

Solid Rabbit Fertilizer Development on Growth and Results Some Varieties of Chili (*Capsicum Frutescens* L.)

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Abstract. The purpose of this study was to obtain the most appropriate dense rabbit fertilizer for increasing fertility and the availability of nutrients and varieties that most respond to fertilization to get the best growth and yield of chilli. This research is a factorial experiment, with a randomized block design (RCBD) basic design with 2 factors tried and carried out in a greenhouse from April to September 2018. In the first factor the dose of rabbit manure from 4 levels: K 0 = without fertilizer, K 1 = 10 tons ha⁻¹, K 2 = 20 tons ha⁻¹, K 3 = 30 tons ha⁻¹. The second factor with 3 levels: V 1 = Rawita variety, V 2 = Dewata variety, V 3 = Sigantung variety. From the experiment, 12 combination treatments will be repeated and will be repeated 3 times. The interaction (K x V) between the development of solid rabbit manure (K) on the growth and yield of some chilli varieties (V) (*Capsicum frutescens* L.) on all influential variables was not significant ($P \geq 0.05$). The fruit weight per plant in the highest solid rabbit fertilizer at K 3 was 107.10 g which was not significant with K2 and K1 at 95.48 g and 80.22 g which increased 12.17% and 33.51% and were significantly different with K0 which is 67.87 g where K3 increases by 57.80%. The results of this study showed that the high fruit weight at dense rabbit fertilizer at K3 dose of 30 tons ha⁻¹ supported by the highest plant height was obtained at K3 of 150.74 cm, the highest number of branches was 9.11, the highest number of leaves was 321, 11 strands, the widest leaf area of 23,003.12 cm², the highest number of fruits of 108.11 fruit, the heaviest leaf wet weight of 112.02 g, the heaviest wet weight of stem and branch of 224.12 g, the heaviest root wet weight of 107.12 g. Fruit weight in the treatment of several varieties showed the highest response was obtained at V 2 (Rawita) which was 129.27 g significantly different from V 3 (Sigantung) and V1 (Dewata) which was 73.28 g and 60.46 g respectively increased by 76, 41% and 113.81%. The highest fruit weight in V2 is supported by the highest number of branches of 10.92 pieces, the highest number of leaves is 448.17 pieces, the highest number of fruits is 176.50 pieces.

Keywords: Dosage of Solid Rabbit Cage Fertilizer, Chili Varieties

1 Introduction

Chili is a horticultural commodity that is still needed by the market. Availability in the market has many influencing factors including low production levels, environmental conditions in production centers and natural disasters, increasing community needs.

The high demand for chili in the community where its availability in the market cannot meet the demand, both for large chili (*Capsicum annum* L.) and small chilli (*Capsicum frutescens* L.) makes it an opportunity and to meet demand and fill these opportunities through increased application cultivation technology in plants.

Giving manure to the planting media can provide an increase in nutrient supply which is one of the application of correct cultivation techniques. The number of types of manure that exist in the market causes the provision of chili plants to be tested where manure provides the greatest impact on plant growth and development. Mayun Wirajaya's research results; Yuliantini; Kartini [1] in testing several types of manure and pruning obtained the highest fresh fruit weight on the interaction of rabbit manure with apical trimming 16 days after planting (K3P2) of 47.67 g and when compared with the results of the combination without fertilizer and without trimming (K0P0) of 37.80 g there was an increase of 26.11%. From the results of this study rabbit solid fertilizer gave the highest value, but it should be sought at which dose is most appropriate when given to chili plants. Provision of dense rabbit fertilizer with the right dose must be effective and effective.

Rabbit-dense fertilizers which have high nutrient content compared to other manure, may not be responded well to any chilli plant varieties. Adaptability, plant morphology and other abilities possessed by each variety will have different effects on plant growth and yield.

From the background explanation above the problem can be formulated is how many doses of rabbit solid fertilizer are right and the most responsive varieties are to get the best growth and yield of chili.

2 Methodology

2.1. Place and time of research

This study is an experiment in a greenhouse located at the Faculty of Agriculture, University Warmadewa Road Terompong No. 24 Cape bungkek Denpasar which lasts from April to September 2018 located at a height of 25 meters above sea level.

