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Applications Various Extracts of Plant On Stem Growth Response of Red Dragon Fruit (*Hylocereus polyrhizus*)

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ABSTRACT

This study aims to determine the response of the growth of red dragon fruit stem cuttings (*Hylocereus polyrhizus*) with the treatment of various plant extracts and dosage of goat manure. This research was conducted in experimental garden of UMM. This research was conducted from October 2017 until January 2018. The study used a randomized block design, which was repeated 3 times with 2 factors. Factor 1 is a kind of plant extract and factor 2 is the dosage of manure. Factor 1 consists of 4 level, while factor 2 that consists of 3 level. Observation parameters include: Shoots, shoot number, shoot length, root length, root number, total wet weight, shoot dry weight, wet root weight, and root dry weight. The results showed that the treatment of green bean sprout extract and dose 187.5 g / polybag showed the best result on the number of shoot and wet weight of cuttings. Treatment of green bean sprout extract showed relatively good results. Treatment of fertilizer doses of 187.5 g / polybag showed relatively good results.

Keywords*:* *Plant extracts, Fertilizer, Red Dragon Fruit*

INTRODUCTION

Red dragon fruit (Hylocereus polyrizhus) is a kind of fruit plants that have beautiful colours, as well as unique shapes. According to Winarsih (2007) in Nurfadillah et al (2013), dragon fruit needs in Indonesia to date recorded 200-400 tons per year. The need is not only for consumption in the fresh form but also for health products (Ministry of Agriculture 2005). To obtain the production of dragon fruit that is able to meet market needs, there is still need improvement in the cultivation, one of them is by using the vegetative technique (cuttings). In order to accelerate growth in the process of cuttings, can be done with the provision of growth regulators (ZPT). In addition to spurring the growth of cuttings also require manure, where the optimal nutrient in manure is able to assist in the growth process of the cuttings.

According to Abidin (1983), growth regulators are organic compounds that are not nutrients which in small amounts can support the physiology of plants. Plant growth regulators applied to plants are natural and synthetic. Goat manure is one type of manure that contains many organic compounds, friendly to the environment, and the use of goat manure in a continuous

positive impact on soil fertility. Fertile soil will facilitate the development of plant roots. Roots of plants that can grow well will more easily absorb water and nutrients available in the soil can grow optimally.

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The purpose of this research is to know the response of growth of red dragon fruit stem (*Hylocereus polyrizhus*) to the treatment of various plant extract and dosage of goat manure.

METHODS

This research was conducted in the experimental garden of Faculty of Agriculture-Animal Husbandry University of Muhammadiyah Malang Tegal Gondo Village, Karangploso Sub-district, Malang for 4 month period. The tool used is a hoe, shovel, sieve, polybag 25 x 25 cm, scales, bucket, camera, stationery. The ingredients used are onion tuber, bean sprouts 3 days old bean sprouts (togue) age 3 days, goat manure, red dragon fruit cuttings, soil katel and fungicide. The study used a Randomized Complete Block Design (RCBD) with 2 factors repeated 3 times. Factor 1 is a kind of plant extract, consisting of 4 level is Z0= without extract, Z1= green bean sprout extract, Z2= cowpea extract, Z3= red onion extract, while factor 2 is the dosage of goat manure consisting of 3 level P1= 125 g / polybags, P2= 187.5 g / polybag, and P3= 250 g / polybag resulting in 12 treatment combinations. Observation parameters include Shoots, shoot number, shoot length, root length, root number, total wet weight, shoot dry weight, wet root weight, and root dry weight.

RESULTS AND DISCUSSION

1. Analysis Appears Shoots

The average emerging shoots treatment of extracts of various kinds of plants and manure are presented in Table 2 as follows:

Table 2. The average appearance of buds (day) on the red dragon fruit stem cuttings (*Hylocereus polyrhizu*) in response to each treatment.

Treatment	Appears Buds (days)
Kinds of Plant Extracts	
Without Extract	27.93 a
Green Bean Sprout Extract	31.07 a
Cowpea Bean Extract	29.74 a
Red Onion Extract	30.04 a
The dosage of Goat Cage	
Dose 125 g / polybag	31.08 a
Dose 187,5 g / polybag	27.75 a
Dose 250 g / polybag	30.25 a

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Note: Figures accompanied by the same letter in the same treatment show no significant difference in the DMRT test of 5% level.

