

# Study of Doses of Cow Manure in Monoculture and Intercropping of Sesame and Corn Cultivation in Karanglor, Manyaran, Wonogiri

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## Abstract

Problem of sesame and maize cultivation in Indonesia is low productivity. Planting rainfed land in Manyaran District, Wonogiri Regency. The research objective was to determine the effect of organic fertilizer on maize and sesame production by monoculture and intercropping. The study used grumosol soil which was idle for 2 years. Research in March-November 2020 during the Covid-19 pandemic. Complete Randomized Block Design Research with two factors. The first factor, the dose of cow manure consisted of 0 controls, 150, 200 gr. The second factor was the types of crops in the form of maize, sesame and intercropping of sesame and corn. The variables observed were plant height, leaf color, number of branches per plant, number of filled pods per plant, seed weight per plant, number of cobs, weight of corn cobs in monoculture and intercropping. The results showed that the intercropping system was more productive than monoculture.

**Key words:** corn, sesame, cow manure, intercropping, monoculture

## I. INTRODUCTION

Lack of sesame domestic production in 2001 about 10,265 tons, while domestic production only about 10,000 tons (Ardjasa, 1994). Causes of low sesame production in the country is low productivity and reduced land area sesame. The low yield of the sesame is due to the still cultivation technique traditional and continuous use of seeds from local varieties without through selection (Soerjandono, 2008). Intensification is very necessary for increase the productivity of sesame. Intensification can be done by engineering growing environment, improving cultivation techniques and using varieties with high yield suitable for a particular type of land. Other than that, Increased production of sesame is also done by increasing the area cultivation, especially on marginal lands such as the results of land reclamation of sand (El-Habbasha 2007).

Corn planting areas are generally in dry areas, which are less than optimal for rice cultivation and horticultural commodities, because maize can adapt widely, from optimum land to marginal land with low water availability and higher temperatures (Wirosoedarmo et al, 2011) . Corn has a high diversity because of its very wide area of cultivation (Yasin et al, 2016). Intercropping is the planting of two or more plants simultaneously on the same plot of land with the spacing of the plants certain (Prasetiawati, 2014), the planting time can be concurrent or different but not past flowering. System intercropping is more profitable than monoculture system because land productivity becomes higher, the type of commodity produced various, the risk of failure can be minimized, (Dinesh, 2010). Selection of intercropping corn with sesame takes into account the factors ecophysiology, habitus and age of both plants. Through land use and diversification of plant cultivation, it is necessary to study through this research which aims to:

1. Produce a technology package in the form of monoculture development of sesame and corn and intercropping using manure and knowing the best effect of using manure on monoculture and intercropping yields.
2. Knowing the ratio of sesame to maize with different morphological appearance in the intercropping or monoculture system which gives higher yields.

## II. RESEARCH METHOD

### 2.1. Location

The research was conducted on agricultural land in Karanglor Village, Manyaran District, Wonogiri Regency, Central Java. Implementation in March-November 2020. Tool: rope, bamboo, bucket, rollmeter, handsprayer, mechanical scales, plastic bags, Digital Lux Meter (Takemura Electric Works LTD), oven, ruler, leaf area meter, pathok, scissors, sickle, nameplate, camera, and writing tools. Material : Winas 1 sesame seeds, hybrid maize seeds, cow manure, Urea fertilizer, SP-36 fertilizer, KCl fertilizer, Furadan 3G, and Azodrin.

## 2.2. Observation

The study used a completely randomized block design (RAKL) with two factors. This treatment combination was repeated 3 times. The data obtained will be analyzed by analysis of variance, if it is significant, it will be further tested with the Duncan Test at the 5% real level. Yield parameters and yield components observed were plant height, leaf color, number of branches per plant, number of filled pods per plant, seed weight per plant, ear weight, number of cobs.