2.2. Materials

The materials used in this study are Rawita Varieties, Dewata Varieties and Sigantung Varieties, solid rabbit manure, insecticides. While the tools used are scissors, sprayers, meters, stationery, scales, millimeter block paper.

2.3. Metode Penelitian

This research is a factorial experiment with a basic randomized blockdesign (RBD) with 2 factors tried. The first factor of the dense rabbit fertilizer dose consists of 4 levels:

K 0 = without fertilizer,

K 1 = rabbit solid fertilizer 10 ton ha⁻¹

K 2 = rabbit solid fertilizer 20 ton ha⁻¹

K 3 = rabbit solid fertilizer 30 ton ha⁻¹

The second factor with 3 levels:

- V 1 = Varieties Rawita
V 2 = Varieties Dewata
V 3 = Varieties Sigantung.

From the experiment, 12 combination treatments will be obtained and will be repeated 3 times so that a total of 36 combination treatments will be taken. The data obtained were analyzed by analysis of variance and continued with the BNT distance test or Duncan 5%.

2.4. Implementation of Research

To achieve success in this study, the stages carried out until harvest are as follows:

- a. Prepare the nursery media by mixing the soil with manure and cocopit for both small and small amounts of diray and polybag5 : 2,5 : 1. Insert the media mixture into the tray and small polybag to prepare the seedling nursery.
- b. Chili seeds that have been soaked for 2-3 hours are sown in a tray that is placed one seed for one hole. Seeds from different chili varieties are placed in a arranged nursery so that there are no mistakes in planting seeds. If the seeds are 2 weeks old, they are transferred to a small polybag prepared until they are 5 weeks old from the seedlings. During the nursery process, both the tray and the small polybag are always watered in the morning and evening.
- c. Soil media that has been sifted will be used as a planting medium for chili seedlings prepared as much as 10 kg / polybag and 1 day before planting, water is given to the field capacity of each polybag. NPK base fertilizer as much as 1.5 g / polybag is given at the time of planting. NPK fertilizer will be given back at the age of 30 days after planting in the same amount in all polybags.
- d. The soil placed on a large polybag is given solid manure according to treatment (K0 = without fertilizer, K1 = 50 g / polybag fertilizer, K2 = 100 g fertilizer / polybag, K3 = 150 g fertilizer / polybag) 7 days before planting and the seedlings are transferred to large polybag by arranging varieties according to treatment. Furadan 3G needs to be given when planting in order to avoid nematode attacks.
- e. Attach a pin to each polybag as soon as the seedlings are transferred to a large polybag.
- f. During the process of growth and development, chili will be watered every morning and evening according to soil conditions.
- g. Doing prevention of the development of pests and diseases by spraying Demolish and Ditahne M-45 according to plant conditions.
- h. Fruit harvest will be carried out in stages with the criteria of the fruit being red and the final harvest according to the time of the study will be counted including green fruit.
- i. Variable measurements were observed every 1 week and began to be observed since the plants were 2 weeks after planting.
- j. Observations will be made on variables: plant height, branch number, leaf number, leaf area, number of fruit, leaf dry and wet weight, root dry and wet weight, wet and dry weight of fruit, wet and dry weight of stems & branches.

3 Results and Discussion

3.1. Results

The results of the statistical analysis on the variables observed in this study and the results of the significance of "Development of Solid Rabbit Cages (K) Against Growth and

Results of Some Chili (V) Varieties (*Capsicum frutescens* L.)" and their interactions (K xV) are presented in Table 3.1.

Table 1.Significance of the Development of Solid Rabbit Cages (K) Against the Growth and Results of Some Chili Varieties(V) (*Capsicum frutescens* L.)”

