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Effect of Cow Manure Dosage and Biofertilizer Concentration on the Growth and Yield of Peanut Plants (Arachis hypogaea L.)

Husni Ginanjar[1], Lia Amalia[2], Hudaya Mulyana[3]

[1]Student of the Master of Agrotechnology Study Program, Faculty of Agriculture, Winaya Mukti University, Indonesia

[2,3]Lecturer in the Master of Agrotechnology Study Program, Faculty of Agriculture, Winaya Mukti University, Jl. Raya Bandung-Sumedang Km.29 Tanjungsari 45362, Kab. Sumedang, West Java, Indonesia

E-mail: husniginanjar@gmail.com

Abstract

The experimental research was carried in Dawuan Kidul Village, Dawuan District, Subang Regency with an altitude of 92 m above sea level, with a type C climate (slightly wet) from August 2022 to October 2022. This study aims to study the interaction effect of cow manure application and the concentration of biological fertilizers. Environmental design using a completely randomized design (RAK) factorial pattern, with treatment of cow manure and biological fertilizer. Cow manure (K) consists of 4 levels, namely k0 = 0 tons ha¯¹ (control), k1 = 10 tons ha ¯¹ k2 = 20 tons ha¯¹, k3 = 30 tons ha¹ and bio-fertilizer bio-extreme (Y) consists of 4 levels, namely y0 = 0 ml L ¯¹ water (control) or equivalent to 0 liters of bio-extreme biofertilizer ha¯¹ y1 = 2.5 ml L ¯¹ water or equivalent to 0.5 liters ha¯¹ bio-extreme biofertilizer ha¯¹ y2 = 5 ml L¯ ¹ water or the equivalent of 1 liter of bio-extreme biofertilizer ha¯¹ y3 = 7.5 ml L¯¹ of water or the equivalent of 1.5 liters of bio-extreme biofertilizer ha¹. The results showed that the effect of cow manure and biological fertilizers had an interaction effect on plant height at 14 days after planting and the number of branches at 28 days after planting, while observing the number of leaves, number of pods planted, total pod weight and number of pods per plot showed no interaction.

Keywords: Cow Manure, Biofertilizer, Peanuts

Abstract

Penelitian dilaksanakan di Desa Dawuan Kidul Kecamatan Dawuan Kabupaten Subang dengan ketinggian 92 m di atas permukaan laut, dengan iklim tipe C (agak basah) dari bulan Agustus 2022 sampai Oktober 2022. Penelitian ini bertujuan untuk mempelajari pengaruh interaksi pemberian pupuk kandang Sapi dan Konsentrasi Pupuk Hayati. Rancangan lingkungan menggunakan rancangan acak lengkap (RAK) pola faktorial, perlakuan pupuk kandang sapi dan pupuk hayati. Pupuk kandang sapi (K) teridiri dari 4 taraf, yaitu k0 = 0 ton ha¯¹ (kontrol), k1 = 10 ton ha ¯¹ k2 = 20 ton ha¯¹, k3 = 30 ton ha¯¹ dan pupuk hayati bio extrim (Y) terdiri dari4 taraf yaitu y0 = 0 ml L ¯¹ air (kontrol) atau setara dengan 0 liter pupuk hayati bio-extrim ha¯¹ y1 = 2,5 ml L ¯¹ air atau setara dengan 0,5 liter ha¯¹ pupuk hayati bio-extrim ha¯¹ y2 = 5 ml L ¯¹ air atau setara dengan 1 liter pupuk hayati bio-extrim ha¯¹ y3 = 7,5 ml L ¯¹ air atau setara dengan 1,5 liter pupuk hayati bio-exrim ha¯¹. Hasil penelitian menunjukkan bahwapengaruh pupuk kandang sapi dan pupuk hayati memberikan efek interaksi pada tinggi tanaman umur 14 HST dan jumlah cabang umur 28 HST sedangkan pada pengamatan jumlah helai daun, jumlah polong pertanaman, jumlah bobot polong pertanaman dan jumlah polong per petak tidak menunjukkan adanya interaksi.

