to contribute to practical understanding for farmers and become the basis for the formulation of sustainable agricultural recommendations [10].

2. Research Methods

The research was conducted in Sanca Village, Gantar District, Indramayu Regency at an altitude of 50 m above sea level, with climate type C according to the Oldeman classification. The research was conducted from July 2023 to October 2023. The materials used included soybean seeds from six cultivars, namely Anjasmoro, Dega 1, Deja 2, Dering 1, Gepak kuning, and Grobogan, and one Hybrid corn cultivar, Pioneer 21. The fertilizers used included Urea, Phonska, and LOF Azolla. Materials for making LOF Azolla consisted of Azolla plants, brown sugar, rice washing water, EM4, and water. The tools used involved a hoe for tillage and making plots, a roller meter to measure the plots, a tugal to help make planting holes, a stake to mark the plots, stationery to record observations, and a camera to document the implementation of the experiment. Specialized tools for the production of LOF Azolla include drums, kitchen knives, scales, tampah, and jerry cans [11].

The research design was conducted experimentally in the field using a non-factorial Randomized Group Design (RAK). There were six treatments of soybean cultivars and five treatments of LOF Azolla concentration, resulting in a total of 30 treatment combinations that were repeated twice [12]. Planting was done on a 1.5 m x 3 m plot, with soybean spacing of 40 cm x 15 cm, and corn spacing of 75 cm x 25 cm. The concentration of LOF Azolla was given at five levels, namely 0 ml/liter of water, 100 ml/liter of water, 200 ml/liter of water, 300 ml/liter of water, and 400 ml/liter of water [13].

The data obtained from this study were analyzed using the analysis of variance method. If there were significant differences between treatments, further tests were carried out with the Scott-Knott cluster test at the 5% significance level. All data were processed using Microsoft Excel version 2111 software. Thus, this research method details the steps of conducting research from site selection, materials and tools, research design, to data analysis, which is in accordance with the objectives of research on the impact of Azolla LOF concentration and cultivar on Land Equivalency Ratio (LER) of corn and soybean in intercropping system [14].

3. Results and Discussion

3.1 Agroclimatic Conditions of the Research Site

a). Climate Type:

The research site has climate type C3 according to the Oldemen classification. This means that this land can only be planted once with rice and twice with secondary crops or vegetables [15].

b). Rainfall:

The average rainfall during the experiment was 248.78 mm. The water requirement of soybean plants ranges from 350 - 400 mm/3.5 months, while corn plants require 1200 - 1600 mm. Rainfall at the site is less suitable for soybean and not eligible for maize growth [16].

c). Daily Temperature:

The average daily temperature during the experiment was 27.6 °C. High temperatures can affect soybean pod formation, while maize requires daily temperatures between 26 - 30°C [17].

d). Humidity:

The average humidity during the experiment was 79.1%. Soybean plants require 75-90% humidity for growth to pod filling, while corn requires 36 - 42% [18].

e). Analisis Tanah:

The soil pH of 6.19 indicates a slightly acidic soil, but is suitable for the growth needs of soybean plants.

C-organic content was low (1.41), N-total was moderate (0.22), C/N was low (6.40), P_2O_5 HCl 25% (10.89 mg/100g), P_2O_5 (Bray/Olsen) was low (5.24 ppm), K_2O HCl 25% (37.59 mg/100g). Silty clay texture (sand 8%, silt 49%, clay 43%) [19].

f). Pests, Diseases, and Weeds:

Pests identified include green ladybugs, brown ladybugs, and grasshoppers. Weeds found were weeds such as sedges and grasses. Brown and green ladybirds can cause up to 80% pod damage to soybean plants, and grasshoppers damage leaves and shoots [20]. Weeds were controlled mechanically using sickles and corers..