Based on the analysis of variance, the response emerged shoots to the addition of plant extracts and dosage of manure, showed different responses were not real, while the response of each factor showed different not real. According to Hidayanto et al (2003), that the carbohydrate content contained in the cuttings is a major factor for the development of primordial shoots and roots, with sufficient feeding reserves then cuttings will be able to form new shoots.

2. Number of Shoots

The average number of shots indicated by the treatment of plant extracts and the dosage of manure is presented based on Table 3:

Table 3. Average number of shots on red dragon fruit stem cuttings in response to each treatment (strands)

Treatment	Number of Shoots 56 Day
Without Extract, Dosage 125 g / polybag	2.00 abcd
Without Extract, Dosage 187.5 g / polybag	1.33 a
Without Extract, Dosage 250 g / polybag	2.22 bcd
Green Bean Sprout Extract - Dosage 125 g / polybag	2.00 abcd
Green Bean Sprout Extract - Dosage 187.5 g / polybag	2.67 d
Green Bean Sprout Extract - Dosage 250 g / polybag	2.00 abcd
Cowpea Bean Extract - Dosage 125 g / polybag	1.78 abc
Cowpea Bean Extract - Dosage 187,5 g / polybag	1.67 abc
Cowpea Bean Extract - Dosage 250 g / polybag	2.33 cd
Red Onion Extract- Dosage 125 g / polybag	1.44 ab
Red Onion Extract - Dosage 187.5 g / polybag	2.44 cd
Red Onion Estrate- Dosage 250 g / polybag	1.67 abc

Note: Figures accompanied by the same letter in the same column show no significant difference in the DMRT test of 5% level.

Based on table 3, the 56 days after planting treatment of green bean sprouts extract and fertilizer dose of 187.5 g / polybag showed the best results compared to other treatments. This crop has begun to see the existence of nutritional supplements derived from plant growth regulators and manure, and also the plants have adapted to the environment. The plant is able to grow well because gibberellin and auxin in green bean sprouts will stimulate the entire plant tissue and soak through roots, stems and leaves (Reksa, 2007).

Table 4. Average number of shots on red dragon fruit stem cuttings in response to each factor (strands)

Treatment	Length of Tunas Cuttings (DAP)					
	14	21	28	35	42	49
Types of Growing Regulators						
Without Extract	1.59 a	1,59 a	1.59 a	1.70 a	1.74 a	1.85 a
Green Bean Sprout Extract	2.00 a	2.00 a	2.00 a	2.00 a	2.04 a	2.11 a
Cowpea Bean Extract	1.63 a	1.63 a	1.56 a	1.59 a	1.67 a	1.63 a
Red Onion Extract	1.63 a	1.63 a	1.70 a	1.70 a	1.74 a	1.70 a
Dosage of Goat Cage						
Dosage 125 g/polybag	1.67 a	1.67 a	1.64 a	1.67 a	1.72 a	1.75 a
Dosage 187,5 g/polybag	1.69 a	1.69 a	1.75 a	1.75 a	1.81 a	1.81 a
Dosage 250 g/polybag	1.78 a	1.78 a	1.78 a	1.83 a	1.86 a	1.92 a

Note: Figures accompanied by the same letter in the same column show no significant difference in the DMRT test of 5% level.

According to Table 4, the addition of each factor showed no significant difference in the number of stem cuttings on day 14, 21, 28, 35, 42 and 49 after planting.

3. Long Shoots

The average length of shoots due to the treatment of extracts and dosage of manure is presented based on Table 5:

Table 5. Average shoot length of red dragon fruit stem cuttings in response to each treatment (cm)

Treatment	Long Shoot (DAP)	
	35	56
Without Extract, Dose 125 g / polybag	11.38 a	15.41 ab
Without Extract, Dose 187.5 g / polybag	17.86 d	24.19 d
Without Extract, Dose 250 g / polybag	12.47 abc	16.97 abc
Green Bean Sprout Extract - Dosage 125 g / polybag	11.36 a	16.59 abc
Green Bean Sprout Extract - Dosage 187.5 g / polybag	13.40 abc	17.14 abc
Green Bean Sprout Extract - Dosage 250 g / polybag	11.21 a	17.18 abc
Cowpea Bean Extract - Dosage 125 g / polybag	11.92 ab	16.91 abc
Cowpea Bean Extract - Dosage 187,5 g / polybag	16.36 cd	22.00 bcd
Cowpea Bean Extract - Dosage 250 g / polybag	13.43 abc	20.83 abcd
Red Onion Extract- Dosage 125 g / polybag	15.89 bcd	22.41 cd
Red Onion Extract - Dosage 187.5 g / polybag	10.79 a	14.38 a
Red Onion Estrate- Dosage 250 g / polybag	12.39 abc	17.97 abcd

Note: Figures accompanied by the same letter in the same column show no significant difference in the DMRT test of 5% level.