Key words: Pupuk Kandang Sapi, Pupuk Hayati, Kacang Tanah.

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1. Introduction

Peanuts (Arachis hypogaea L.) are a food crop that has high economic value because of their nutritional content, especially high protein and fat. The need for peanuts continues to increase from year to year in line with the increase in population, nutritional needs of the community, food diversification, and increasing capacity of the feed and food industry in Indonesia.

The problems faced in increasing national peanut production are caused by several things including: a) the application of technology has not been carried out properly, so that productivity is not optimal, for example, land processing is less than optimal so that drainage is poor and the soil structure is dense, plant maintenance is less than optimal so that OPT is high, b) the use of quality seeds is still low, c) the use of biological and organic fertilizers is still low.

An effort made to increase peanut production is through selecting suitable peanut varieties and fertilizing. Fertilizer is divided into two types, namely: organic fertilizer and inorganic fertilizer. One organic fertilizer that can be used as an alternative to increase the efficiency and availability of nutrients in peanut cultivation is manure. Cow manure is expected to improve the physical, chemical and biological properties of the soil, thereby increasing peanut yields.

The addition of organic fertilizer to the soil does not only depend on the level of nutrient elements, but also has other roles, namely improving the structure, aeration, water holding capacity of the soil, influencing or regulating soil temperature conditions and providing a breakdown product that can help plant growth (Hafizah and Rabiatul, 2017).

Apart from cow manure, this research also used Bio-Extrim fertilizer, which is a liquid compound biological fertilizer containing bacteria that can increase plant production. Bio-Extreme contains bacteria which are very beneficial for plants and the soil itself.

2. Materials and Methods

This research was to study the growth and yield of peanuts by administering doses of cow manure and Bio-Extreme Biological Fertilizer Concentration. So the research method used is verification by conducting experiments. The experiment was carried out in the experimental garden located in Dawuan Kidul Village, Dawuan District, Subang Regency at an altitude of 96 m above sea level, and will be carried out from August 2022 to October 2022

The materials used in this research were local Garuda Biga variety peanut seeds, the manure used in this research was decomposed cow manure and Bio-Extrim biological fertilizer. The tools used in this research were a hoe, machete, hand spayer, tape measure, caliper, hammer, bucket, analytical scale, name pamphlet, rope, petridis and writing tools.

This experiment was carried out using a Randomized Block Design (RAK) with a factorial pattern consisting of two factors, namely the first factor was the dose of cow manure (K) at 4 levels and the second factor was the concentration of Bio-Extreme Biological Fertilizer (Y) at 4 levels. From this research design, 16 treatment combinations were obtained. Each treatment was repeated 2 times, so that 32 experimental plots were

obtained. The plot size is 2 square meters. In one experimental plot there were 16 plants. Sample plants per plot are 2 plants per plot (without including edge plants).

Table 1. Combination treatment doses of cow manure and Bio-Extreme fertilizer

Cow manure dosage (K)	Bio Extreme fertilizer concentration (Y)			
	y0	y1	y2	y3
k0	k0 y0	k0 y1	k 0y2	k0y3
k1	k1 y0	k1 y1	k1 y2	k1y3
k2	k2 y0	k2 y1	k2 y2	k2y3
k3	k3y0	k3y1	k3y2	k3y3

Description: k_0= 0 ha¯¹, k1 = 10 tons ha¯¹ equivalent to 1 kg / treatment, k2 = 20 tons ha¯¹ equivalent to 2 kg/ treatment, k3= 30 tons ha¯¹ equivalent to 3 kg/ treatment y0= 0 ml L-1, y1 = 2.5 ml L -1 water is equivalent to 0.5 liter ha¯¹, y2 = 5 ml L-1 is equivalent to 1 liter ha¯¹, y3= 7.5 ml L-1 is equivalent to 1.5 liter ha¯¹