3.2 Growth Components

a). Soybean Plant Height

Figure I. Visualizing the height of intercropped soybean plants at various treatments and stages of observation time (3 weeks, 5 weeks, and 7 weeks). At 3 weeks of planting, the highest plant height was recorded in treatment VII (Dega 1 + 100 ml/l + P21 + 100 ml/l) at 35.10 cm, while the lowest was in treatment XVII (Dering 1 + 100 ml/l + P21 + 100 ml/l) with plant height only reaching 10.00 cm. At 5 weeks of planting, the highest plant height was achieved by treatment V (Anjasmoro + 400 ml/l + P21 + 400 ml/l) at 51.20 cm, while the lowest plant height was in treatment XVI (Dering 1 + 0 ml/l + P21 + 0 ml/l) at 29.20 cm. At the age of 7 weeks after planting, treatment XXX (Grobogan + 400 ml/l + P21 + 400 ml/l) produced the highest plant height of 62.50 cm, while the lowest plant height was recorded in treatment XI (Deja 2 + 0 ml/l + P21 + 0 ml/l) around 40.05 cm.

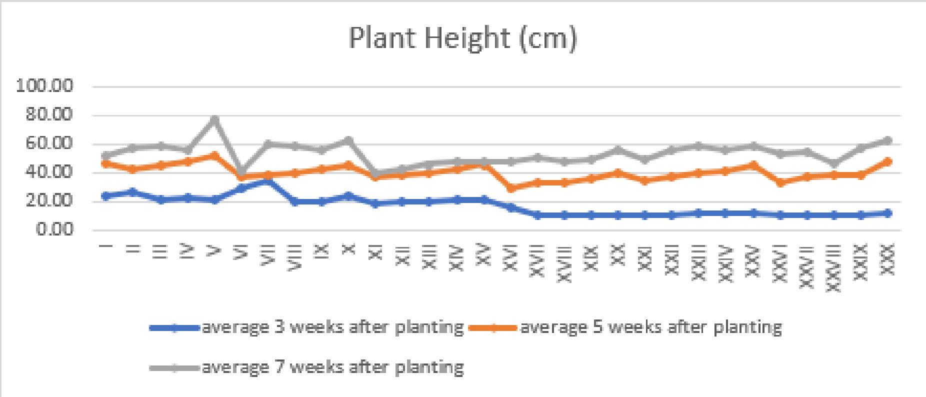

Figure I. Height of Intercropped Soybean Plants

Factors affecting plant height can be explained by the addition of organic matter, as indicated in treatments VII and V which used Dega 1 and Anjasmoro at certain doses. Organic matter contains vitamins, auxins, aromatic, and aliphatic acids that can spur or inhibit plant growth, including plant height [21].

b). Number of Soybean Leaves

Figure II. Shows the observation of the number of leaves on intercropped soybean plants at three different time points, namely the age of 3 weeks, 5 weeks, and 7 weeks. At 3 weeks of planting, the highest average number of leaves reached 4.15 in treatment V (Anjasmoro + 400 ml/l + P21 + 400 ml/l), while the lowest number of leaves was recorded in treatment XX (Dering 1 + 400 ml/l + P21 + 400 ml/l) with only 1.40 leaves. At 5 weeks of planting, treatment XXX (Grobogan + 400 ml/l + P21 + 400 ml/l) showed the highest average number of leaves at 11.00, while treatment XVI (Dering 1 + 0 ml/l + P21 + 0 ml/l) had the lowest number of leaves at 6.20. At 7 weeks of planting, treatment V (Anjasmoro + 400 ml/l + P21 + 400 ml/l) again showed the highest average number of leaves, reaching 14.06, while treatment XI (Deja 2 + 0 ml/l + P21 + 0 ml/l) had the lowest number of leaves, 7.20.