No	Variable	Treatment		
		Rabbit Fertilizer Solid (K)	Variety Chili (V)	Interaction (K x V)
1.	Maximum Plant Height(cm)	ns	**	ns
2.	Maximum Branch Number(buah)	*	**	ns
3.	Maximum Leaves Amount(helai)	*	**	ns
4.	Maximum Leaf Area(cm ²)	ns	**	ns
5.	Number of Harvested Fruits(pcs)	*	**	ns
6.	Leaves Wet Weight(g)	*	**	ns
7.	Rod & Branch Wet Weight(g)	**	**	ns
8.	Root Wet Weight(g)	ns	**	ns
9.	Fruit Weight per Plant(g)	*	**	ns
10.	Dry Leaf Weight (g)	*	*	ns
11.	Stem & Branch Dry Weight (g)	*	**	ns
12.	Dry Root Weight (g)	ns	**	ns
13.	Dry Fruit Weight (g)	ns	**	ns

Information : ns= no real effect($P \geq 0,05$)

**= very real effect($P < 0,01$)

*= have a real impact($P < 0,05$)

From Table 3.1. showed an analysis of the variables observed that the interaction between the administration of solid rabbit manure on various small chili varieties (K x V) had no significant effect ($P \geq 0,05$).

The treatment of giving solid rabbit manure had no significant effect ($P \geq 0,05$) on the variables of maximum plant height, maximum leaf area, root wet weight, root dry weight and fruit dry weight but had a significant effect ($P < 0,05$) on variable number of branches maximum, maximum number of leaves, number of fruits, leaf wet weight, fruit weight, leaf dry weight and stem & root dry weight and very significant effect ($P < 0,01$) on stem and branch wet weight variables.

Testing of various varieties had a very significant effect ($P < 0,01$) on all variables observed except for leaf dry weight significantly ($P < 0,05$).

Table 2. Average plant height, number of branches, number of leaves, leaf area, number offruits on the treatment of the development of rabbit manure (K) and several varieties chili (V)

Treatment	Plant height(cm)	Number of branches(buah)	Number of leaves(helai)	Leaf area(cm ²)	Number of fruits(piece)
Solid Rabbit Fertilizer	137,04 a	6,22 b	244,89 b	17012,86	70,78 a
K0	148,40 a	8,33 a	275,86 b	a	83,00 a
K1	147,83 a	7,67 ab	299,78 ab	19894,51	86,00 a

K2 K3	150,74 a	9,11 a	321,11 a	a 20172,45 a 23003,12 a	108,11 b
BNT 5%	-	1,60	44,32	-	21,50
Chili Varieties					
V1	148,33 b	7,50 b	233,83 a	26697,30	50,50 a
V2	125,52 c	10,92 a	448,17 b	a	176,50 b
V3	164,18 a	5,08 c	174,00 c	13482,84 b 19882,06 c	33,92 a
BNT 5%	13,75	1,85	51,18	5331,21	24,83

Information: The mean value followed by the same letter in the treatment and column are the same meaning not significantly different from BNT test level 5%

1. Plant height (cm)

The average plant height due to the highest dense rabbit manure at K 3 was 150.74 cm which was not significantly different from K 1, K 2 and K 0, respectively 148.40 cm, 147.83 cm and 137.04 cm respectively.

The average maximum plant height in some varieties was shown to be the highest response obtained at V 3, which was 164.18 cm significantly different from V 1 and V 2 by 148, 33 cm and 125.52 cm, each increasing 10.69% and 30.80 %.

2. Number of Branches (piece)

The average maximum number of branches due to the administration of the highest solid rabbit manure at K 3 is 9.11 different significantly with K 1, K 2 and K 0 of 8.33 pieces, 7.67 pieces and 6.22 pieces each increasing 9.36%, 18.77% and 46.46% .

The average maximum number of branches in several varieties was shown to be the highest response obtained at V 2 which is 10.92 pieces significantly different from V 1 and V 3 at 7.50 pieces and 5.08 pieces each increasing 45.60% and 114.96 %.

3. Number of Leaves (strands)

The average maximum number of leaves due to the highest dense rabbit manure at K 3 of 321.11 strands differed not significantly with K 2 of 299.78 strands which increased by 7.11% and were significantly different from K1 and K0 each of 275 , 86 strands and 244.89 strands where K3 increased by 16.40% and 31.12%.

The average maximum number of leaves in several varieties showed the highest response obtained at V 2, namely 448.17 strands significantly different from V 1 and V 3 amounting to 233.83 strands and 174.00 strands increasing 91.66% and 157.57 respectively. %.