Based on Table 5, on day 35, 56 after planting, showed no treatment of plant extract application with a dose of fertilizer 187.5 g / polybag showed the best results than other treatments. Planting has begun to absorb nutrients available on the media plants, besides that other factors that influence is the factor of the cuttings. Good cuttings are cuttings originating from the mother and

also the right age. Healthy cuttings can be identified by looking at the vigour of a strong parent plant. According to Harjadi (1989), there are several factors that also influence the success of cuttings, namely the origin of cuttings (the position of cuttings in the parent plant), the length of cuttings, and the environment (rooting media, temperature, and moisture, light).

Table 6. Average shoot length of red dragon fruit stem cuttings in response to each factor (cm)

Treatment	Length of Cuttings (DAP) (cm)				
	14	21	28	42	49
Kinds of Plant Extracts					
Without Extract	3.94 a	7.56 a	10.51 a	17.21 a	17.98 a
Green Bean Sprout Extract	2.68 a	6.95 a	09.59 a	15.46 a	16.40 a
Cowpea Bean Extract	3.14 a	7.44 a	10.96 a	17.72a	18.40 a
Red Onion Extract	2.40 a	6.73 a	09.77 a	16.02 a	17.36 a
Dosage of Goat Cage					
Dosage 125 g/polybag	3.02 a	7.03 a	09.65 a	16.51 a	17.19 a
Dosage 187,5 g/polybag	3.57 a	8.26 a	11.58 a	17.25 a	18.41 a
Dosage 250 g/polybag	2.54 a	6.22 a	09.40 a	16.05 a	17.16 a

Note: Figures accompanied by the same letter in the same treatment show no significant difference in the DMRT test of 5% level.

Based on Table 6, the addition of each factor showed no significant difference in the length of shoot cuttings of red dragon fruit stems on the 14, 21,, 28, 42 and 49 days after planting.

4. Long Root Primer

The average length of the primary roots due to the treatment of each factor is presented based on Table 7 as follows:

Table 7. Average root length of red dragon fruit stem cuttings in response to each factor (cm)

Treatment	Root Length (cm)
Kinds of Plant Extracts	
Without Extract	29.56 a
Green Bean Sprout Extract	27.61 a
Cowpea Bean Extract	28.02 a
Red Onion Extract	31.51 a
The dosage of Goat Cage	
Dosage 125 g/polybag	29.79 a
Dosage 187,5 g/polybag	30.36 a
Dosage 250 g/polybag	27.38 a

Note: Figures accompanied by the same letter in the same treatment show no significant difference in the DMRT test of 5% level.

According to Table 7, the addition of each factor showed no significant difference in the root diameter of the red dragon fruit stem. In addition to the availability of adequate foodstuffs for the growth of cuttings, it is suspected that the environment also affects the rooting medium of the cuttings.

5. Number of Primary Roots

The average number of primary roots due to the treatment of each factor is presented based on Table 8 as follows:

Table 8. Average number of primary roots on red dragon fruit stem cuttings in response to each factor (strands)

Treatment Kinds of Plant Extracts	Number of Roots (sheet)
Without Extract	8.00 a
Green Bean Sprout Extract	8.89 a
Cowpea Bean Extract	7.63 a
Red Onion Extract	8.96 a
The dosage of Goat Cage	
Dosage 125 g/polybag	7.53 a
Dosage187,5 g/polibag	8.69 a
Dosage 250 g/polybag	8.89 a

Note: Figures accompanied by the same letter in the same treatment show no significant difference in the DMRT test of 5% level.

Based on Table 8, the additional treatment of each factor showed no significant difference in the number of root diameter of red dragon fruit stem. The number of roots of a plant is one indicator of plant growth. Root formation in a plant is influenced by carbohydrate content and the balance of auxin hormone in planting material (Sudomo et al 2007).