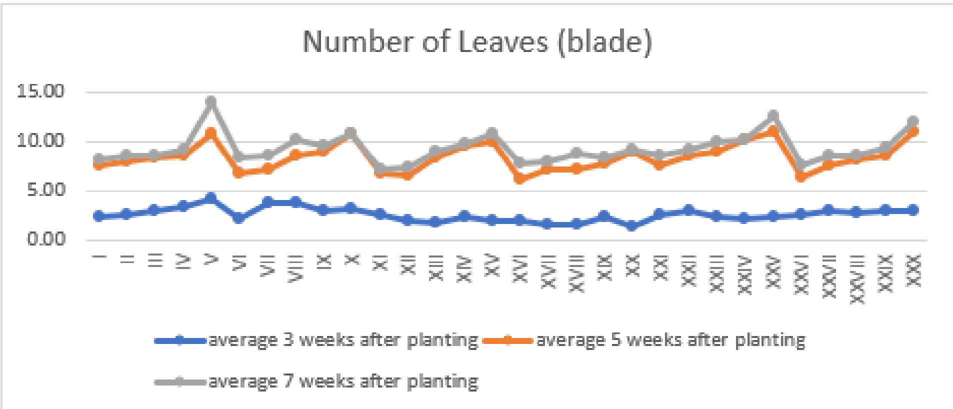

Figure II. Number of Soybean Leaves in Intercropping

The analysis showed significant variation in the number of leaves of intercropped soybean plants, which could be influenced by treatment factors and observation time. Differences in the number of leaves can be caused by the element nitrogen (N) absorbed by plants. Nitrogen is an important amino acid component in enzyme synthesis and the formation of plant cells. Adequate nitrogen availability will improve plant quality, including an increase in the number of leaves per plant. LOF Azolla, with its high nitrogen content, has the potential to promote vegetative growth of soybean plants.

3.3 Outcome Components

a). Seed Weight per Plant, 100 Seed Weight and Seed Weight per Plot of Intercropped Soybean

The research results illustrated in Table 1, regarding the weight of seeds per plant. Treatment V (Anjasmoro + 400 ml/l + P21 + 400 ml/l) gave the highest yield with 8.41 grams, not significantly different from several other treatments.

Table 1. Seed Weight per Plant, 100 Seed Weight and Seed Weight per Plot of Intercropped Soybeans

Treatment	Seed Weight per Plant	100 Seed Weight	Seed Weight per Plot
I (Anjasmoro + 0 ml/l + P21 + 0 ml/l)	4,09 a	12,35 b	204,25 a
II (Anjasmoro + 100 ml/l + P21 + 100 ml/l)	5,38 b	13,20 b	269,00 b
III (Anjasmoro + 200 ml/l + P21 + 200 ml/l)	5,58 b	14,70 c	278,75 b
IV (Anjasmoro + 300 ml/l + P21 + 300 ml/l)	5,90 b	15,65 c	294,50 b
V (Anjasmoro + 400 ml/l + P21 + 400 ml/l)	8,41 b	17,96 c	420,50 b
VI (Dega 1 + 0 ml/l + P21 + 0 ml/l)	5,25 b	15,85 c	262,50 b
VII (Dega 1 + 100 ml/l + P21 + 100 ml/l)	4,18 a	15,75 c	208,75 a
VIII (Dega 1 + 200 ml/l + P21 + 200 ml/l)	5,32 b	16,25 c	265,75 b
IX (Dega 1 + 300 ml/l + P21 + 300 ml/l)	6,29 b	16,95 c	314,50 b
X (Dega 1 + 400 ml/l + P21 + 400 ml/l)	5,73 b	17,60 c	286,50 b
XI (Deja 2 + 0 ml/l + P21 + 0 ml/l)	3,41 a	12,65 b	170,25 a
XII (Deja 2 + 100 ml/l + P21 + 100 ml/l)	3,90 a	13,20 b	195,00 a
XIII (Deja 2 + 200 ml/l + P21 + 200 ml/l)	4,76 a	13,45 b	238,00 a
XIV (Deja 2 + 300 ml/l + P21 + 300 ml/l)	4,67 a	13,60 b	233,25 a
XV (Deja 2 + 400 ml/l + P21 + 400 ml/l)	6,80 b	14,95 c	340,00 b
XVI (Dering 1 + 0 ml/l + P21 + 0 ml/l)	3,40 a	7,70 a	170,00 a
XVII (Dering 1 + 100 ml/l + P21 + 100 ml/l)	6,39 b	8,80 a	319,25 b
XVIII (Dering 1 + 200 ml/l + P21 + 200 ml/l)	4,29 a	9,20 a	214,50 a
XIX (Dering 1 + 300 ml/l + P21 + 300 ml/l)	4,21 a	9,70 a	210,25 a
XX (Dering 1 + 400 ml/l + P21 + 400 ml/l)	4,40 a	10,00 a	219,75 a
XXI (Gepak K. + 0 ml/l + P21 + 0 ml/l)	3,43 a	9,25 a	171,50 a
XXII (Gepak K. + 100 ml/l + P21 + 100 ml/l)	2,86 a	9,90 a	142,75 a
XXIII (Gepak K. + 200 ml/l + P21 + 200 ml/l)	5,39 b	11,90 b	219,50 a
XXIV (Gepak K. + 300 ml/l + P21 + 300 ml/l)	4,70 b	12,75 b	234,75 a
XXV (Gepak K. + 400 ml/l + P21 + 400 ml/l)	6,97 b	13,70 b	348,25 b
XXVI (Grobogan + 0 ml/l + P21 + 0 ml/l)	5,50 b	16,10 c	274,75 b
XXVII (Grobogan+100 ml/l + P21 + 100 ml/l)	4,43 a	17,05 c	221,25 a
XXVIII (Grobogan+200 ml/l + P21+200 ml/l)	3,70 a	17,35 c	185,00 a
XXIX (Grobogan + 300 ml/l + P21 + 300 ml/l)	5,25 b	18,70 c	262,25 b
XXX (Grobogan + 400 ml/l + P21 + 400 ml/l)	5,93 b	19,60 c	296,50 b