4. Leaf area (cm²)

The average maximum leaf area due to the highest dense rabbit manure at K 3 is 23003.12 cm² which is not significantly different from K 2, K 1 and K 0, respectively by 20172.45 cm², 19894.51 cm², 17012, 86 cm².

The average maximum leaf area in some varieties was shown to be the highest response obtained at V 1, which was 26697.30 cm² significantly different from V 3 and V 2 at 19882.06 cm² and 13482.84 cm², respectively increasing 34.28% and 98, 01%.

5. Number of fruits (pieces)

The average number of fruit harvests due to the highest dense rabbit manure at K 3 of 108.11 was not significantly different with K 2 of 86.00 fruits which increased by 25.71% and significantly different from K1 and K0 respectively for 83.00 pieces and 70.78 pieces where K3 increased by 30.25% and 52.74%.

The average number of fruit harvests in several varieties showed the highest response obtained at V 2, which was 176.50 significantly different from V 1 and V 3 at 50.50 fruits and 33.92 each increasing 249.5% and 420.34 %.

Table 3. Average leaf wet weight, stem & branch wet weight, root wet weight, weight fruit per plant in the treatment of rabbit (K) and some chili varieties(V)

Treatment	Leaf wet weight (g)	Wet stem & branch weight (g)	Root wet weight (g)	Fruit weight per plant (g)
Solid Rabbit Fertilizer				
K0	89,7 a	150,09 a	74,83 a	67,87 a
K1	105,80 b	186,15 b	97,01 a	80,22 ab
K2	108,07 b	196,83 bc	98,51 a	95,48 bc
K3	112,02 b	224,12 c	107,12 a	107,10 c
BNT 5%	13,62	33,93	-	24,40
Chili Varieties				
V1	127,33 a	234,43 a	105,14 a	60,46 a
V2	77,68 c	136,19 b	51,10 b	129,27 b
V3	106,74 b	197,28 a	126,87 a	73,28 a
BNT 5%	15,73	39,18	28,56	28,18

Keterangan : The mean value followed by the same letter in the treatment and column are the same meaning not significantly different from BNT test level 5%

6. Leaves Wet Weight (g)

The average wet weight of leaves due to the highest dense rabbit manure at K 3 of 112.02 g was not significantly different from K 2 and K1 of 108.67 g and 105.80 g which increased by 3.08% and 5.87 % and significantly different from K0 of 89.77 g where K3 increased by 24.79%.

The average wet weight of leaves in several varieties showed the highest response obtained at V 1, ie 127.33 g significantly different from V 2, 106.74 g, increasing 19.29% and V1 against V3 which was 77.68 g, increasing by 63.92 %. Likewise, V3 was significantly different from V2 and V3 which increased 37.41%.

7. Rod and Branch Wet Weight (g)

The average stem and branch wet weight due to the highest dense rabbit manure at K 3, 224.12 g, was not significantly different from K 2 ie and K3 increased by 13.86%. K3 was

significantly different from K1 and K0, which were 186.15 g and 150.09 g, but still experienced increases of 20.40% and 49.32% respectively.

The average stem and branch wet weight in several varieties showed the highest response obtained at V 1 which was 234.43 g which was not significantly different from V 3 which was 197.28 g, increasing by 18.83% and V1 against V2 which was 136.19 g increasing by 72.13%.

8. Root Wet Weight(g)

The average wet weight of leaves due to the highest dense rabbit manure given at K 3, 107.12 g, was not significantly different from K 2, K 1 and K 0 which were 98.51 g, 97.01 g and 78.83 g but still increased respectively 8.74%, 10.42% and 35.89%.

The average wet weight of leaves in several varieties showed the highest response obtained at V 3, 126.87 g, which was not significantly different from V 1, which was 105.14 g, increasing by 20.68% and V1 significantly different from V2 which was 51.10 g increasing by 148.28%.

9. Fruit Weight Per Plant(g)

The average fruit weight due to the highest dense rabbit manure at K 3 of 107.10 g was not significantly different from K 2 and K1 of 95.48 g and 80.22 g which increased 12.17% and 33.51% and significantly different from K0 which is 67.87 g where K3 increased by 57.80%.