Table 2. Operational Independent Variables and Dependent Variables

No	Variable Type	Sub Variable	Variable Indicator
1	independent variable (Treatment)	1. Dose of cow manure (K)	k0 = 0 tons ha¯¹ (control) k1 = 10 tons ha¯¹ k2 = 20 tons ha¯¹ k3 = 30 tons ha¯¹
		2. Bio-Extreme Biological Fertilizer Concentration (Y)	y0 = 0 ml L-1 water y1 = 2.5 ml L-1 water y2 = 5 ml L-1 water y3 = 7.5 ml L-1 water
2	dependent variable (Response)	1. Peanut growth characteristics	1. plant height 2. number of leaves 3. number of branches
		2. peanut yield	1. number of pods planted 2. weight of planting pods 3. weight of pods per plot

Table 3. List of analyzes of various randomized block designs with factorial patterns

Diversity Source	Degrees of Freedom	Sum of Squares	Middle Square	F count
Deuteronomy (r)	r-1 = 1	JKr	KTr	KTr/KTg
Treatment (t)	ky -1 = 15	JKt	Summit	KTP/KTG
Cow Manure Dosage (K)	k - 1 = 3	JK (k)	KT (k)	KT (k)/KTg
Biofertilizer Concentration (Y)	y - 1 = 3	JK (y)	KT (y)	KT (y)/KTg
Interaction (KY)	(k-1)(y-1) = 9	JK (ky)	KT (ky)	KT (ky)/KTg
Error (g)	(ky-1)(r-1) = 6	JK is wrong	KTg	
Total	kyr - 1 = 31	JKT		

Source Herdiyantoro (2013) in Yati Haryati (2018)

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3. Results and Discussion

Plant Height

The effect of giving cow manure and Bio-extreme Biological Fertilizer on observations of plant height at 28 DAP, 42 DAP and 56 DAT showed no interaction, whereas at 14 DAP there was interaction.

Table 4. Effect of Cow Manure and Bio-Extreme Concentration on Height Plants aged 28 HST, 42 HST and 56 HST

TREATMENT	Plant Height (cm)					
	28 HST		42 HST		56 HST	
Cow Manure Dosage						
k0 (0 t ha¹)	35.25	a	47.00	a	58,625	a
k1 (10 t ha¹)	38.63	ab	50,125	ab	60.75	ab
k2 (20 t ha¹)	37.63	ab	51.50	b	62,875	b
k3 (30 t ha¹)	40.38	b	53,125	b	69,625	c
Biological Fertilizer Concentration						
y0 (0 ml L-1)	37.63	a	49,375	a	61,625	a
y1 (2.5 ml L-1)	38.25	a	50,375	a	63,125	a
y2 (5 ml L-1)	37.00	a	49.25	a	62,625	a
y3 (7.5 ml L-1)	39.00	a	52.75	a	64.50	a

Note: The average number of treatments followed by the same letter in the direction of the column is not significantly different according to the LSD (Least Significant Different) test at the five percent significance level.

Table 5. Effect of Cow Manure and Bio-Extreme Concentration on Plant height at 14 HST

Factor	k0		k1		k2		k3	
y0	14.00	BC	16.50	a	18.50	b	20.00	b
	A		B		BC		C	
y1	12.50	ab	17.00	a	15.00	a	18.00	b
	A		BC		B		C	
y2	11.00	a	17.50	a	16.50	ab	15.50	a
	A		B		B		B	
y3	15.00	c	19.00	a	16.50	ab	18.50	b
	A		C		AB		BC	

Note: The average number of treatments followed by the same letter in the direction of the column is not significantly different according to the LSD (Least Significant Different) test at the five percent significance level.

From Table 5, it can be seen that there was an interaction between the treatment dose of Cow Manure and Bio-Extreme Concentration on Plant Height at the age of 14 HST. The y0k3 treatment (Bio-Extreme concentration 0 ml L-1 and a dose of Cow Manure 30 tons ha¯1) gave the best plant height characteristics.