Notes: Mean numbers followed by the same letter indicate not significantly different based on the Scott-Knott Cluster Test at the 5% real level.

This shows a positive effect on seed weight per plant. Based on 100 Seed Weight: Treatment XXX (Grobogan + 400 ml/l + P21 + 400 ml/l) showed the best results with 19.60 grams, not significantly different from several other treatments. The XXX treatment was significantly different from most of the other treatments, indicating a positive effect on 100 seed weight. Based on Seed Weight per Plot: Treatment V (Anjasmoro + 400 ml/l + P21 + 400 ml/l) showed the highest yield with 420.50 grams, not significantly different from several other treatments. Treatment V was significantly different from most of the other treatments, showing a positive effect on soybean seed weight per plot.

LOF Azolla, with its high nitrogen content, can act as a stimulator of vegetative growth of soybean plants. The role of LOF Azolla as an effective nitrogen source can affect plant growth, including an increase in seed weight per plant and seed weight per soybean plot. In the context of plant psychology, interactions between plants and their environment include plant responses to nutritional stimuli that affect overall plant growth and yield [22].

b). Seed Weight per Intercropped Corn Plot

The observation results of seed weight per intercropped corn plot are presented in Table II, which includes cultivar treatment variations and LOF Azolla. Analysis of variance of treatment combinations showed a significant effect on seed weight per intercropped corn plot. Based on the table, treatment V (P21 + 400 ml/l + Anjasmoro + 400 ml/l) stood out as the treatment with the highest yield, reaching a weight of 744.40 grams. This treatment was not significantly different from several other treatments, namely XV, XXV, XX, XXX, and X, which also gave quite high yields.