The average fruit weight in several varieties showed the highest response obtained at V 2, namely 129.27 g, significantly different from V 3 and V 2, namely 73.28 g and 60.46 g each increasing 76.41% and 113.81%.

Table 4. Average oven dry weight of leaves, oven dry stems & branches, dry weight oven root, fruit oven dry weight per plant in the development treatment rabbit manure (K) and some chili varieties (V)

Treatment	Dry leaf oven weight(g)	Dry oven & branch weight(g)	Dry oven root weight(g)	Fruit oven dry weight(g)
Solid Rabbit Fertilizer				
K0	15,67 a	27,74 a	65,32 a	13,11 a
K1	17,27 ab	36,52 a	82,54 a	17,23 ab
K2	20,45 c	32,61 a	81,08 a	18,46 b
K3	19,64 bc	50,75 b	88,45 a	20,94 b
BNT 5%	3,11	11,40	-	-
Chili Varieties				
V1	20,91 a	50,01 a	91,36 a	10,84 a
V2	16,82 b	27,95 b	40,43 b	29,91 b
V3	17,04 b	32,75 b	106,26 a	11,56 a
BNT 5%	3,59	13,17	30,56	5,69

Keterangan : Nilai rata-rata yang diikuti oleh huruf yang sama pada perlakuan dankolom yang sama berarti berbeda tidak nyata pada taraf uji BNT 5%

10. Dry leaf oven weight (g)

The average leaf oven dry weight due to giving rabbit manure to the highest at K 2 at 20.45 g was not significantly different with K 3 at 19.64 g increasing by 4.12% and K2 significantly different from K1 and K0 which was 17.27 g and 15.67 have increased by 18.41% and 30.50%.

The average oven dry weight of leaves in several varieties showed the highest response obtained at V 1 which is 20.91 g significantly different from V 3 and V 2 which is 17.04 g and 16.82 g each increased by 22.71% and 24, 32%.

11. Heavy Dry Oven Stems and Branches(g)

The average stem and branch oven dry weight due to the highest dense rabbit manure at K 3 of 50.75 g was significantly different from K 1, K2 and K0, which was 36.52 g, 32.61 g and 27.74 increased by 38.96%, 55.63% and 82.95%.

The average stem and branch oven dry weight in several varieties showed the highest response obtained at V 1 which was 50.01 g significantly different from V 3 and V 2 which was 32.75 g and 27.95 g each increasing 52.70% and 78.93%.

12. Heavy Dry Root Oven(g)

The average dry oven root weight due to the highest dense rabbit manure at K 3 was 88.45 g which was not significantly different from K 1, K 2 and K 0, respectively 82.54 g, 81.08 g and 65, 32 g.

The average root oven dry weight in some varieties indicated the highest response obtained at V 3, 106.26 g, which was not significantly different from V 1 which was 91.36 g where V 3 increased by 16.31% and was significantly different from V 2 which 40.43 g increased by 162.82%.

13. Heavy Dry Fruit Oven(g)

The average dry fruit oven weight due to the highest dense rabbit manure at K 3 is 20.94 g which is not significantly different from K 1 and K 2 by 18.46 g and 17.23 g, respectively. The lowest value obtained at K 0 is equal to 13.11 g different from K 3 and increases 59.73%.

The average fruit oven dry weight in several varieties indicated the highest response obtained at V 2, which is 29.91 g significantly different from V 3 and V 1 which is 11.56 g and 10.84 g increased by 158.74% and 175.92 g %.