## III. RESULTS AND DISCUSSION

### 3.1. Plant height in sesame monocultures

Manure dosage (0 g / plant, 100 g / plant, and 200 g / plant) gave the same average response to plant height, even though the dose of 100 g / ha produced the highest plant height because it was not significantly different when compared to doses of 0 g / ha and 200 g / ha. SBR 1 Variety, SBR 3 Variety, and Winas Variety 1 gave an average response to different plant heights, where Winas 1 variety produced the highest plant height compared to SBR 1 and SBR 3 varieties. Meanwhile, SBR 1 varieties produced significantly higher plant height than SBR 3 varieties.

Use of organic ameliorant directly affect agroecology, oil content, soil health, and human health. The use of organic resources reduce the dependency of chemical fertilizer and pesticide. The experimental Nurhayati, 2017 showed that chicken manure at a dose of 30 ton/ha on sandy land productively increased yield [20] and the application of cow manure 10 ton/ha combined with NPK (100:100:50).

### 3.2. Plant height in sesame intercropping

Giving cow manure with different doses at level V1 will result in a different average plant height, where at a dose of 200 g / plant the highest plant height is significantly compared to the dose of 0 g / plant but is not significant when compared to a dose of 100 g / plant. The same condition as level V1 also occurs at level V2. Table 3 also shows that the use of various varieties at the level of 0 g / plant will produce the same average plant height. The same thing also happened at the 200 g / plant level, while at the 100 g level it was different where the V2 variety produced the highest plant height compared to the V variety.

Dose of Cow Manure (P)	Kind of Variety (V)	
	V1	V2
P0 = 0 g/tanaman	104,00 a A	101,00 a A
P1 = 100 g/tanaman	114,67 a B	124,00 b B
P2 = 200 g/tanaman	119,67 a B	120,00 a B

Information :

- Lowercase to the side for testing varieties
- Capital letters downwards for testing the dose of cow feed

Giving cow manure with different doses at level V1 will result in a different average plant height, where at a dose of 200 g / plant the highest plant height is significantly compared to the dose of 0 g / plant but is not significant when compared to a dose of 100 g / plant. The same condition as level V1 also occurs at level V2. Table 3 also shows that the use of various varieties at the level of 0 g / plant will produce the same average plant height. The same thing also happened at the 200 g / plant level, while at the 100 g level it was different where the V2 variety produced the highest plant height compared to the V variety.

### 3.3. Plant height for corn intercropping

Application of cow manure with different doses will result in a different average plant height, where at a dose of 300 g / plant produces the highest plant height compared to the dose of 100 g / plant but not significantly compared to the dose of 200 g / plant. plant. The use of various varieties will produce an average plant height that is not the same, where the V2 variety produces the highest plant height compared to the V1 variety.

Kind of variety (V)	Average plant height (cm)	BNJ test results 5%
Variety V1	190,11	a
Variety V2	200,11	b

Information :

The mean plant height followed by the same letter is not significant.

### 3.4. Plant height in maize monocultures

The three doses of cow manure gave the same average response to plant height, although the dose of 300 g / ha produced the highest plant height because it was not significantly different when compared to the doses of 100 g / ha and 200 g / ha. Both varieties gave the same average response to

plant height, even though V1 variety produced higher plant height because it was not significantly different when compared to variety V2.

Dose of cow manure (P)	Average plant height (cm)	BNJ test results 5%
P1 = 100 g / plant	209,67	a
P2 = 200 g / plant	215,67	a
P3 = 300 g / plant	218,67	a

Information :

The mean plant height followed by the same letter is not significant.

### 3.5. Dry weight of stover in sesame monocultures

The three doses of cow manure gave different responses to the average dry weight of stover, where the dose of 200 g / plant produced the highest dry weight of stover compared to the dose of 0 g / plant but it was not significantly different when compared to the dose of 100 g / plant. The average response to plant height was the same, although SBR1 variety produced heavier dry weight of stover because it was not significantly different when compared to varieties SBR 3 and Winas 1.

Dose of cow manure (P)	average stover weight (g)	BNJ test results 5%
Po = 0 g / plant	14,26	a
P1 = 100 g / plant	19,63	b
P2 = 200 g / plant	21,38	b

Information :

The mean plant height followed by the same letter is not significant.