Table II. Seed Weight per Intercropped Maize Plot

Treatment	Seed Weight per Plot
I (P21 + 0 ml/l + Anjasmoro + 100 ml/l)	705,05 a
II (P21 + 100 ml/l + Anjasmoro + 100 ml/l)	713,78 b
III (P21 + 200 ml/l + Anjasmoro +200 ml/l)	721,60 c
IV (P21+ 300 ml/l + Anjasmoro + 300 ml/l)	733,60 d
V (P21 + 400 ml/l + Anjasmoro + 400 ml/l)	744,40 e
VI (P21 + 0 ml/l + Dega 1 + 0 ml/l)	706,35 a
VII (P21 + 100 ml/l + Dega 1 + 100 ml/l)	713,60 b
VIII (P21 + 200 ml/l + Dega 1 + 200 ml/l)	718,60 c
IX (P21 + 300 ml/l + Dega 1 + 300 ml/l)	733,20 d
X (P21 +400 ml/l + Dega 1 + 400 ml/l)	742,45 e
XI (P21 + 0 ml/l + Deja 2 + 0 ml/l)	707,15 a
XII (P21 + 100 ml/l +Deja 2 + 100 ml/l)	713,30 b
XIII (P21 + 200 ml/l + Deja 2 + 200 ml/l)	719,15 c
XIV (P21 + 300 ml/l + Deja 2 + 300 ml/l)	733,75 d
XV (P21 + 400 ml/l + Deja 2 + 400 ml/l)	744,30 e
XVI (P21 + 0 ml/l + Dering 1 + 0 ml/l)	708,30 a
XVII (P21 + 100 ml/l +Dering 1 + 100 ml/l)	712,95 b
XVIII (P21 + 200 ml/l +Dering 1 + 200 ml/l)	719,60 c
XIX (P21 + 300 ml/l + Dering 1 + 300 ml/l)	733,40 d
XX (P21 + 400 ml/l +Dering 1 + 400 ml/l)	743,60 e
XXI (P21 + 0 ml/l + Gepak K. + 0 ml/l)	707,75 a

Treatment	Seed Weight per Plot
XXII (P21 + 100 ml/l + Gepak K. + 100 ml/l)	712,95 b
XXIII (P21 + 200 ml/l + Gepak K. + 200 ml/l)	719,60 c
XXIV (P21 + 300 ml/l + Gepak K.+ 300 ml/l)	732,65 d
XXV (P21 + 400 ml/l +Gepak K. + 400 ml/l)	743,70 e
XXVI (P21 + 0 ml/l + Grobogan + 0 ml/l)	707,95 a
XXVII (P21 + 100 ml/l + Grobogan + 100 ml/l)	712,55 b
XXVIII (P21 + 200 ml/L +Grobogan + 200 ml/l)	716,15 c
XXIX (P21 + 300 ml/L + Grobogan + 300 ml/l)	731,85 d
XXX (P21 + 400 ml/L + Grobogan + 400 ml/l)	743,55 e

Notes: Mean numbers followed by the same letter indicate not significantly different based on the Scott-Knott Cluster Test at the 5% real level.

The results of treatments I to XXX showed variations in seed weight per intercropped maize plot, and significant differences between treatments could be identified. For example, treatment V with the highest seed weight (744.40 grams) was significantly different from treatments I to IV and VI to IX, which had lower seed weights.

The presentation of results using the letters a, b, c, d, and e in the column "Seed Weight per Plot" facilitates the identification of treatment groups that are not significantly different based on the Scott-Knott Cluster Test at the 5% real level. Treatments with the same letter indicate that there is no significant difference between them [23].

c). Land Equivalency Ratio (LER)

The data in Table III, presents the production results of corn and soybean plants for each treatment with LOF concentration of 400 ml/liter of water. This information is a quantitative representation of the experimental results, enabling analysis of crop productivity in the context of Azolla LOF use.

Table III. Maize and Soybean Crop Production

Treatment Concentration LOF 400 ml/liter of water	Land Equivalency Value		
	Corn	Soybeans	Intercropping
P21 + Anjasmoro	1,00	6,79	7,80
P21 + Dega 1	1,00	4,18	5,18
P21 + Deja 2	1,00	6,24	7,24
P21 + Dering 1	1,00	8,70	9,70
P21 + Gepak kuning	1,00	6,63	7,63
P21 + Grobogan	1,00	4,29	5,29

Notes : The highest Land Equivalency Ratio was Obtained in Intercropping Corn and Soybean Cultivar Dering 1.