3.2. Discussion

From the analysis of the variables observed it was found that the interaction between the administration of solid rabbit manure on various small chili varieties (K x V) had no significant effect ($P \geq 0.05$). The fruit weight per plant in the highest dense rabbit fertilizer at K 3 was 107.10 g which was not significantly different from K2 and K1 at 95.48 g and 80.22 g which increased 12.17% and 33.51% and significantly different with K0 which is 67.87 g where K3 increased by 57.80%. Hardjowigeno [2] states that to improve soil fertility is to fertilize with organic fertilizer or manure. Nutrient content in manure is not too high, but this type of fertilizer has other features that can provide physical properties of the soil such as soil permeability, soil porosity, soil structure, power to resist water and soil cations and so on. Solid rabbit manure in the soil has a good influence on the physical properties of the soil, this causes better root growth so that it makes it easier for plant roots to absorb nutrients in dense rabbit manure. The results of this study showed that the high fruit weight in the administration of solid rabbit fertilizer at the K3 dose of 30 tons ha⁻¹ was supported by the highest plant height obtained in K3 of 150.74 cm, the highest number of branches was 9.11 fruits, the highest number of leaves was 321, 11 strands, the broadest leaf area of 23,003.12 cm², the highest number of fruits amounted to 108,11 fruit, the heaviest weight of leaf weight was 112.02 g, the heaviest weight of stem and branches was 224.12 g, the heaviest weight of roots was 107.12 g. The existence of a high response by all observed variables is supported by the

opinion of Rinsema [3] that the role of nutrients is to help stimulate the development of all parts of the plant so that the plants will grow faster, the absorption of nutrients is relatively large. Furthermore, Lakitan [4] states that the success and response of plants to fertilizer application is largely determined by several factors including plant physiological properties, technical culture actions and plant morphology. The role of manure by Sarief [5] stated that manure is an organic material and humus which has an influence on physical changes, the biological chemistry of the soil which contains macro and micro nutrients, so that more nutrients are available for plants. According to Setyamidjadja [6] the function of manure on agricultural land is to increase the content of organic matter (humus), increase soil fertility by increasing plant nutrients, improve the life of soil microorganisms, and protect the soil against damage caused by erosion. Lakitan [7] states that organic fertilizer is not easily washed and available to plants after the organic material has been decomposed by soil microorganisms and is available for a long time. The very low element content of N, P, K and C organic on the soil used as a medium gives a very high response to all observed variables so that very positive support for fruit weight per plant at a dose of 30 tons ha⁻¹. Sajimin et al. [8] found that the use of rabbit manure on potato and cabbage plants increased production by an average of 23.5% compared to sheep fertilizer. Ruminta et al [9] found that 5 tons / ha rabbit manure treated the best independent effect on panicle length, panicle weight per clump and seed weight per plant.

The fruit weight in the treatment of some of the highest response varieties was obtained at V2 (Rawita), which was 129.27 g, significantly different from V3 (Sigantung) and V1 (Dewata) which were 73.28 g and 60.46 g each increasing 76.41% and 113.81%. The highest fruit weight in V2 is supported by the highest number of branches of 10.92, the highest number of leaves is 448.17 pieces, the highest number of fruits is 176.50 pieces. The increasing number of branches will cause more leaves, and the greater the contribution of photosynthesis results will be able to contribute to the increase in the number of flowers formed and the greater the chance to get the most fruit. Syukur et al (2016) [10] stated that to increase the productivity of chili, the use of superior quality seeds is absolutely necessary. Furthermore, it is stated that the more chili varieties on the market, the selection must be released by the Minister of Agriculture to be used for chili cultivation. The superior character of chili varieties should meet several criteria including high productivity, early harvest age, resistance to pest and disease attacks, longer shelf life, certain spiciness levels and fruit quality in accordance with consumer tastes.

4 Conclusion

The results of the study can be concluded, including:

1. The interaction between the development of solid rabbit manure (K) on the growth and yield of several chili (V) (*Capsicum frutescens* L.) varieties had no significant effect ($P \geq 0.05$).
2. Solid Rabbit Cage (K) had a significant effect ($P < 0.05$) on the weight of harvested fruit per plant. The fruit weight per plant in the highest dense rabbit fertilizer at K 3 was 107.10 g which was not significantly different from K2 and K1 at 95.48 g and 80.22 g which increased 12.17% and 33.51% and significantly different with K0 which is 67.87 g where K3 increased by 57.80%
3. Chili (V) varieties tested had a very significant effect ($P < 0.01$) on harvested fruit weight per plant. The fruit weight in the treatment of some of the highest response varieties was

obtained at V 2 (Rawita), namely 129.27 g, significantly different from V3 (Sigantung) and V1 (Dewata), namely 73.28 g and 60.46 g each increasing 76.41% and 113.81%.

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