6. Total Wet Weight

The average total wet weight due to the treatment of plant extracts and the dosage of goat manure is presented based on Table 9 as follows:

Table 9. The average total wet weight of red dragon fruit stem cuttings in response to each treatment (gram)

Treatment	Total Wet Weight (grams)
Without Extract, Dosage 125 g / polybag	208.89 abcd
Without Extract, Dosage 187.5 g / polybag	226.56 cd
Without Extract, Dosage 250 g / polybag	225.56 cd
Green Bean Sprout Extract - Dosage 125 g / polybag	162.89 ab
Green Bean Sprout Extract - Dosage 187.5 g / polybag	236.00 d
Green Bean Sprout Extract - Dosage 250 g / polybag	217.00 bcd
Cowpea Bean Extract - Dosage 125 g / polybag	175.67 abc
Cowpea Bean Extract - Dosage 187,5 g / polybag	206.11 abcd
Cowpea Bean Extract - Dosage 250 g / polybag	190.44 abcd
Red Onion Extract- Dosage 125 g / polybag	234.00 cd
Red Onion Extract - Dosage 187.5 g / polybag	154.56 a
Red Onion Estrate- Dosage 250 g / polybag	180.33 abcd

Note: Figures accompanied by the same letter in the same column show no significant difference in the DMRT test of 5% level.

Based on Table 9, the addition of green bean sprout extract and fertilizer dose of 187.5 g / polybag showed a significantly different figure with other treatments.

7. Dry Shoot Weight

The average dry weight of shoots due to the treatment of each factor is presented based on Table 10 as follows:

Table 10. The average dry weight of shoots on red dragon fruit stem cuttings in response to each factor (gram)

Treatment Kinds of Plant Extracts	Dry Weight Roots (gram)
Without Extract	32.96 a
Green Bean Sprout Extract	32.96 a
Cowpea Bean Extract	32.26 a
Red Onion Extract	33.70 a
The dosage of Goat Cage	
Dosage 125 g/polybag	31.67 a
Dosage 187,5 g/polybag	31.11 a
Dosage 250 g/polybag	36.14 a

Note: Figures accompanied by the same letter in the same treatment show no significant difference in the DMRT test of 5% level.

According to Table 10, the addition of each factor showed no significant difference in dry weight of red dragon fruit stem bud.

8. Wet Weight Root

The average wet weight of roots due to the treatment of each factor is presented based on Table 11 as follows:

Table 11. Average root wet on red dragon fruit stem cuttings in response to each factor (gram)

Treatment Kinds of Plant Extracts	Weight Wet Roots (gram)
Without Extract	3.06 a
Green Bean Sprout Extract	2.67 a
Cowpea Bean Extract	2.22 a
Red Onion Extract	2.33 a
The dosage of Goat Cage	
Dosage 125 g/polybag	2.40 a
Dosage 187,5 g/polybag	2.81 a
Dosage 250 g/polybag	2.51 a

Note: Figures accompanied by the same letter in the same treatment show no significant difference in the DMRT test of 5% level.

According to Table 11, the addition of each factor showed no significant difference in the wet weighted root parameter of red dragon fruit stem cuttings.

9. Root Dry Weight

The average dry weight of roots due to the treatment of each factor is presented based on Table 12 as follows:

Table 12. Average dry root weight of red dragon fruit stem cuttings in response to each factor (gram)

Treatment Kinds of Plant Extracts	Dry Weight Roots (gram)
Without Extract	2.07 a
Green Bean Sprout Extract	2.29 a
Cowpea Bean Extract	1.75 a
Red Onion Extract	1.66 a
The dosage of Goat Cage	
Dosage 125 g/polybag	2.13 a
Dosage 187,5 g/polybag	1.88 a
Dosage 250 g/polybag	1.83 a

Note: Figures accompanied by the same letter in the same treatment show no significant difference in the DMRT test of 5% level

According to Table 12, the addition of each factor showed no significant difference in root dry weight parameters on red dragon fruit stem cuttings.

9. The result of Soil Analysis

The result of soil analysis which has been done in Soil and Plant Chemistry Laboratory of Balitkabi Malang and UPT Laboratory. Development of Food Crops Agribusiness and Bedang Horticulture Cultivation is presented in Table 13 below:

Table 13. The result of Soil Analysis

No.	Parameter Test	Result Testing	Status
1.	pH H_2O	6,3	Medium
2.	C- organic (%)	3.54	Height
3.	N (%)	2.50	Very High
4.	C/N ratio	1.43	Very High
5.	P_2O_5 (ppm)	12.5	Medium
6.	Organic Materials	6.10	-
	-Ka ($Cmol^4/kg$)	0.76	Height
	-Ca ($Cmol^4/kg$)	15.12	Height
	-Mg ($Cmol^4/kg$)	1.68	Low
	-SO_4 (ppm)	46.85	Very High

Soil test results show soil pH of 6.3 which means medium status, this is according to the test results in the laboratory analysis, then its C-organic content of 3.54% means having a high status, N elements as much as 2.50% which means very high, the C/N ratio has a very high value of 1.43 as well, then P_2O_5 is worth 12.5 which means medium status, this is according to the results of the analysis in the laboratory. Table 12 shows that the soil contains the elements needed by plant growth so that each has its own role in plant growth. One of the important requirements in cultivation is to pay attention to the media used.