Number of Leaves

The effect of giving cow manure and Bio-extreme Biological Fertilizer on the number of leaves aged 56 HST shows an interaction.

Table 6. Effect of Cow Manure and Bio-Extreme Concentration on the Number of Strands Plant leaves aged 14 HST, 28 HST, 42 HST, and 56 HST

TREATMENT	Number of Leaves (strands)			
	14 HST	28 HST	42 HST	56 HST
Cow Manure Dosage				
k0 (0 t ha¹)	14.00 a	86.00 a	136.5 a	192.75 a
k1 (10 t ha¹)	18.00 b	87.00 ab	136.5 a	215.00 a
k2 (20 t ha¹)	17.00 b	87.00 ab	138.00 a	261.75 b
k3 (30 t ha¹)	17.00 b	89.50 b	137.50 a	267.50 b
Biological Fertilizer Concentration				
y0 (0 ml L-1)	17.50 ab	87.50 a	137.00 ab	234.50 a
y1 (2.5 ml L-1)	15.00 a	87.50 a	135.00 a	238.25 a
y2 (5 ml L-1)	15.50 ab	87.00 a	138.00 ab	223.75 a
y3 (7.5 ml L-1)	18.00 b	87.50 a	138.50 b	240.50 a

Note: The average number of treatments followed by the same letter in the direction of the column is not significantly different according to the LSD (Least Significant Different) test at the five percent significance level.

From Table 6, it can be seen that the k2 (20 ton ha¹) and k3 (30 ton ha¹) cow drum fertilizer treatment gave the highest number of leaves at the age of 56 HST, however the Bio-Extreme Concentration treatment at the age of 56 HST did not have a significantly different effect on each other. other.

Number of Branches

The effect of giving cow manure and Bio-extreme Biological Fertilizer on the observation of the number of branches aged 56 HST shows that there is an interaction between cow manure k2 (20 tons D-1 and bio extreme biofertilizer y3 (7.5 ml L-1)).

Table 7. Effect of Cow Manure and Bio-Extreme Concentration on the number of branches aged 14 HST, 42 HST, and 56 HST

TREATMENT	Number of branches (fruit)		
	14 HST	42 HST	56 HST
Cow Manure Dosage			
k0 (0 t ha¹)	1,125 a	6,000 a	7,375 a
k1 (10 t ha¹)	1,375 b	7,500 b	9,250 b
k2 (20 t ha¹)	1,250 a	8,375 b	9,375 b
k3 (30 t ha¹)	1,250 b	7,625 b	8,375 ab
Biological Fertilizer Concentration			
y0 (0 ml L-1)	1,250 a	7,125 a	8,250 a
y1 (2.5 ml L-1)	1,125 a	7,250 a	8,500 a
y2 (5 ml L-1)	1,375 a	6,875 a	8,500 a
y3 (7.5 ml L-1)	1,250 a	8,250 a	9,125 a

Note: The average number of treatments followed by the same letter in the direction of the column is not significantly different according to the LSD (Least Significant Different) test at the five percent significance level.

In terms of the independent effect of cow pen treatment at the observation age of 56 DAP, all treatment levels showed significant differences compared to the control except

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for the K3 treatment (30 tons ha¹), however at this observation age there was no significant effect for the Bio-Extreme Concentration treatment.

Table 8. Effect of Cow Manure and Bio-Extreme Concentration on Number of Branches Age 28 HST

Factor	k0		k1		k2		k3		Average
y0	3.00	a	3.50	a	5.00	b	33.00	a	3.83
	A		A		B		B		B
y1	3.50	a	3.50	a	3.50	a	31.00	a	3.50
	A		A		A		A		A
y2	4.50	a	5.00	a	3.00	a	35.00	a	4.17
	B		B		A		B		B
y3	3.50	a	4.50	a	5.50	b	35.00	a	4.50
	A		AB		B		AB		AB

Note: The average number of treatments followed by the same letter in the direction of the column is not significantly different according to the LSD (Least Significant Different) test at the five percent significance level.