LER was used as a metric to evaluate the efficiency of land productivity in the intercropping system. All LER values recorded were greater than one indicating that the intercropping systems tested in this study were more productive than monocropping.

The highest Land Equivalency Ratio, reaching 9.70, was obtained in the intercropping treatment between corn and soybean with Dering 1 cultivar. This result reflects high effectiveness in utilizing available land and resources. Thus, the Land Equivalency Ratio analysis consistently indicates that the intercropping of corn and soybean with Dering 1 cultivar has excellent potential in increasing land productivity [24].

These findings consistently support the main objective of this study, which was to explore the effectiveness of Azolla LOF and various cultivars in improving soil equivalence ratio in maize and soybean crops in intercropping systems. With these results, this study makes a positive contribution in directing agricultural practices towards sustainable and optimal productivity [25].

3.4 Discussion

Agroclimatic conditions and soil factors affecting the growth of maize and soybean crops in intercropping systems at the research site. It has a C3 climate type, which limits rice cultivation and is more suitable for secondary crops or vegetables. Rainfall during the experiment did not meet the water needs of soybean and maize plants, indicating challenges in plant growth due to suboptimal water availability. In addition, high daily temperatures and moderately high air humidity affected soybean pod formation, while for maize, suitable temperatures ranged from 26 - 30°C [26].

Soil analysis showed a slightly acidic soil pH that is suitable for the growth needs of soybean plants. However, nutrient contents such as C-organic, N-total, P2O5, and K2O need special attention to improve soil quality. The presence of pests such as green ladybugs, brown ladybugs, and grasshoppers, as well as weeds such as weed grass and belulang grass, indicate a potential threat to plant growth. The application of mechanical control of weeds shows awareness to minimize disturbance to plants [27].

In terms of plant growth, plant height and number of leaves of soybean plants experienced significant variations between treatments. The use of certain organic materials, such as Dega 1 and Anjasmoro, had a positive impact on plant height. The number of leaves, which is influenced by nitrogen, showed diverse responses to treatments and observation time. LOF Azolla, with its high nitrogen content, has the potential to spur vegetative growth of soybean plants [28].

Plant production yields, such as seed weight per plant, 100-seed weight, and seed weight per soybean plot, showed variation among treatments. The use of LOF Azolla in some treatments, especially Anjasmoro, stood out as a factor that contributed positively to soybean yield. Similarly, the seed weight per intercropped maize plot, where certain treatments, such as V (P21 + 400 ml/l + Anjasmoro + 400 ml/l), showed high yields and potential to be applied in the context of sustainable agriculture.

Land Equivalency Ratio (LER) analysis provides a quantitative picture indicating the efficiency of the intercropping system of maize and soybean with Dering 1 cultivar. The highest LER in the treatment confirms the high potential in utilizing available land and resources. Thus, this finding provides support to the main objective of the study, which was to explore the effectiveness of Azolla LOF and cultivars in improving the land equivalence ratio of maize and soybean crops in intercropping systems [29].

4. Conclusion

The application of Azolla LOF, especially with Anjasmoro cultivar, and the use of organic matter such as Dega 1 showed positive contributions to plant height, number of leaves and soybean yield. Analysis of production outcomes, such as seed weight per plant and seed weight per soybean plot, revealed significant variations between treatments, with treatment V (Anjasmoro + 400 ml/l) standing out as the most productive. The Land Equivalency Ratio (LER) confirmed that the intercropping system of maize and soybean with Dering 1 cultivar has high potential in utilizing the available land and resources, with the highest LER reaching 9.70. These overall findings provide a foundation for the development of more efficient and adaptive sustainable farming practices, guiding farmers and stakeholders to design sustainable and adaptive farming strategies amidst the challenges of specific agroclimatic conditions.

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