10. Goat Cage Analysis

Based on the analysis of fertilizer that has been done in the Laboratory of Soil and Plant Chemistry Balitkabi Malang laboratory test results are presented in Table 14

Table 14. Goat Cage Manure Analysis

No.	Parameter Test	Result Testing	Status
1.	C- organic (%)	18.56	Height
2.	C/N ratio	6.87	Low
3.	Water content (%)	59.1	Height
4.	Micronutrients		
	N- organic	2.22	Low
	$N\text{-}NH_4$	0.25	Low
	$N\text{-}NO_3$	0.238	Low
	N total (%)	2.70	Medium
	P	0.30	Low
	K	1.52	Low
6.	pH H_2O	8.2	Medium
	Mg	0.83	Low
	Ca	5.98	Height
	Na	1.30	Medium

Based on the analysis of fertilizers that have been tested in the laboratory presented in Table 14 shows the varied yield content of C-organic (18.56%), P (0.30%), K (1.52%), C / N ratio (6, 87%).This percentage variation due to organic fertilizer composition determines nutrient content in the organic manure of goat manure. Based on the analysis of laboratory test of the C-organic content of goat fertilizer that is 18.65%, showing high category because the organic material has been decomposed, while the minimum requirement to meet the criteria of organic goat organic fertilizer is C-organic at least 15%. Organic matter is a food microorganism that will be decomposed into

nutrients that can be utilized by plants. Organic material can be recovered by the plant if it has been decomposed (Suryani, 2014).

11. Growth Regulatory Analysis

Based on the analysis of growth regulators that have been performed with GCMS analysis are presented in Table 15 below:

Table 15. Growth Regulatory Analysis

Gynaecology	Green Bean Sprout Extract	Gynaecology	Cowpea Bean Extract	Gynaecology	Red Onion Extract
Auxin 1	3.78 %	Auxin 1	2.75%	Auxin 1	2.30%
Auxin 2	1.88 %	Auxin 2	2.70%	Auxin 2	1.62%
Cytokines 1	1.09 %	Cytokines 1	1.02%	Giberelin A4	0.46%
Cytokines 2	1.91 %	Cytokines 2	1.36%	Giberelin A20	0.31%
Giberelin 12	1.39 %	Giberelin A7	1.77%	Giberelin A12	0.42%
Giberelin A4	1.71 %	Giberelin A4	1.29%	Giberelin A3	1.55%
Giberelin A3	2.33 %	Giberelin A20	1.58%	Giberelin A1	1.50%
Giberelin A24	1.32 %	Giberelin A3	2.41%	Giberelin A14	0.52%
Giberelin A14	1.12 %	Giberelin A1	1.33%	Giberelin A19	0.23%
Giberelin A1	1.50 %	Giberelin 36	0.66%	Giberelin 8	0.39%
Giberelin A19	1.16 %	Giberelin 8	0.84%	Giberelin 17	0.40%
Gibberellin A17	1.17 %				
Gibberellin A28	1.74%				

Based on Table 15 shows the value of ZPT content in green bean sprout extract, cowpea sprouts and onions. The content of growth regulator values grows in the largest extract of gibberellin. In addition to contributing to the growth and development of cells, auxin also plays a role in various processes of morphogenesis, such as apical dormancy, leaf and fruit pruning, and parthenocarpic (Arini, 2013). Cytokines are adenine derived plant hormones that act to stimulate cell division and mitotic the mitotic, differentiate at the root tips and translate through the xylem vessels (Siagian, 2011). Gibberellin is able to stimulate the formation of flowers in long day plants, break dormancy, inhibit the growth of adventitious roots, and induce the production of enzyme amylase (Santoso, 2010).

CONCLUSIONS

Based on this research can be concluded that:

1. Treatment interaction between application of green bean sprout extract with goat manure dose 187.5 g / polybag showed the best treatment on the parameters of the total shoot and total wet weight.

2. Treatment of addition of green bean sprouts extract showed relatively best results.
3. Treatment of goat manure dose 187.5 g / polybag showed the best relative yield.

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