### 3.6. The dry weight of the stover on the sesame intercropping

The three doses of cow manure gave the same average response to stover dry weight, although the dose of 200 g / plant produced a higher dry weight of stover because it was not significantly different when compared to doses of 0 g / plant and 100 g / plant. both varieties gave the same average response to stover dry weight, although V1 variety produced heavier dry weight because it was not significantly different when compared to V2 variety.

### 3.7. Dry weight of stover in corn intercropping

The three doses of cow manure gave the same average response to stover dry weight, although the dose of 200 g / plant produced heavier dry weight of stover because it was not significantly different when compared to doses of 100 g / plant and 300 g / plant. The average dry weight of stover was the same, although V1 variety produced heavier dry weight because it was not significantly different when compared to V2 variety.

### 3.8. Dry weight of stover in maize monocultures

The three doses of cow manure gave the same average response to stover dry weight, although the 200 g / plant dose resulted in heavier dry weight of stover because it was not significantly different when compared with the doses of 100 g / plant and 300 g / plant. both varieties gave the same average response to stover dry weight, even though V2 variety produced heavier dry weight because it was not significantly different from variety V1.

### 3.9. Seed weight per cup in sesame monocultures

The three doses of cow manure gave the same average response to seed weight per cup, although the dose of 200 g / plant resulted in heavier seed weight per cup because it was not significantly different when compared to doses of 0 g / plant and 100 g / plant. The three varieties gave a different response to the average seed weight per cup, where Winas 1 produced the heaviest seed weight per cup compared to the SBR 1 and SBR 3 varieties. when compared to the SBR 3 variety.

Kind of Variety (V)	Average seed weight per cup (g)	Hasil uji BNJ 5%
Variety SBR 1	67,22	a
Variety SBR 3	63,89	a
Variety Winas 1	71,44	b

Information :

The mean seed weight per cup followed by the same letter is not significant.

### 3.10. Seed weight per cup in sesame intercrops

The three doses of cow manure gave the same average response to seed weight per cup, although the dose of 200 g / plant resulted in heavier seed weight per cup because it was not significantly different when compared to doses of 0 g / plant and 100 g / plant. both varieties gave the same response to the average seed weight per cup, although V1 variety produced heavier seed weight per cup because it was not significantly different when compared to V2 variety. The crucial requirement for soils to be used as a growing medium is a well-managed condition of soil physically and chemically. Physically good soil can sustain root growth and be able to be an aeration and moisture content site which all related to the role with organic matter (Dewi and Siswadi, 2019).

### 3.11. Seed weight per cup for corn intercropping

The three doses of cow manure gave the same average response to seed weight per cup, although the dose of 200 g / plant resulted in heavier seed weight per cup because it was not significantly different when compared to the doses of 100 g / plant and 300 g / plant. The two varieties gave a different response to the average weight of seeds per cup, where the V2 variety produced the highest seed weight per cup compared to the V1 variety. In experiment Nurhayati (2016) the use of manure 30 ton ha<sup>-1</sup> affected significantly in supporting the growth and production of sesame and sesame oil content as many as 47%. Overall, manure provided good growth for sesame.

### 3.12. Seed weight per cup in maize monocultures

The three doses of cow manure gave the same average response to seed weight per cup, although the dose of 200 g / plant resulted in heavier seed weight per cup because it was not significantly different when compared to the doses of 100 g / plant and 300 g / plant. the two varieties gave a different response to the average weight of seeds per cup, where the V2 variety produced the highest seed weight per cup compared to the V1 variety.

### 3.13. Effect of Monoculture and Intercropping Planting on Equivalent Area Ratio

Treatment	Sesame Yield	Corn Yield	Equivalent Area Ratio
M1 (sesame monoculture)	67,52	-	1,00
T1 (intercropping for sesame and corn)	64,61	205,72	1,95
M2 (Monoculture corn)	-	206,00	1,00

The table shows that intercropping planting of sesame and maize will result in the highest land equivalent ratio value of 1.95. If the Equivalent Area Ratio value is greater than 1 (> 1), this means that the intercropping system is more productive than monoculture.

## IV. CONCLUSION

Based on the research, it was found that the intercropping system of sesame and maize was more productive than sesame monocultures or maize monocultures.

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