From Table 8 it can be seen that there was an interaction between the treatment dose of Cow Manure and the Bio-Extreme Concentration on the Number of Branches at 28 HST. Treatments y2k3 and y3k3 provide the highest number of branches.

Number of Pods per Plant

The effect of giving cow manure and bio extreme biological fertilizer on observing the number of pods per plant shows an interaction.

Table 9. Effect of Cow Manure and Bio-Extreme Concentration on Number of Pods Per Plant

TREATMENT	Number of Pods Per Plant (fruit)	
Cow Manure Dosage		
k0 (0 t ha¹)	24.38	a
k1 (10 t ha¹)	27.69	a
k2 (20 t ha¹)	24.06	a
k3 (30 t ha¹)	25.38	a
Biological Fertilizer Concentration		
y0 (0 ml L-1)	24.81	a
y1 (2.5 ml L-1)	24.13	a
y2 (5 ml L-1)	24.88	a
y3 (7.5 ml L-1)	27.69	a

Note: The average treatment numbers followed by the same letter in the column direction are not significantly different according to the LSD (Least Significant Different) test at the five percent significance level.

Pod Weight per Plant

The effect of giving cow manure and bio-extreme biological fertilizer on observations of pod weight per plant showed an interaction but was not significant.

Table 10. Effect of Cow Manure and Bio-Extreme Concentration on Pod Weight per Plant

TREATMENT	Pod Weight per Plant (grams)
Cow Manure Dosage	

k0 (0 t ha¹)	51.63	a
k1 (10 t ha¹)	58.69	a
k2 (20 t ha¹)	53.75	a
k3 (30 t ha¹)	61.69	a
Biological Fertilizer Concentration		
y0 (0 ml L-1)	53.31	a
y1 (2.5 ml L-1)	57.06	a
y2 (5 ml L-1)	53.25	a
y3 (7.5 ml L-1)	62.13	a

Note: The average number of treatments followed by the same letter in the direction of the column is not significantly different according to the LSD (Least Significant Different) test at the five percent significance level.

Pod Weight per Plot

The effect of giving cow manure and bio-extreme biological fertilizer on observations of pod weight per plot showed that there was no interaction between cow manure and bio-extreme concentration on pod weight.

Table 11. Effect of Cow Manure and Bio-Extreme Concentration on Pod Weight

TREATMENT	Pod Weight		
	Per Plot (kg)		Per Hectare (ton)
Cow Manure Dosage			
k0 (0 t ha¹)	3.30	a	8.26
k1 (10 t ha¹)	3.76	a	9.39
k2 (20 t ha¹)	3.44	a	8.60
k3 (30 t ha¹)	3.95	a	9.87
Biological Fertilizer Concentration			
y0 (0 ml L-1)	3.41	a	8.53
y1 (2.5 ml L-1)	3.65	a	9.13
y2 (5 ml L-1)	3.41	a	8.52
y3 (7.5 ml L-1)	3.98	a	9.94

Note: The average number of treatments followed by the same letter in the direction of the column is not significantly different according to the LSD (Least Significant Different) test at the five percent significance level.

4. Conclusion

Based on the results of the data analysis and discussion that has been presented, it can be concluded that the effect of cow manure and bio extreme biofertilizer is: There is an interaction between the dose of cow manure and the bio-extreme concentration on the characteristics of plant height at 14 DAT and the number of branches at 28 DAP . There is no optimum dose of cow manure at each biological fertilizer concentration that provides the highest pod weight per plot. Using a dose of cow manure, namely 30 tons ha-1 with the use of extreme bio fertilizer of 7.5 ml L-1, has a better influence on the growth of peanut plants (plant height, number of leaves and number of productive branches) but has no effect on yield. plant (pod weight). Similar research needs to be carried out in different seasons and locations.

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